



Netherlands Commission for  
Environmental Assessment  
Dutch Sustainability Unit

## Climate Change Profile: KENYA

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September 2016

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## Advisory Report by the Dutch Sustainability Unit

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<b>Subject</b>	<b>Climate Change Profile: Kenya</b>
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<b>Reference</b>	7196

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The Dutch Sustainability Unit is hosted by the Netherlands Commission for Environmental Assessment at the request of the Ministry of Foreign Affairs. The views expressed in this publication are those of the DSU and do not necessarily reflect the views and policies of the Netherlands Government.

*Photo (cover): Mr J. de Schutter*

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# Climate Change Profile: Kenya

Kenya is very vulnerable to climate change with current projections suggesting that its temperature will rise up to 2.5°C between 2000 and 2050, while rainfall will become more intense and less predictable. Even the slightest increase in frequency of droughts will present major challenges for food security and water availability, especially in Kenya's Arid and Semi-Arid Lands (ASALs) in the north and east (see [Map 1](#)). Other parts of the country, most notably in the Rift Valley province, are also vulnerable to climate change due to increasing extreme events (droughts and floods, combined with landslides) while glacier melt will further reduce future water availability. Coastal areas will suffer from rising sea levels and associated floods and salt intrusion.

## Overall ranking

Kenya ranks 154 out of 180 countries in the ND-GAIN index<sup>1</sup> (2014), which is slightly better than its rank in 2013 (rank 155). Kenya is the 35<sup>th</sup> most vulnerable country and the 25<sup>th</sup> least ready country- meaning that it is rather vulnerable to, yet highly unready to combat climate change effects. *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.* Kenya has a tropical climate, hot and humid at the coast, temperate inland, and very dry in the north and northeast parts of the country. Most of the country is arid or semi-arid: 80% of the country receives less than 700 mm of **rainfall** per year, while some areas in the northwest and east receive only 200 mm per year. Areas near Lake Victoria and the central highlands east of the Rift Valley however can receive 1,200–2,000 mm rain per year<sup>2</sup>. Maximum 24-hour precipitation can equal around 76 mm<sup>3</sup>. The rainfall pattern is characterized by the migration of the Inter-Tropical Convergence Zone (ITCZ, a belt of low pressure and heavy precipitation near the equator), resulting in four periods of seasonal rainfall<sup>4</sup>:

- long wet season: April – June;
- cool dry season: July – September;
- short wet season: October – December;
- warm dry season: January – March.

Significant rainfall also occurs during the cool dry season in the western highlands and along the coast. Rainfall in Kenya is variable, especially in the ASALs. Annual variations follow El Niño and La Niña episodes (higher and lower than average rainfall)<sup>5</sup>.

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<sup>1</sup> 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/kenya>

<sup>2</sup> Parry, J.E.; Echeverria, D.; Dekens, J.; Maitima, J., (2012): Climate Risks, Vulnerability and Governance in Kenya: A review, (United Nations Development Programme (UNDP); International Institute for Sustainable Development (IISD), [http://www.iisd.org/sites/default/files/pdf/2013/climate\\_risks\\_kenya.pdf](http://www.iisd.org/sites/default/files/pdf/2013/climate_risks_kenya.pdf)

<sup>3</sup> Parry et al. (2012); United Nations Office at Nairobi. <https://dcs.unon.org>

<sup>4</sup> McSweeney, C., New, M., & Lizcano, G. (2012). UNDP Climate Change Country Profiles: Kenya. Available via [http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/UNDP\\_reports/Kenya/Kenya.lowres.report.pdf](http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/UNDP_reports/Kenya/Kenya.lowres.report.pdf)

<sup>5</sup> Parry et al. (2012)

*Current trends.* The first **rains** of the long wet season have become unreliable and on average significantly reduced. The first rains are sometimes insufficient to support a harvest or even livestock rearing, especially in the east of the country. While the average number of rainy days during the short wet season has reduced from 60 to 30, rainfall has become more intense and the season is being prolonged into January and February, leading to higher total rainfall for this season. Rainfall intensity has increased all over the country, but especially in the coastal area<sup>6</sup>. The area of west-central Kenya receiving 500 mm of rain or more has shrunk since 1960 and is likely to keep shrinking over the next 30 years<sup>7</sup>. Mean annual temperatures have increased significantly, at a rate of 0.34°C per decade over the last 30 years.<sup>8</sup>.

