Netherlands Commission for Environmental Assessment
Dutch Sustainability Unit

Climate Change Profile: RWANDA

This profile is part of a set that was developed in a cooperation between:
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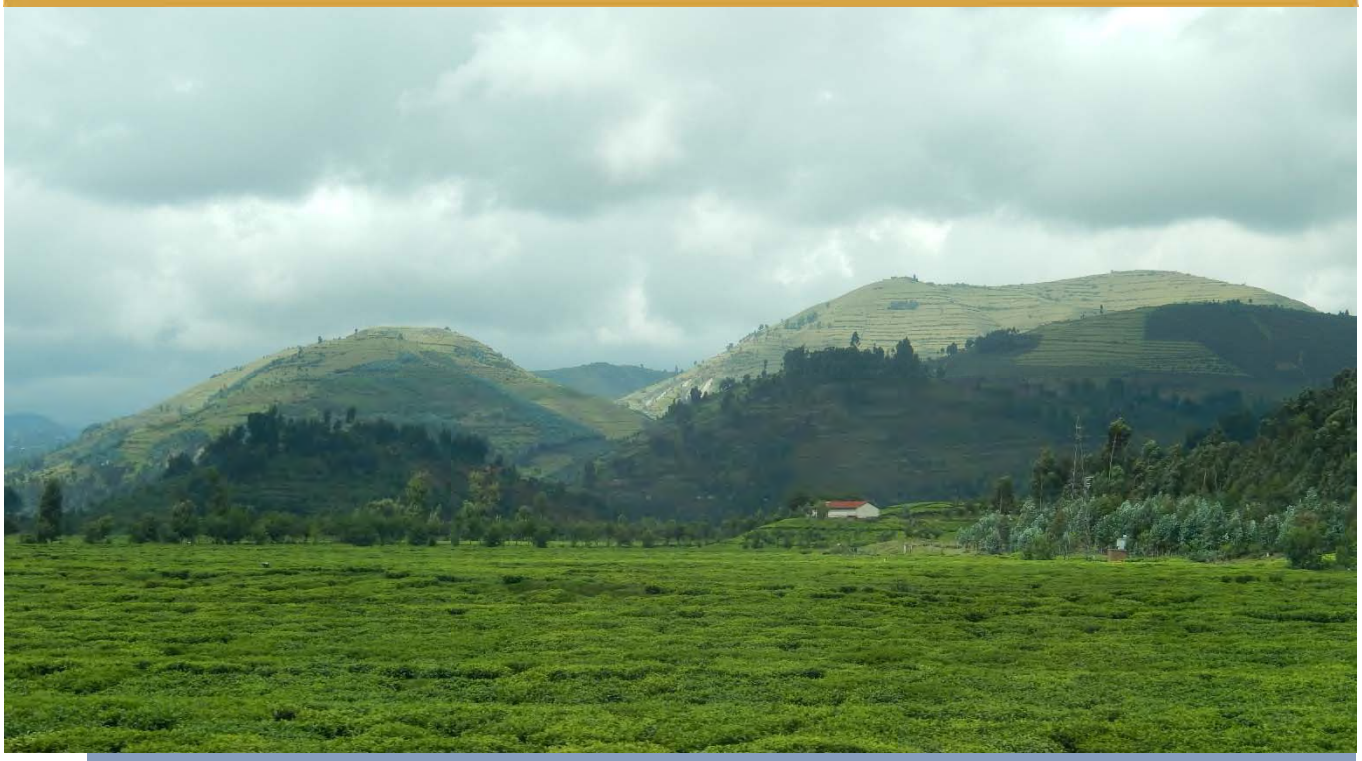

September 2016
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Advisory Report by the Dutch Sustainability Unit

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Rwanda is a landlocked country with a moderate climate and relatively high rainfall. Climate change is expected to result in increased temperatures, intensified rainfall, and prolonged dry seasons. This presents different challenges for different regions: the mountainous west of the country will be subject to erosion, parts of the central north and south will experience severe floods, and the east and southeast will suffer from droughts and desertification. In terms of food security, the four most vulnerable regions (out of twelve) are the Eastern Agro-Pastoral Zone, the Eastern Semi-Arid Agro-Pastoral Zone, the Bugesera Cassava Zone in the south, and parts of the Eastern Congo-Nile Highland Subsistence Farming Zone[1] (see Map 1). Some climate change effects, such as the lowering level of lakes and water flows and forest degradation, are expected to occur throughout the country[2].

Overall ranking

Rwanda ranks 130 out of 180 countries in the ND-GAIN index[3] (2014), which is slightly better than in 2013 (rank 131). It ranks 162nd on vulnerability and 97th on readiness - meaning that it is highly vulnerable to climate change effects, yet its readiness to combat these effects is moderate. *Vulnerability* measures the exposure, sensitivity, and ability to cope with climate related hazards by accounting for the overall status of food, water, environment, health, and infrastructure within a country. *Readiness* targets those portions of the economy, governance and society that affect the speed and efficiency of adaptation.

Biophysical vulnerability

Current climate. The current **rainfall** pattern of Rwanda shows high annual average precipitation above 1500 mm in mountainous western regions of the country and just below 700 mm in eastern regions[4]. The country's rainfall pattern is characterized by four **seasons**: a short wet season (September-November), a short dry season (December-February), a long wet season (March-May) and a long dry season (June-August)[5]. Rwanda's average annual **temperature** is between 15-17 ℃ in high altitude areas and up to 30 ℃ in lowlands in the east and southwest[6].

Current trends. Analysis of **rainfall** trends has shown an increasing occurrence of extremes over time and in various regions of the country. Rainy seasons are becoming shorter and more intense, especially in the northern and western provinces, which increases erosion risks in these mountainous parts of the country. Eastern regions have experienced serious rainfall

[1] USAID and FEWS NET (2011): *Livelihoods zoning 'plus' activity in Rwanda*. http://www.fews.net/sites/default/files/documents/reports/RW_livelihood%20descriptions%202011.pdf

[2] Ministry of Land, Environment, Forestry, Water and Mines (2006): *NAPA Rwanda*.

[3] GAIN index summarizes a country's vulnerability to climate change and other global challenges in combination with readiness to improve resilience. http://index.gain.org/country/rwanda

[4] REMA (2011a): *Atlas of Rwanda's Changing Environment: Implications for Climate Change Resilience*. https://na.unep.net/siouxfalls/publications/REMA.pdf

[5] REMA (2009): Chapter IX: Climate change and natural disasters. In: Rwanda state of environment and outlook report. http://www.rema.gov.rw/soe/chap9.php

[6] REMA (2009)

deficits in a number of years over previous decades, alternated with rainfall excesses in other years[7]. At the same time, there has been a trend over the past decades towards a higher **temperature**: increases up to 2.0 ℃ have been measured between 1970 and 2009[8].