These trends are accompanied by an increase in **extreme events** such as droughts and floods. Kenya is already counted as one of the most disaster-prone countries in the world, ranking 6<sup>th</sup> among all countries in terms of population affected by natural disasters (annual average, 2000–2009) and first among East African countries. In 2012, it was ranked 7<sup>th</sup> by number of victims caused by disasters of which half concerned climatological and the other half hydrological events<sup>9</sup>. Major droughts currently occur every ten years, and moderate droughts or floods every three to four years, with devastating results. **Droughts** have affected more people and had the greatest economic impact (8% of GDP every five years). As many as 28 droughts have been recorded in the past 100 years, at an increasing frequency<sup>10</sup>. Droughts are often nation-wide, but normally have the most severe effects in the ASALs. While droughts affect most people, **floods** have caused the greatest losses of human lives (see [Map 2](#)). They are more localized than droughts, seasonally affecting parts of Nyanza and western provinces, especially around the Lake Victoria basin, the Tana River drainage basin, and coastal settlements. ASALs periodically experience flash floods. Since 1950 six serious floods occurred in the country, on average resulting in a loss of 5.5% of GDP every seven years. Of particular concern is the **glacial melt** at Mount Kenya. The mountain had 18 glaciers in 1900, but in 2008 only seven of them still existed. Since these glaciers supply water to the Tana and Nzoia rivers, there has been a serious decrease in water availability<sup>11</sup>.

*Climate change.* Current temperature and rainfall trends as well as the increasing frequency of extreme events are expected to continue. **Rainfall** forecasts vary, depending on which model is used. Projections suggest a tendency towards an increase in annual total precipitation. For 2100, an increase ranging from +3% to +41% is likely. Further, more intense and more frequent heavy rainfall as well as a slight decrease in the duration of dry spells, is predicted<sup>12</sup>. Although

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<sup>6</sup> Parry et al. (2012); Hayes, C. (2007): Climate change, water and Kenya, <http://www.trocaire.org/sites/trocaire/files/resources/edu/kenya-climate-change-water-post-primary.pdf>

<sup>7</sup> UNEP Global Environmental Alert Service (GEAS), (2011): *Food Security in the Horn of Africa: The implications of a Drier, Hotter and More Crowded Future* [http://na.unep.net/geas/getUNEPPageWithArticleIDScript.php?article\\_id=72](http://na.unep.net/geas/getUNEPPageWithArticleIDScript.php?article_id=72)

<sup>8</sup> Climate Service Center Germany (2016). Climate Fact Sheet – Kenya. Updated version 2015.

<sup>9</sup> Guha-Sapir, D.; Hoyois, P.; Below, R., (2013): *Annual Disaster Statistical Review 2012: The Numbers and Trends*, Centre for Research on the Epidemiology of Disasters (CRED), [http://reliefweb.int/sites/reliefweb.int/files/resources/ADSR\\_2012.pdf](http://reliefweb.int/sites/reliefweb.int/files/resources/ADSR_2012.pdf)

<sup>10</sup> Huho, J.M.; Mugalavai, E.M. (2010): The Effects of Droughts on Food Security in Kenya, (The International Journal of Climate Change: Impacts & Responses 2(2)) [http://www.researchgate.net/publication/238224873\\_The\\_Effects\\_of\\_Droughts\\_on\\_Food\\_Security\\_in\\_Kenya](http://www.researchgate.net/publication/238224873_The_Effects_of_Droughts_on_Food_Security_in_Kenya)

<sup>11</sup> Parry et al. (2012)

<sup>12</sup> Climate Service Center Germany (2016). Climate Fact Sheet – Kenya. Updated version 2015.

rainfall at the national level is expected to increase, projections suggest that changes will be different according to location and season:

- the highest increases (or the lowest decreases) are expected for the north of the country (see [Map 3](#)) – with increases up to 40% projected until 2100, in the form of more intense rains;
- for the long wet season, 100 mm decline of precipitation is expected, although a slight increase may occur in highlands and coast;
- for the short wet season, an increase in rainfall is predicted, especially for the Rift valley<sup>13</sup>.