Climate change. Current trends in rainfall and temperature are expected to continue in the future. Rwanda has experienced a **temperature** increase of 1.4°C since 1970, higher than the global average, and can expect an increase in temperature of up to 2.0°C by the 2030s from 1970[9]. The increase is expected to be consistent across the country and across seasons – although the increase in the long dry season may be slightly higher than in other seasons[10]. Besides influencing crop yields (see below), this will make previously malaria-free highlands more susceptible or even highly suitable for malaria in several decades[11], with populations at risk increasing by 150% by 2050[12]. Average annual **rainfall** models predict a change between −100 mm and +400 mm for the period 2000–2050[13]. Rwanda perceives itself as a water-rich country and therefore does not see including climate change considerations in planning on water resources as a priority. Although these predictions seem to support that perception, they do not account for regional and seasonal differences:

- frequent rainfall deficits are expected in parts of the eastern province (Bugesera, Nyagatare, Gatsibo, Kayonza, Ngoma, Kirehe) and the southern province (Nyanza, Gisagara), while increased rainfall is expected in parts of the western, northern and southern provinces;
- rainfall is expected to be more intense in the rainy seasons while dry seasons will be longer and dryer, which brings new challenges for water management, storage and drainage.

In brief, rainfall is highly variable in Rwanda but average annual rainfall may increase by up to 5–10% by the 2030s from 1970. This is expected to lead to increasing rainfall intensity, leading to a higher frequency of floods and storms resulting in landslides, crop losses, health risks, and damage to infrastructure, as well as an increase in temperatures resulting in proliferation of diseases, crop decline and reduced land availability that impacts on food security and export earnings[14].

Some of these challenges are extreme events including severe **droughts** and **floods**, which will occur more often due to climate change**.** Droughts have already resulted in famine, population displacement, conflicts, and biodiversity loss. Seasonal droughts are expected to be prolonged, which will cause problems especially in the east and southeast of the country (Bugesera, Mayaga, and Umutara)[15]. The Ministry of Land, Environment, Forestry, Water and Mines made

[7] REMA (2009)

[8] REMA (2011a); REMA (2011b): *Guidelines for Mainstreaming Climate Change Adaptation and Mitigation in the Health Sector*. http://rema.gov.rw/rema_doc/DNA/CCmainstreamingguide-Health-finaldraft-Aug02.doc#_Toc300054349

[9] REPUBLIC OF RWANDA, INDC (2015), pp.2. http://www4.unfccc.int/submissions/INDC/Published%20Documents/Rwanda/1/INDC_Rwanda_Nov.2015.pdf

[10] Mitchell (2003)

[11] Boko, M., Niang, I., Nyong, A., et al. (2007): Africa: Climate Change 2007: Impacts, Adaptation and Vulnerability. Cambridge University Press, Cambridge UK, 433-467.

[12] SEI (2009): Economics of Climate Change in Rwanda.

[13] Tenge et al. (2013)

[14] REPUBLIC OF RWANDA, INDC (2015), pp.2. http://www4.unfccc.int/submissions/INDC/Published%20Documents/Rwanda/1/INDC_Rwanda_Nov.2015.pdf

[15] REMA (2009)

an inventory of the most current environmental risks due to climate change. It concluded that prolonged seasonal drought, dry spells in rainy seasons, and recurrent droughts for three or more years are among the most pressing problems[16]. At the same time, the country has experienced major floods in a number of consecutive years (2006–2009), resulting in serious health problems, displacement, large scale erosion, and damages to infrastructure[17]. Droughts and floods are region-specific problems, with droughts occurring mainly in the east of the country (see Map 2) and floods in the western/central north and south (see Map 3). Some regions are also prone to erosion (see Map 4).

Changes in rainfall and temperature with an increase in floods and droughts will impact **food security** and **water availability**. An assessment of the influence of climate change on crop productivity in African countries has concluded that Rwanda may be a hotspot of food insecurity in the future, along with many of its neighbouring countries (which limits opportunities for import)[18]. Food security will be influenced because of the vulnerability of some crops to increasing temperatures and/or water stress (see below). The most food insecure regions of the country are in the west and central south (see Map 5).

Rwanda has not experienced serious water availability problems due to its relatively high precipitation rate, despite the lowering level of lakes and waterways. However, climate change – combined with rapid population growth, urbanisation, environmental degradation and pollution – will raise new challenges. More attention to water management and options for water storage, irrigation infrastructure and water monitoring[19] is needed to cope with future water demands in all region of the country (see Map 6).

Socio-economic vulnerability

Key facts:

GDP (PPP) per capita (2014)[20]:	USD 1,661
Population (April 2016)[21]:	11,571,166
Projected population (2050)[22]:	21,187,000
Population density per km^2 (2014)[23]:	460
Human Development Index (2014)[24]:	163 out of 188 countries
Corruption Perception Index (2015)[25]:	44 out of 168 countries
Gender Inequality Index (2015)[26]:	163 out of 188 countries
Adult literacy (2015)[27]:	70.5% (male 73.2%; female 68%)

[16] Ministry of Land, Environment, Forestry, Water and Mines (2006): NAPA Rwanda.

[17] Tenge et al. (2013)

[18] Liu, J., Fritz, S., et al. (2008): A spatially explicit assessment of current and future hotspots of hunger in Sub-Saharan Africa in the context of global change. *Global and Planetary Change* 64(3-4), pp 222-235.

[19] Government of Rwanda (2011): Green Growth and Climate Resilience: National Strategy for Climate Change and Low Carbon Development. http://www.uncsd2012.org/content/documents/364Rwanda-Green-Growth-Strategy-FINAL.pdf

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

[21] World Population Review – Rwanda. http://worldpopulationreview.com/countries/rwanda-population/

[22] UNDESA (2015): *World Population Prospects: The 2015 Revision.* http://esa.un.org/wpp/

[23] World Bank Data – Population density. http://data.worldbank.org/indicator/EN.POP.DNST

[24] UNDP (2014). http://hdr.undp.org/en/content/table-1-human-development-index-and-its-components

[25] http://www.transparency.org/cpi2015

[26] http://hdr.undp.org/en/content/table-4-gender-inequality-index

[27] CIA The World Factbook (2015). https://www.cia.gov/library/publications/the-world-factbook/fields/2103.html

Rwanda is highly vulnerable to climate change because of its dependence on agriculture, accounting for 33% of GDP in 2013 and employing 90% of the country's inhabitants (directly or indirectly)[28]. Almost all agricultural activities are rain-fed, which makes the country very vulnerable to changes in rainfall patterns. Strong dependency of agriculture on natural resources further increases vulnerability to climate change: an evaluation of social vulnerability to climate change ranks Rwanda first among all African countries in terms of *natural resource dependency*, which it considers to be one of three indicators for social vulnerability to climate change[29]. Vulnerability is further increased by Rwanda's high population density – with 460 persons per square kilometre among the highest in the world[30] – which will increase further due to its annual population growth rate of 2.7%. Population density is especially high in the central/western north and south[31], areas which are also characterized by high flood risks. Adaptive capacity of people in these areas is low because high population density decreases people's options of relocation in the case of an extreme event.

Climate change has different effects for the production of different crops. Cassava, once the main food and income-generating crop, was reported in 2009 to be 'a rare commodity' because of declining yields due to low soil moisture[32]. Yields only picked up since the onset of the Crop Intensification Program, which claims to have led to tripled cassava production in Rwanda between 2009 and 2012[33].
Expected future effects for the country's main staple crops – in order of importance – are:

- bananas (35% of productive area): productivity is unlikely to change as they grow well in higher temperatures;
- beans (22-30% of cultivated land): yields will seriously decrease because they require cooler temperatures (14-18 ℃) that will no longer exist. Low soil moisture will further decrease yields[34];
- sorghum: will become suitable for some areas in the (north) west, which are currently too cold[35];
- potatoes: yields are expected to increase (25-90% between 2010 and 2050), which will make Rwanda able to meet all domestic demand and supply to an export market by 2050.