**Temperature** projections are more consistent across climate change models. An average increase of 0–2.5 °C is expected for the country between 2000 and 2050, with 1–2 °C as the most likely range<sup>14</sup>. For 2100 a warming ranging between 1.3 °C and 3.9 °C is likely<sup>15</sup>, with some models suggesting an increase of 4 °C by 2100. Highest increases are expected for the far northeast, and smallest increases for the southeast (see [Map 4](#)). In general, the plateaus, mountain ranges and coastal area will remain cooler than inland lowlands. Temperature increases will be seasonal, with the smallest increase expected for the start of the long wet season (March – May).

Increasing rainfall intensities will result in more frequent and heavier **floods** (accompanied by landslides) and simultaneously prolonged periods of **drought**<sup>16</sup>. Nation-wide droughts will occur more frequently, but they will mainly affect farmers and pastoralists in the east and north of the country. Glacial melt is expected to continue, eventually leading to complete disappearance of Mount Kenya's glaciers. Finally, **rising sea levels** will increase the risk of floods in coastal areas. Coastal erosion, a loss of coastal wetlands, and salt intrusion are expected, resulting in total economic costs of sea level rise equal to USD 7–58 million per year by 2030 and USD 31–313 million per year by 2050<sup>17</sup>.

Current and future climate change effects impact **water availability** and **food security** in Kenya. The country is already one of the water-scarcest areas in Africa. The projected increase in evaporation, altered rainfall patterns, sea level rise, and accelerated loss of glaciers will further decrease available water for agriculture and other purposes. Climate change is expected to affect all four dimensions of food security: availability, access, utilization and stability<sup>18</sup>. While these problems occur all over the country, they are least severe in Nyanza and the western province. Even there, however, important crop production areas are expected to shrink if (seasonal) rainfall decreases<sup>19</sup> (see [Map 5](#)). Moreover, productivity per hectare will change. Under a 3.5°C increase and a 20% precipitation change by 2030, production in high-potential areas will only face a small decrease or even an increase (up to 1%), but production in medium- and low-potential areas will decrease by 21.5%. In the ASALs especially, yields may decline by 20%

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<sup>13</sup> Odera, M.M.; Thomas, T.S.; Waithaka, M.; Kyotalimye, M., (2013a) in: IFPRI (2013): *East African Agriculture and Climate Change*. (Chapter 7: Kenya), <http://www.ifpri.org/sites/default/files/publications/rr181ch07.pdf>

<sup>14</sup> Odera et al. (2013a)

<sup>15</sup> Climate Service Center Germany (2016). Climate Fact Sheet – Kenya. Updated version 2015.

<sup>16</sup> Parry et al. (2012)

<sup>17</sup> Parry et al. (2012)

<sup>18</sup> Patel, P.N.; Mbagaya, G.M.; Imo, B.E. (2012): Impact of climate change on food and nutrition security in Kenya, *International Journal of Current Research* 4(1), pp. 242–248. <http://www.journalcra.com/sites/default/files/1573.pdf>

<sup>19</sup> USGS and USAID. 2010: A Climate Trend Analysis of Kenya—August 2010. <http://www.fews.net/sites/default/files/documents/reports/FEWS%20Kenya%20Climate%20Trend%20Analysis.pdf>

even if temperatures increase only 2.5°C<sup>20</sup>. See [Map 6](#) for an overview of primary climate risks for food security per area in the country.

### Socio-economic vulnerability

#### Key facts:

GDP (PPP) per capita (2015) <sup>21</sup> :	USD 3,083
Population (June 2016) <sup>22</sup> :	47,251,449
Projected population (2050) <sup>23</sup> :	95,504,640
Population density per km <sup>2</sup> (2014) <sup>24</sup> :	79
Human Development Index (2014) <sup>25</sup> :	145 out of 188 countries
Corruption Perceptions Index (2015) <sup>26</sup> :	139 out of 168 countries
Gender Inequality Index (2014) <sup>27</sup> :	126 out of 188 countries
Adult literacy (2015) <sup>28</sup> :	78% (male 81.1%; female 74.9%)

Kenya's most vulnerable areas to climate change are the ASALs in the north and east, where both crop and livestock production are expected to suffer increasingly from droughts. In these areas, the population is poor and access to infrastructure and markets is low, which limits adaptive capacity to climate change.