Coffee and tea are the most important cash crops of the country. Coffee especially is very sensitive to climatic factors: temperatures above 25 ℃ as well as atypical rainfall patterns have adverse effects on the plants[36]. Higher temperatures due to climate change will force coffee producers to cultivate higher lands that are more prone to erosion, simultaneously leading to

[28] Index Mundi (2013): *Rwanda Economy Profile 2013*. http://www.indexmundi.com/rwanda/economy_profile.html

[29] Nabalamba, A., Mubila, M., Alexander, P. (2011): Climate Change, Gender and Development in Africa. African Development Bank.

[30] World Bank Data – Population density. http://data.worldbank.org/indicator/EN.POP.DNST

[31] Tenge et al. (2013)

[32] REMA (2009)

[33] Ministry of Agriculture (2012): About Crop Intensification Program – CIP. http://www.minagri.gov.rw/fileadmin/user_upload/documents/CIP/MORE_INFORMATION_ABOUT_CROP_INTENSIFICATION_PROGRAM.pdf

[34] REMA (2009)

[35] Tenge et al. (2013)

[36] Ngabitsinze, J.C., Mukashema, A., Ikirezi, M., Niyitanga, F. (2011): *Planning and costing adaptation of perennial crop systems to climate change : Coffee and banana in Rwanda*. http://pubs.iied.org/pdfs/G03174.pdf

possible conflicts with small-scale farmers in such areas[37]. Rwanda's 'persistent lack of economic diversification' beyond these crops[38] thus makes it more vulnerable to climate change.

Rwanda's energy security may be at risk due to climate change, as hydropower contributes 50% of electricity, making it vulnerable to variation in rainfall and evaporation. Droughts reduce generating capacity of hydroelectric dams, and floods increase soil erosion and siltation, which can damage dams. A good example of this is the drought in 2004 in Rwanda that reduced hydropower capacity so much that the government was forced to rent diesel power plants to meet domestic demand.[39] A 2009 study on the economics of climate change in Rwanda found that climate change is likely to cost 1% of GDP per year by 2030[40].

Accessibility of markets in Rwanda is reasonable – most urban centres can be reached within 1-3 hours[41] – but it is too poor to encourage private sector development beyond agriculture[42]. Moreover, the fact that Rwanda is a landlocked country isolates it from global trade and information networks while simultaneously making it vulnerable to climate change effects from neighbouring countries.

More than half of Rwanda's population lives below the USD1 poverty line, with women, disabled, widowed, and rural populations disproportionately affected. Moreover, Rwanda's traditional social networks are eroded by recent trends including migration, but also by the impact of the 1990's genocide[43]. This implies poverty not only in an economic sense, but also in a social sense – which limits people's opportunities for adapting to climate change. It is also important to note that Rwanda ranks 6th of 53 African countries in terms of the female share of the agricultural workforce (57%)[44]. Women's often unfavourable situation in terms of land tenure security and access to options for climate change adaptation suggests that they may be disproportionately affected by climate change[45]. Moreover, existing power imbalances between men and women cause women to bear most negative effects of (climate change-induced) disasters. The fact that women are primarily responsible for households' water availability and food security moreover suggests their burdens will increase disproportionately due to climate change[46].

[37] Republic of Rwanda (2011): *Green Growth and Climate Resilience: National Strategy for Climate Change and Low Carbon Development*. http://www.uncsd2012.org/content/documents/364Rwanda-Green-Growth-Strategy-FINAL.pdf

[38] Tenge et al. (2013)

[39] Republic of Rwanda (2011): *Green Growth and Climate Resilience*. http://www.uncsd2012.org/content/documents/364Rwanda-Green-Growth-Strategy-FINAL.pdf

[40] CDKN (2013a): *Climate and Development Outlook Rwanda: Pioneering steps towards a climate resilient green economy*. http://cdkn.org/wp-content/uploads/2013/09/CDKN-Outlook-8_Rwanda_WEB.pdf

[41] Tenge et al. (2013)

[42] The World Bank (2014): *Rwanda Overview*. http://www.worldbank.org/en/country/rwanda/overview

[43] REMA (2011b)

[44] Nabalamba et al. (2011)

[45] NCEA-DSU (2014): Integrating Gender Equality in Climate-Smart Development: Quick Reference Guide. http://dsu.eia.nl

[46] NEPAD (2012): *African Gender, Climate Change and Agriculture Support Program (GCCASP) – Rwanda Consultation Report*. http://www.nepad.org/system/files/Rwanda%20National%20Consultation%20Report.pdf

National government strategies and policies

Rwanda has ratified the UN Convention on Biological Diversity (CBD), the Convention to Combat Desertification (CCD), the Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Rwanda prepared a National Strategy for Climate Change and Low Carbon Development (2011) and was one of the first countries in Africa to submit a NAPA (2006)[47]. The NAPA identified six priority adaptation actions:

- IWRM (integrated water resources management);
- early warning systems/ rapid intervention;
- promotion of income-generating activities;
- promotion of intensive agriculture and animal husbandry;
- introduction of varieties resistant to environmental conditions;
- development of energy sources alternative to firewood.

The first and second actions have been taken up by a programme under the Least Developed Country Fund, approved in 2010.

Rwanda's ambitious Green Growth and Climate Resilience Strategy (GGRS) was launched at a UNFCCC side event at CoP17 in Durban in 2011. The purpose of the Strategy is threefold:
1. to guide national policy and planning in an integrated way;
2. to mainstream climate change into all sectors of the economy;
3. to position Rwanda to access international funding to achieve climate resilience and low carbon development[48].

The associated Programmes of Action planned under these objectives are 14 in total, including 'sustainable intensification of small-scale farming', 'agricultural diversity of markets', 'sustainable land use management', and 'integrated water resource management'. For financing the implementation of this strategy, the government is applying to various funds, including the new Green Climate Fund[49].

Rwanda has made a request to the National Support Plan Global Support Programme (NAP-GSP) for support for the development of its National Adaptation Plan. Rwanda has submitted to the UNFCCC seven NAMAs for which it is seeking support for preparation. The proposed mitigation actions include sustainable fertility production and use, developing a sustainable charcoal value chain, electrification with PV mini-grids, energy efficiency improvement in the tea and coffee sector, transport in Rwanda, and waste-to-energy and improved waste management practices in Kigali.

In May 2013, the second Economic Development and Poverty Reduction Strategy (2013-2018) (EDPRS 2) was approved by the cabinet. The strategy forms the centrepiece of Rwanda's medium-term plan for development and the framework within which the Government of Rwanda will focus efforts on transforming the economy and realising Vision 2020. Pursuing a 'green economy approach' to development is one of five economic priorities in the EDPRS 2. Climate change and the environment have been integrated into EDPRS 2 as a 'cross-cutting issue' with the focus on mainstreaming environmental sustainability into productive and social sectors

[47] Republic of Rwanda (2011)

[48] Partnership for SDGs Republic of Rwanda, https://sustainabledevelopment.un.org/partnership/?p=2253

[49] Republic of Rwanda (2011): *Green Growth and Climate Resilience – National Strategy for Climate Change and Low Carbon Development.* http://www.uncsd2012.org/content/documents/364Rwanda-Green-Growth-Strategy-FINAL.pdf

and reducing vulnerability to climate change. The EDPRS 2 identifies both the GGCRS and FONERWA (see under 'Climate finance') as strategic tools for guiding specific interventions within national sector strategic plans and their implementation[50].

There are still institutional and financial challenges for the Government of Rwanda to develop its activities on climate change, but over the past decade it has demonstrated a keen awareness of the economic risks and opportunities of climate change for sustainable socio-economic development. The development of a strategy (GGCRS) and a fund (FONERWA) for climate change action put it ahead of many neighbouring countries.

Intended Nationally Determined Contributions (INDC)

In its Intended Nationally Determined Contribution (INDC) Rwanda introduces itself as a country with high rates of economic growth, decreasing population growth (although at 2.8% a year), and increasing food crop production. Adaptation is the first priority due to high vulnerability of key economic activities such as agriculture, energy and forestry. Rwanda has one of the lower GHG emissions per capita in the world (estimated at .99 tCOeq/person). Nonetheless Rwanda has established mitigation targets through its Green Growth and Climate Resilient Strategy (GGCRS). Rwanda's INDC is built upon its National Strategy for Climate Change and Low Carbon Development Strategy. The priority actions are those identified in its GGCRS with many of the actions having both adaptation and mitigation benefits.

These Adaptation actions include:

- sustainable intensification of agriculture (e.g. soil conservation and land husbandry; sustainable pest management, irrigation and water management),
- agricultural diversity in local and export markets (e.g. add value to agricultural products);
- sustainable forestry, agroforestry and biomass energy (e.g. promote afforestation/ reforestation; improved forest management);
- ecotourism, conservation and payment for ecosystem services promotion in protected areas (strategic conference management);
- integrated water resource management and planning (e.g. establish a national integrated water resource management framework that incorporates district and community-based catchment management);
- integrated approach to sustainable land use planning and management (e.g. improve spatial data by harnessing ICT and GIS);
- disaster management (e.g. conduct risk assessments and vulnerability mapping);
- climate data and projects DRR) programmes designed and practices (e.g. employ community-based disaster risk reduction (around local environmental and economic condition).

Mitigation actions include:

- low carbon energy mix (e.g. establishment of new grid connected renewable electricity generation capacity in the form of large-scale hydro power plants and solar PV power);
- sustainable small scale energy installation (e.g. installation of solar PV mini-grids in rural communities);
- energy efficiency and demand side management (e.g. increase energy efficiency through demand-side measures and grid-loss reduction):
- efficient resilient transport system (e.g. improvement of transport infrastructure);

[50] CDKN (2013a): *Climate and Development Outlook Rwanda: Pioneering steps towards a climate resilient green economy.* http://cdkn.org/wp-content/uploads/2013/09/CDKN-Outlook-8_Rwanda_WEB.pdf

- green industry and private sector development (e.g. scale up resource efficiency to reduce energy demand in agro-processing industries);
- implementation of low carbon urban systems (e.g. utilization of urban waste as a high resource stream);
- sustainable forestry, agroforestry and biomass energy.

The Ministry of Natural Resources (MINRENA) is the responsible for formulating and monitoring national policies related to climate change and environment, while the Rwanda "Environment Management Authority (REMA) is responsible for implementing national policies and strategies related to climate change and environment.

The estimated costs of implementing the GGCRS was estimated as USD 24.15 Billion in the sectors of water resource management, agriculture and energy up to 2030. It is noted that full implementation of the INDC will require predictable sustainable and reliable support in the form of finance, capacity building and technology transfer[51].

Climate finance

One of the recommendations of the GGCRS was the creation of a national fund through which international and domestic climate finance can be managed. This fund has now been established under the name FONERWA (Fund for Environment and Climate Change). Its development was supported by CDKN, which will also remain involved in operationalization of the fund and in capacity building in the private sector, civil society and government agencies. In 2013, FONERWA obtained financing from the British International Climate Fund (ICF) to the value of £22.5 million, making it the largest demand-based climate fund in Africa. FONERWA can be accessed only for projects in Rwanda, through four thematic windows:

- conservation and sustainable natural resource management;
- R&D, technology transfer and implementation;
- environment and climate change mainstreaming;
- environmental impact assessment monitoring and enforcement[52].

Almost 700 applications were submitted during FONERWA's first application round. Most proposals came from government ministries' departments – both national and sub-national – with some further applications from civil society and private sector institutions[53].

FONERWA ensures that Rwanda is able to coordinate, manage and disburse climate finance. But the country is also in a good position to receive funding from international climate funds. It is one of few African countries with a National Implementing Entity (NIE) for the UNFCCC's Adaptation Fund – next to Benin, Kenya, Morocco, Namibia, Senegal and South Africa. Rwanda's NIE is the Ministry of Natural Resources (MINIRENA)[54,55]. It also has a designated authority to

[51] Ibidem, pp. 2.

[52] CDKN (2013a): *Climate and Development Outlook Rwanda: Pioneering steps towards a climate resilient green economy.* http://cdkn.org/wp-content/uploads/2013/09/CDKN-Outlook-8_Rwanda_WEB.pdf

[53] CDKN (2013b): *Climate and Development Outlook – Stories of change from CDKN.* http://cdkn.org/wp-content/uploads/2013/11/ClimateandDevelopmentOutlookNov2013financeFINAL.pdf

[54] Schaeffer, M; Baarsch, F.; Munang, R.; Baxter, C. (eds) (2015): *Africa's Adaptation Gap 2 – Technical Report.* AMCEN, UNEP, Climate Analytics and African Climate Finance Hub. http://apps.unep.org/publications/pmtdocuments/-Africa%E2%80%99s_Adaptation_Gap_2__.pdf

[55] Otiende, B. (2014): *EAC Climate Change Financing Options: Finance Readiness Activities and EAC Climate Change Fund.* East African Community. http://www.acadfacility.org/downloads/climate_finance_and_investment_forum_29-

receive funding from the Green Climate Fund (opposed to neighbouring countries such as Burundi and DRC), which is the Rwanda Environmental Management Authority (REMA)56. In October 2015 By 2016 FONERWA wants to have capitalisation commitments of USD 150 Million, by both international and domestic funders. By 2015 FONERWA approved 30 investments with a total exposure of USD 70 Million57.

A reasonable amount of climate finance from international funds has been approved for Rwanda so far. Accounts range from USD 28 million approved for adaptation and no finance for mitigation[58] to USD 55 million approved for adaptation and mitigation combined[59]. It has recently been approved as a pilot country for the Climate Investment Fund (CIF)'s Scaling Up Renewable Energy in Low Income Countries Program (SREP) and is preparing an Investment Plan[60].

Rwanda received a grant (USD 300,000) under the GCF's Readiness and Preparatory Support Programme. The funds will enable Rwanda to accelerate access to GCF resources that will be provided for nationally owned projects and programmes. The government will use the grant to enhance the capacity of the Rwandan Environment Management Authority (REMA), its National Designated Authority (NDA). The readiness support will enable the government to assess the priorities for engaging with GCF, define roles and responsibilities, and build on Rwanda's GGCRS.