A large portion of Kenya's population lives in poverty. There are major regional differences: poverty is highest in the Rift Valley, Eastern, and Nyanza provinces (40–70% live on less than USD 2 per day) and lowest in some better-off areas in the Central, Rift Valley, Coast, and Nairobi provinces (10–20%)<sup>29</sup>. Poverty levels have increased in recent years, especially in the densely populated central highlands, where also the most intensive agriculture is found. Over ten million Kenyans suffer from chronic food insecurity, while nearly 30% of children are undernourished<sup>30</sup>. Economic gains mainly benefit the wealthiest quintile of Kenyans, thus contributing to increasing social and economic inequality<sup>31</sup>. Poverty contributes to people's vulnerability to climate change as it limits their social and financial options for adaptation.

Another factor contributing to Kenya's vulnerability to climate change is weak administration and management of land due to a lack of comprehensive national policies. This has caused land fragmentation and disparities in ownership<sup>32</sup>, potentially resulting in a lack of conservation measures that could help farmers to adapt to (effects of) climate change. Lack of clarity

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<sup>20</sup> Parry et al. (2012)

<sup>21</sup> World Bank Data – GDP per capita, PPP. <http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>

<sup>22</sup> World Population Review – Kenya. <http://worldpopulationreview.com/countries/kenya-population/>

<sup>23</sup> UNDESA (2015): *World Population Prospects: The 2015 Revision*. <http://esa.un.org/unpd/wpp/>

<sup>24</sup> World Bank Data – Population density. <http://data.worldbank.org/indicator/EN.POP.DNST>

<sup>25</sup> UNDP (2015): <http://hdr.undp.org/en/content/table-1-human-development-index-and-its-components>

<sup>26</sup> Transparency International (2015): <http://www.transparency.org/cpi2015/results>

<sup>27</sup> UNDP (2015): <http://hdr.undp.org/en/content/table-4-gender-inequality-index>

<sup>28</sup> CIA (2015). The World Factbook – Kenya. Available via <https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html>

<sup>29</sup> Odera et al. (2013a)

<sup>30</sup> Patel et al. (2012)

<sup>31</sup> Parry et al. (2012)

<sup>32</sup> Odera et al. (2013a)

on ownership of resources, combined with resource degradation due to climate change, has already caused conflicts in various parts of the country in recent years<sup>33</sup>.

Women are among the people most vulnerable to climate change. They manage over 40% of Kenya's smallholder farms and provide 80% of the labour for crop production. A majority of women (80%) spends 1–5 hours per day looking for firewood, and in the ASALs women spend 3–5 hours per day collecting water – and more in periods of drought. Because firewood and water are women's responsibilities, decreased availability of natural resources due to climate change will seriously affect them. Indirect effects on women and girls include climate change-induced conflicts and disease outbreaks (particularly malaria), which cause an extra household care burden. Women's adaptive capacity to climate change is limited by their restricted access and ownership over resources (women own only 1–5% of land titles in Kenya) and capital<sup>34</sup>.

A major contributor to Kenya's vulnerability to climate change is the agricultural sector, which is declining in economic importance (generating 25% of annual GDP) but still employing 80% of its population<sup>35</sup>. Adaptive capacity to climate change is low in Kenya's agricultural sector due to various factors. Limited economic resources cause limited opportunities for investment in more resilient production systems, while adoption levels of developed technologies are low. Heavy reliance on rain-fed agriculture combined with frequent droughts and floods, endemic crop and livestock diseases, and frequent pests present another challenge. Post-harvest losses are generally high. The general poverty among smallholders further limits their adaptive capacity<sup>36</sup>.

Nearly all of Kenya's crop production is rain-fed (98%), and the small portion of irrigated land is primarily used for export crops. It is estimated that only 15% of the country (in the southwest) receives sufficient rainfall to support the growth of maize and similar crops, while another 13% is suitable for special dry farming or irrigated agriculture. Rain-fed cultivation in the ASALs has a very high risk of crop failure (25–75% in semi-arid, and 75–100% in arid areas)<sup>37</sup> and is therefore extremely vulnerable to climate change. Most farmers in the ASALs therefore resort to mixed agriculture (crops and livestock) or only livestock production. The livestock sector however is also highly vulnerable to climate change due to limited water availability in the ASALs, where droughts have historically led to significant losses of animals. The livestock sector accounts for 90% of employment and 95% of pastoralists' household income in these areas, which makes the ASALs extremely vulnerable to climate change and extreme (drought) events<sup>38</sup>.