The Green Climate Fund created a new investment fund, KawiSafi, to drive off-grid solar power in East Africa. The KawiSafi fund is a private equity fund designed to finance early-stage small and medium sized enterprises with core business models that address the off-grid solar ecosystems in East Africa to provide universal access to energy to people located beyond the foreseeable grid connection and at the bottom of the economic pyramid. In 2015, Rwanda and Kenya received an initial USD 100 million as Equity Fund, and USD 10 million for Technical Assistance Facility for the investment in 10 to 15 clean energy companies providing household solar technologies.[61]

During COP21, Rwanda has signed an agreement with the Global Green Growth Institute as part of the country's efforts to build a green and sustainable economy. The Global Green Growth Institute (GGGI) will assist Rwanda to establish a new technical advisory facility. The facility will support Rwanda's Green Fund (FONERWA) to design world-class climate resilience

30_sept_2014/presentations/session-2/EAC%20Climate%20Change%20Financing-%20CIF-29-30%20Sept%202014_EAC.pdf

[56] Green Climate Fund (2015): *National Designated Authority (NDA) and focal point designations.* http://www.gcfund.org/fileadmin/00_customer/documents/Readiness/2015-4-12_NDA_and_Focal_Point_nominations_for_the_Green_Climate_Fund.pdf

[57] FONERWA (2015), *FONERWA Key Achievements*, http://www.fonerwa.org/documents/

[58] Nakhooda, S.; Norman, M. (2014): *Climate Finance: Is it making a difference? A review of the effectiveness of Multilateral Climate Funds.* ODI. http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9359.pdf

[59] Climate Funds Update website: http://www.climatefundsupdate.org/country-pages

[60] Government of Rwanda (2014): Aide-Memoire for Scaling-Up Renewable Energy Program in Low Income Countries (SREP) Joint MDB Scoping Mission to Rwanda. https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/AM%20Rwanda%20SREP%20scoping%20mission%20Final%20ver%2012-19-14.pdf and Climate Funds Update, 2015, http://www.climatefundsupdate.org/listing/scaling-up-renewable-energy-program

[61] Green Climate Fund, 2015, Project Briefs 2015, http://www.greenclimate.fund/documents/20182/194568/GCF_Project_Briefs_2015.pdf/b3cb6cd3-cac4-409f-92e7-028ad2fb902b

projects and enhance the fund's capacity to mobilise more resources. The institute will also assist the Green Fund to address cross sector green growth and climate resilience priorities to meet Rwanda's sustainable development needs.[62]. Also, Rwanda has joined forces with nineteen other climate vulnerable countries (V20) to call for more action to reduce global emissions and better financing for climate change adaptation and mitigation efforts in developing nations[63]

Climate change projects

Rwanda is reported to have a 'moderate' number of climate projects underway compared to its neighbours (such as Uganda, implementing a large number of projects, and Burundi, implementing very few)[64]. Some climate change projects with relevance for food security and/or water that are currently being implemented in the country are:

- 'Reducing Vulnerability to Climate Change in North West Rwanda through Community Based Adaptation', for which Rwanda requested and received funding from the Adaptation Fund (USD 10 million grant approved in 2013)[65];
- Strengthening Meteo Rwanda's Weather and Climate Services, implemented by FONERWA[66]
- Building capacity and raising awareness for a sensitive community on climate change adaptation in Rwanda[67].

For a list of projects in Rwanda funded through bilateral/multilateral climate funds, see the Annex.

Climate contribution of the Netherlands Embassy: Pitch & Bid

Beginning in 2014, embassies with development programs have annually been preparing a climate Pitch & Bid. The *Pitch* communicates the embassy's climate-smart actions that will address climate change. Based on the actions described in the Pitch, assignment of the Rio Markers and budget information, the embassy prepares a *Bid*, which is an estimate of how much is likely to be spent on projects that will contribute to climate in the coming three years. For Rwanda the Bid estimates a climate contribution for 2016-2018 an estimated € 47.227.629 [2016: 13.737.750; 2017: 17.049.879; 2018: 16.440.000].

[62] FONERWA, 2015, *Government of Rwanda signs MoU with GGGI*, http://www.fonerwa.org/news/2015/12/6/government-of-rwanda-signs-memorandum-of-understanding-with-the-global-green-growth-institute

[63] FONERWA, 2015, Rwanda joins the V20 Group of Nations, http://www.fonerwa.org/news/2015/11/3/rwanda-joins-the-vulnerable-twenty-v20-group-of-nations

[64] Adaptation Partnership (2011): Review of Current and Planned Adaptation Action: East Africa

[65] https://www.adaptation-fund.org/project/reducing-vulnerability-to-climate-change-in-north-west-rwanda-through-community-based-adaptation/

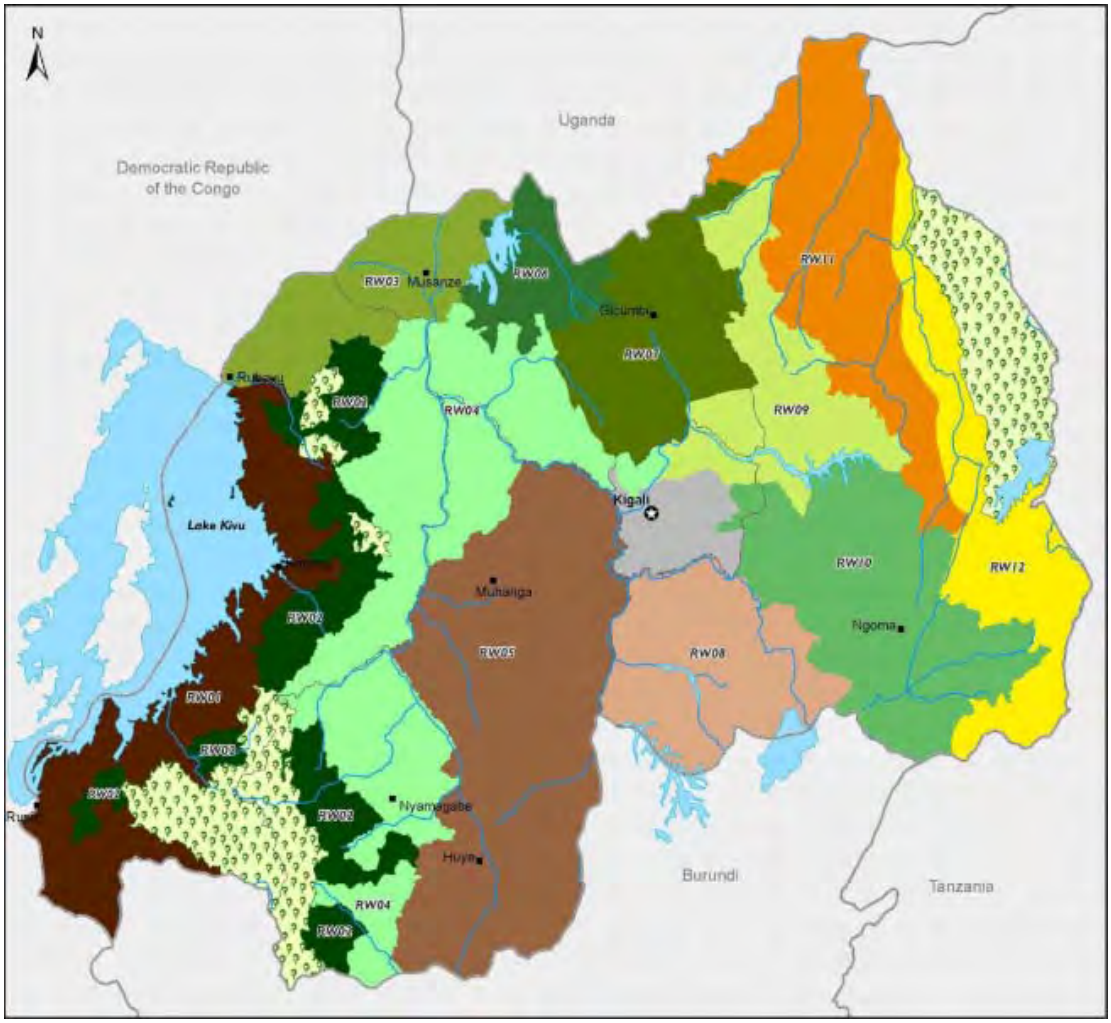
[66] http://www.fonerwa.org/portfolio/strengthening-meteo-rwanda's-weather-and-climate-services