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<sup>33</sup> Wandera, S. (2012): Food security and climate change – What food crop to count on? In The East African SusWatchdog 1(2). <https://static.weadapt.org/knowledge-base/files/1136/510fa14743701suswatchdog-nov-dec-2012-for-online-distribution-english.cdr.pdf>

<sup>34</sup> Parry et al. (2013)

<sup>35</sup> Odera et al. (2013b); Maina, I.; Newsham, A.; Okoti, M., (2013): Agriculture and Climate Change in Kenya: Climate Chaos, Policy Dilemmas, <http://www.future-agricultures.org/publications/research-and-analysis/working-papers/1754-agriculture-and-climate-change-in-kenya-climate-chaos-policy-dilemmas/file>, CIA (2015). The World Factbook – Kenya. Available via <https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html>

<sup>36</sup> Odera et al. (2013b)

<sup>37</sup> Huho and Mugalavai (2010)

<sup>38</sup> Parry et al. (2013)

The main crops produced in Kenya are maize, beans, and pigeon peas (in terms of production area) or maize, tea, and potatoes (in terms of value)<sup>39</sup>. Maize is Kenya's primary staple crop, grown throughout the country (except in arid areas). It is sensitive to drought and temperature, which makes it vulnerable to climate change. Nationwide, a production decline of 90,000 metric tons has been predicted for 2055<sup>40</sup>. Projections for maize cultivation under climate change suggest large regional differences. Before 2050, new maize production areas will be gained in central Kenya, particularly in highlands that were previously too cold for it<sup>41</sup>. Small yield gains are expected in areas along the Tanzanian border (Rift Valley). Total maize production in these areas may increase by 20%. This is not the case in the ASALs, where production decreases of 20% will harm the already vulnerable sector.

Wheat and rice are two other crops that are important for food security. For wheat, climate change projections are mixed: yield gains are expected in the central east of the Rift Valley and parts of the Central province, while losses are predicted for the far west of the Rift Valley, areas around Mount Kenya and east of Mount Elgon, and parts of the Eastern province<sup>42</sup>. For rice, which is cultivated mainly in the densely populated Lake Victoria basin, climate change will have severe effects. Water for rice production is taken from Nzoia river the flow of which is projected to decrease in the long run due to deforestation and glacier melt<sup>43</sup> at a high pace.

Climate change has already encouraged some farmers to start cultivating drought-resistant crops such as cassava, millet and cowpeas. The fact that these are traditionally considered 'poor men's crops' however inhibits some farmers from cultivating them<sup>44</sup>.

### **National government strategies and policies<sup>45</sup>**

In 2010, Kenya launched its National Climate Change Response Strategy (NCCRS). Kenya's Vision 2030 (a long-term development plan, launched in 2008) failed to adequately document the impacts of climate change on national development. The NCCRS recognises the threat climate change poses to sustainable development and advocates the need to integrate climate change information into national government policy. A National Climate Change Action Plan (NCCAP) followed in 2013 (and runs until 2017), which is considered Kenya's first Action Plan on climate change<sup>46</sup>. It has been developed with the aim of implementing the NCCRS. Its focus is on enabling Kenya to reduce vulnerability to climate change and to improve the country's ability to take advantage of the opportunities that climate change offers. Examples of noteworthy farming practices mentioned in the Action Plan include agro-forestry, conservation tillage, the limited use of fire in agricultural areas, the cultivation of drought tolerant crops, water harvesting and integrated soil fertility management. The Action Plan also recognizes the critical

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<sup>39</sup> Odera et al. (2013b)

<sup>40</sup> Parry et al. (2013)

<sup>41</sup> Waithaka, M.; Nelson, G.C.; Thomas, T.S.; Kyotalimye, M, (2013): East African Agriculture and Climate Change - Kenya Preview, [http://www.ifpri.org/sites/default/files/publications/climate\\_kenyapreview.pdf](http://www.ifpri.org/sites/default/files/publications/climate_kenyapreview.pdf)

<sup>42</sup> Odera et al. (2013); Waithaka et al. (2013)