[67] Adaptation Learning Mechanism, website accessed 21 September 2016: http://www.adaptationlearning.net/project/building-capacity-and-raising-awareness-sensitive-community-climate-change-adaptation-rwanda

The Embassy's Pitch & Bid indicates the following focus areas for its climate contribution:

- contribute to better land management and resilience of farmers by improved land use planning and forestry management;
- skills development for lobbying and advocacy on private sector development in support of sustainable economic transformation and increased resilience of the economy as a whole;
- forestation/re-forestation to combat erosion and provide agro-forestry economic opportunities;
- enhance rural infrastructure (rural roads, markets, etc.) that will stimulate local economic development thereby increasing the resilience of local communities. In the next phase this program will be more directly linked to market-demand, increasing the rate of return and sustainability of the public investments;
- provide improved and sustainable access to water for people, agriculture and livestock through the integrated water resources management program that will enhance the capacity of government and local communities to properly use water resources;
- support to agricultural value chain development based on sustainable and climate smart agricultural practices;
- improved natural resources management (land, forest, water) to increase productivity for sustainable food systems, in an area-based approach;
- contribute to increased resilience, by reducing stunting through the introduction of new crop varieties, income-generating opportunities, coupled with skills development for increased employability, thus improve diets through production and income.

Map 1: Livelihood zones in Rwanda



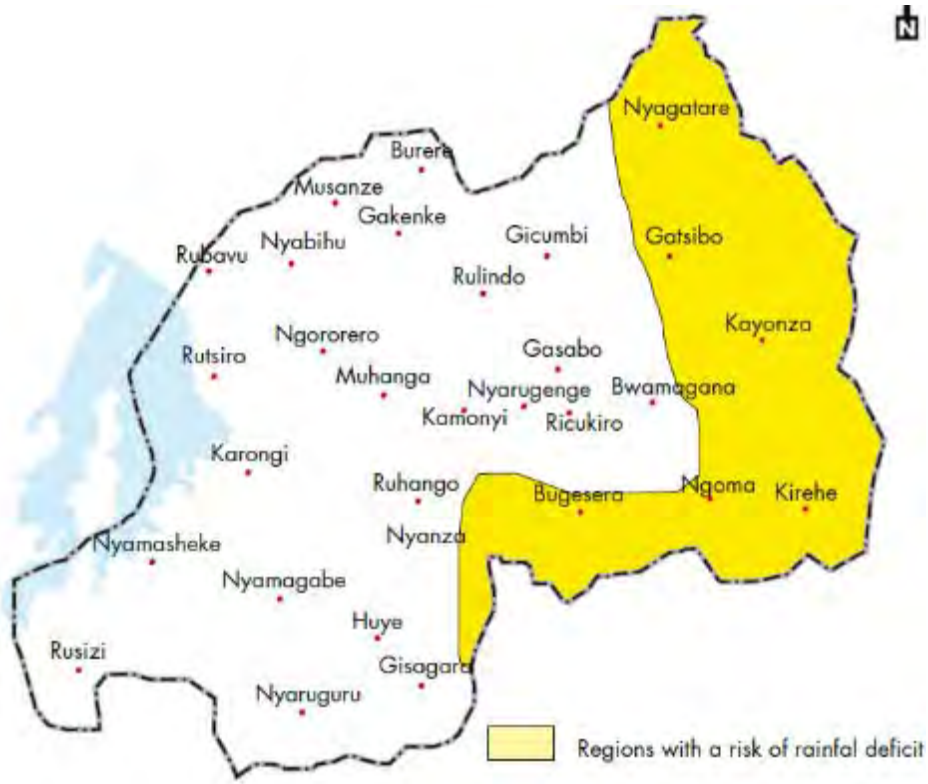
RW01 - Lake Kivu Coffee Zone
RW02 - Western Congo-Nile Crest Tea Zone
RW03 - Northwestern Volcanic Irish Potato Zone
RW04 - Eastern Congo-Nile Highland Subsistence Farming Zone
RW05 - Central Plateau Cassava and Coffee Zone
RW06 - Northern Highland Beans and Wheat Zone
RW07 - Central-Northern Highland Irish Potato, Beans and Vegetables Zone
RW08 - Bugesera Cassava Zone
RW09 - Eastern Plateau Mixed Agricultural Zone
RW10 - Southeastern Plateau Banana Zone
RW11 - Eastern Agro-Pastoral Zone
RW12 - Eastern Semi-Arid Agro-Pastoral Zone
Not Zoned - Urban Area
Not Zoned - National Parks, Forest Reserves

Regions most vulnerable to climate change in terms of food security:

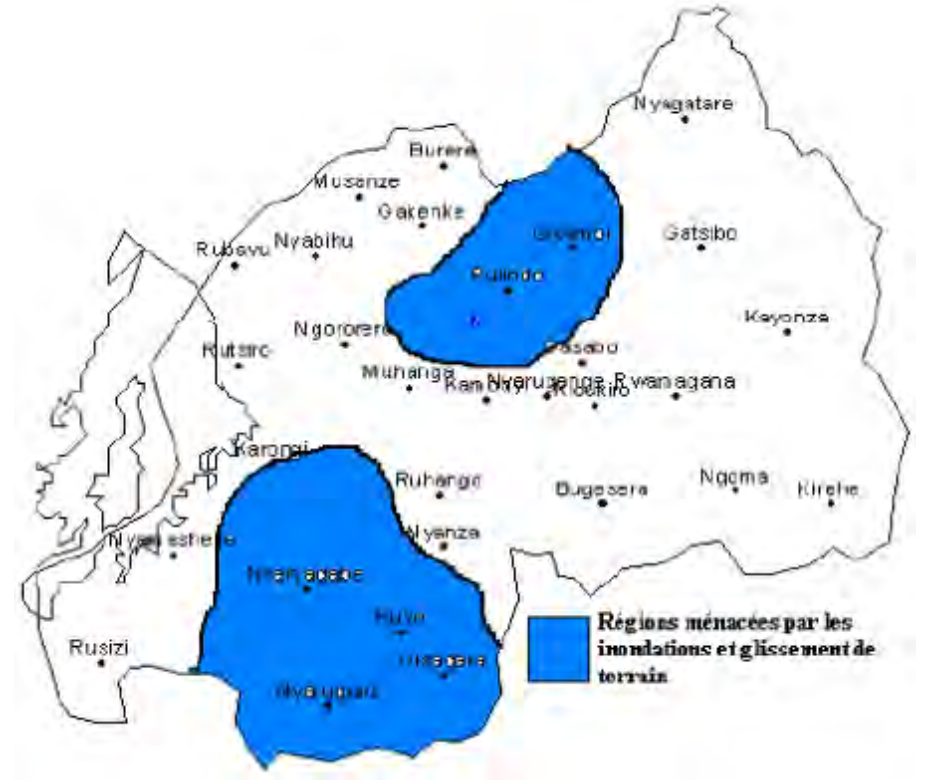
- RW08: the only deficit food production zone (in bad years); drought prone.
- RW11 and 12 (drought prone) and parts of RW04: risk of acute food insecurity (in bad years).