<sup>43</sup> Immerzeel, W.W.; Droogers, P, (2009): Impacts of Global Climate Change on the Water Resources of the Bunyala plains, [http://www.futurewater.nl/downloads/2009\\_Immerzeel\\_FW88.pdf](http://www.futurewater.nl/downloads/2009_Immerzeel_FW88.pdf)

<sup>44</sup> Maina et al. (2013)

<sup>45</sup> This section draws heavily on: Norrington-Davies, G.; Thornton, N., (2011): *Climate change finance and aid effectiveness: Kenya Case Study*. OECD <http://www.oecd.org/environment/environment-development/48458443.pdf>

<sup>46</sup> Republic of Kenya, (2013): *National Climate Change Action Plan 2013-2017, Vision 2030*, <http://cdkn.org/wp-content/uploads/2013/03/Kenya-National-Climate-Change-Action-Plan.pdf>

role that climate change related information, index based insurance schemes, agricultural advisory services and capacity development play in ensuring that options for addressing climate change are widely understood<sup>47</sup>. The aim is to create a low carbon climate resilient development pathway and contributes with concrete actions to Vision 2030 that aims to transform Kenya into a newly industrialising, middle-income country providing a high quality of life to all its citizens in a clean and secure environment<sup>48</sup>. As the coordinating ministry for all environmental issues, the Ministry of Environment and Natural Resources (MEMR) is responsible for coordinating climate change at the ministerial level. A Climate Change Secretariat has been established within the ministry to strengthen this function and to oversee the technical development and implementation of the NCCRS and NCCAP.

Kenya ratified the UN Convention on Biological Diversity (CBD) for which it elaborated a Biological Diversity National Strategy and Plan of Action<sup>49</sup>, and the Convention to Combat Desertification (CCD) for which it elaborated a National Plan of Action to Combat Desertification<sup>50</sup>. Kenya is also a signatory to the Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The country has been an active participant in the Conferences of the Parties (COP) and associated itself with the Copenhagen Accord in 2010. It also drafted its Initial National Communication that was submitted to the UNFCCC in 2002<sup>51</sup>, and completed its Greenhouse Gas (GHG) inventory as part of the Initial National Communication<sup>52</sup>. The Initial National Communication identified mitigation options as well as key sector vulnerability and adaptation issues for agriculture, water, aquatic and marine resources, energy, health, and the social economic context in general<sup>53</sup>. These were elaborated in the NCCAP. National focal points have been identified and are currently operational for the UNFCCC, REDD and Clean Development Mechanism (CDM), all of which sit under MEMR but in different departments. For example, the focal point for REDD is housed in the Kenya Forest Service (KFS), a government parastatal agency, whilst the CDM focal point sits in the National Environmental Management Agency (NEMA).

Since Kenya is not a least developed country (LDC), it is not required to submit a National Adaptation Programme of Action (NAPA) to the UNFCCC. Kenya has submitted a Nationally Appropriate Mitigation Action (NAMA) to the UNFCCC<sup>54</sup> in 2014, to mobilise private investment by channelling targeted international climate finance and technical support for accelerated geothermal energy development<sup>55</sup>. With joint UN/DFID support, Kenya is currently developing a

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<sup>47</sup> FAO, (2014): *Transitioning towards CSA in Kenya*, <http://www.fao.org/climatechange/42101-052030dc948c02b143ca95a7f96cdc7bb.pdf>

<sup>48</sup> Republic of Kenya, (2013)

<sup>49</sup> Ministry of Environment & Natural Resources (2000): *The Kenyan National Biodiversity Strategy and Action Plan* <http://www.cbd.int/doc/world/ke/ke-nbsap-01-en.pdf>

<sup>50</sup> Ministry of Environment & Natural Resources (2002): *National Action Programme, A Framework for combating desertification in Kenya*, <http://www.unccd.int/ActionProgrammes/kenya-eng2002.pdf>

<sup>51</sup> Ministry of Environment & Natural Resources; UNEP; GEF, (2002): *First National Communication of Kenya to the Conference of the Parties to the UNFCCC*, <http://unfccc.int/resource/docs/natc/kennc1.pdf>