Source: USAID and FEWS NET (2011)

Map 2: Regional risks of rainfall deficits/droughts

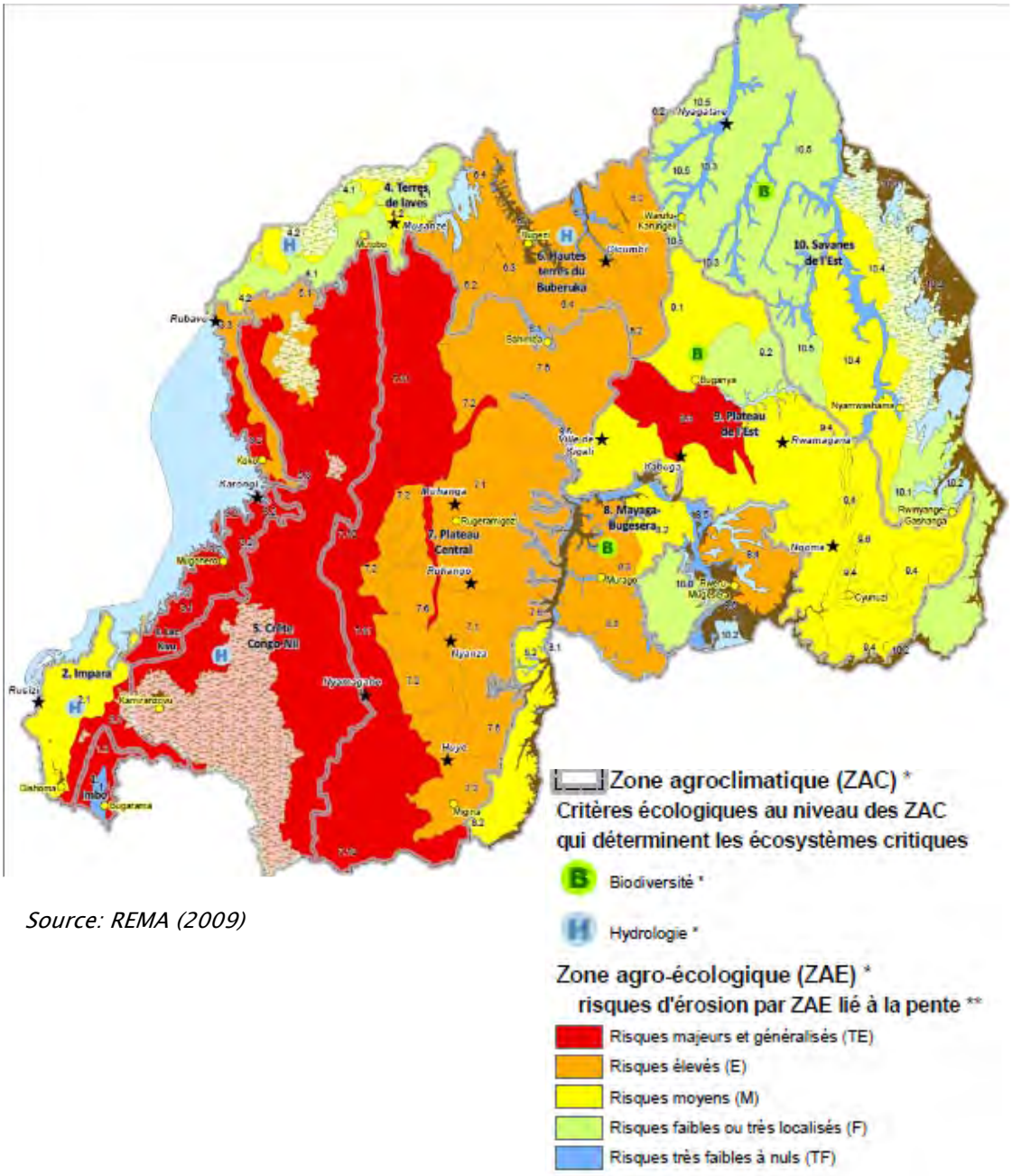


Map 3: Regional risks of floods and landslides



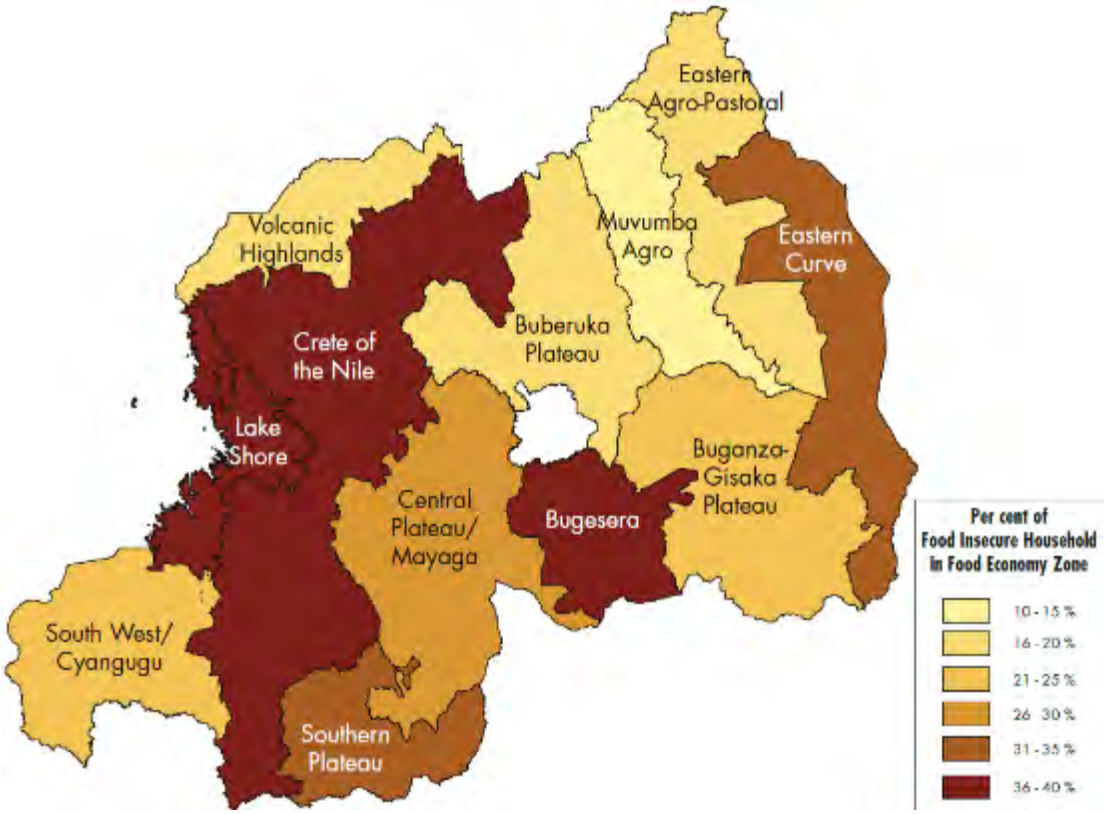
Source: Ministry of Land, Environment, Forestry, Water and Mines (2006)

Map 4: Erosion risks



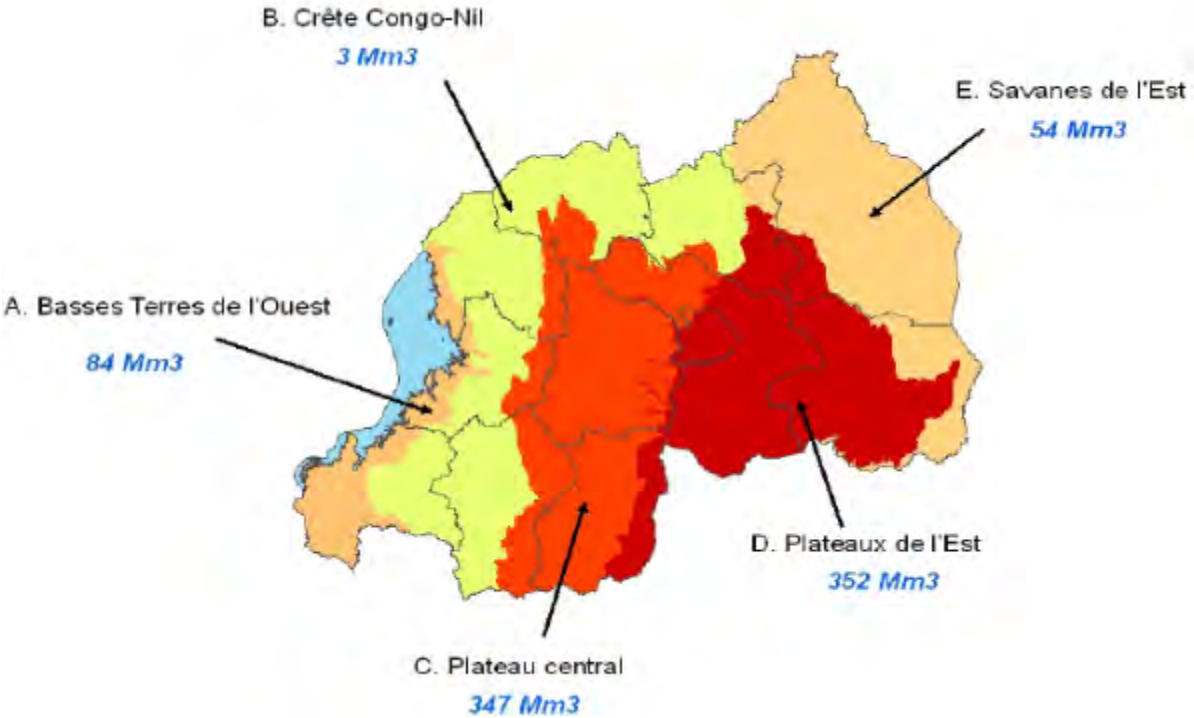
Source: REMA (2009)

Map 5: Food insecurity zones



Source: REMA (2009)

Map 6: Total water requirements in 2020 (units unspecified)



Source: REMA (2009)

Annex: List of projects in Rwanda under bilateral and multilateral climate funds

Source: Climate Funds Update (2016): http://www.climatefundsupdate.org/data

Name of Project	Fund	Funding Approved (USD millions)	Disbursed (USD millions)	Fund Type
Enabling Activities to Facilitate the Preparation of a National Adaptation Plan of Action (NAPA)	Least Developed Countries Fund (LDCF)	0.2	0.2	Multilateral
Budget Support from the Global Climate Change Alliance (GCCA) for Environment and Natural Resources in Rwanda: Ensuring food security through a land tenure reform	Global Climate Change Alliance (GCCA)	5.1	5.1	Multilateral
Reducing Vulnerability to Climate Change by Estab-lishing Early Warning and Disaster Preparedness Systems and Support for Integrated Watershed Management in Flood Prone Areas	Least Developed Countries Fund (LDCF)	3.3	3.3	Multilateral
Post-harvest Agribusiness Support Project	Adaptation for Smallholder Agriculture Programme (ASAP)	7	1	Multilateral
Building Resilience of Communities Living in Degraded Forests, Savannahs and Wetlands of Rwanda Through an Ecosystem Management Approach	Least Developed Countries Fund (LDCF)	5.6	0	Multilateral
Increasing the adaptive capacity of natural systems and rural communities, living in exposed areas of North Western Rwanda, to climate change impacts	Adaptation Fund (AF)	10	3.3	Multilateral

Name of Project	Fund	Funding Approved (USD millions)	Disbursed (USD millions)	Fund Type
Sector Reform Contract (SRC) to promote climate-proof investments by farmers through improved land administration and land use monitoring capacities at central and local government level	Global Climate Change Alliance (GCCA)	4.5	0	Multilateral
Increasing the Capacity of Vulnerable Rwandan Communities to Adapt to Adverse Effects of Climate Change: Livelihood Diversi-fication and Investment in Rural Infrastructures	Least Developed Countries Fund (LDCF)	9	0	Multilateral
Sustainable Energy Development Project (SEDP)	Global Environment Facility (GEF4)	4.5	4.5	Multilateral
Readiness program support	Green Climate Fund (GCF)	0.3	0	Multilateral
Pilot study examining the feasibility of investment in forest and landscape restoration in Rwanda	Germany's International Climate Initiative	0.3	0	Bilateral
Preserving Biodiversity in the Nyungwe Forest	Germany's International Climate Initiative	2.3	0	Bilateral
Drafting a National Climate Change and Low Carbon Development Strategy – 647 – 780	UK's International Climate Fund	0.4	0	Bilateral
Creation of the National Fund for Climate & Environment (FONERWA)	UK's International Climate Fund	0.4	0	Bilateral
Support to the national fund for climate change and environment	UK's International Climate Fund	3.9	0	Bilateral
Landscape approach to forest restoration and conservation (LAFREC)	World Bank	5.5		Multilateral
Rwanda third rural sector support project – additional financing	World Bank	16		Multilateral

Name of Project	Fund	Funding Approved (USD millions)	Disbursed (USD millions)	Fund Type
Land Husbandry, water harvesting and hillside irrigation – and additional financing	World Bank	34 (and 35 additional financing)		Multilateral
Rwanda electricity access – additional financing	World Bank	60		Multilateral
Third rural sector support project	World Bank	80		Multilateral
Rwanda CFL energy efficiency project	World Bank	2.3		Multilateral