<sup>52</sup> Euroconsult Mott MacDonald, (2010): *Developing countries, monitoring and reporting on greenhouse gas emissions, policies and measures Country Report Kenya*, [http://ec.europa.eu/clima/policies/q-gas/monitoring/docs/country\\_report\\_kenya\\_2010\\_en.pdf](http://ec.europa.eu/clima/policies/q-gas/monitoring/docs/country_report_kenya_2010_en.pdf)

<sup>53</sup> Ministry of Environment & Natural Resources; UNEP; GEF, (2002)

<sup>54</sup> UNFCCC (2015): *NAMA Registry*. <http://www4.unfccc.int>

<sup>55</sup> CDKN (2014): *Nationally Appropriate Mitigation Action (NAMA) to accelerate geothermal power: Lessons from Kenya*. <http://cdkn.org/wp-content/uploads/2014/12/Kenya-IS.pdf>

NAMA for its charcoal sector<sup>56</sup>. A NAMA for transformation of Nairobi's transport system is currently under appraisal<sup>57</sup>.

### Intended Nationally Determined Contribution (INDC)

Kenya submitted its Intended Nationally Determined Contribution (INDC) in July 2015<sup>58</sup>. In its INDC, Kenya presents itself as highly vulnerable to climate change effects. Implementation of mitigation and adaptation measures are expected to cost **USD 40 billion** and Kenya requires international support to realize its ambitions. The INDC does not specify what part of this budget is conditional on international support.

*Mitigation.* Kenya aims to reduce GHG emission by **30%** by 2030 compared to a Business-as-Usual (BAU)-scenario and suggest the following mitigation measures:

- expansion in geothermal, solar and wind energy production;
- enhancing energy and resource efficiency;
- establishing a forest tree cover of at least 10%;
- low carbon and efficient transport;
- climate smart agriculture (aligned with the National CSA Framework);
- sustainable waste management systems.

For priority *adaptation* measures the INDC refers to Kenya's NCCAP and NAP.

### Climate finance

Over the past decade, there have been numerous projects and programmes financed by donors aimed at improving Kenya's climate preparedness, including water basin management projects, national capacity building, and agricultural strategy development. Donors include UNDP, African Development Bank, UN and the European Union for development investing mainly in agriculture and rural development<sup>59</sup>. The Ministry of Finance has recently established a carbon-trading unit to explore the potential of attracting additional funding through the clean development mechanism<sup>60</sup>. According to OECD, Kenya's NCCAP is rather ambitious; therefore domestic, bilateral and multilateral funding, as well as international climate finance mechanisms (such as the Green Climate Fund, Adaptation Fund and emerging funding for NAMAs and REDD+ mechanisms) are indispensable for the success of implementation<sup>61</sup>. Kenya, considered a state with low incomes, received USD 33,670,000 in climate funding between 2004 and 2014 – placing the country at number 35 of the climate finance approved ranking list composed of 135 countries<sup>62</sup>.

Kenya joined the Global Environment Facility (GEF) in April 1994 and completed GEF enabling activities (to qualify for funding), including a National Biodiversity Strategy and Action Plan

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<sup>56</sup> UNDP (2014). <http://www.ke.undp.org/content/kenya/en/home/operations/procurement/rfp-009-2014-to-develop-a-national-appropriate-mitigation-action.html>

<sup>57</sup> <http://www.nama-facility.org/projects/kenya.html>

<sup>58</sup> Ministry of Environment and Natural Resources (2015). Kenya's Intended Nationally Determined Contribution (INDC). July 2015. Available via [http://www4.unfccc.int/submissions/INDC/Published%20Documents/Kenya/1/Kenya\\_INDC\\_20150723.pdf](http://www4.unfccc.int/submissions/INDC/Published%20Documents/Kenya/1/Kenya_INDC_20150723.pdf)

<sup>59</sup> European Union (2015): *EU Relations with Kenya*, [http://eeas.europa.eu/kenya/index\\_en.htm](http://eeas.europa.eu/kenya/index_en.htm)

<sup>60</sup> Norrington-Davies, G.; Thornton, N. (2011)

<sup>61</sup> Norrington-Davies, G.; Thornton, N., (2011):

<sup>62</sup> Nakhoda, 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>

(NBSAP)<sup>63</sup> and a country self-assessment. Kenya received GEF grants totalling USD 70.5 million that leveraged USD 269.4 million in co-financing resources for 31 national projects. These include twelve projects in biodiversity, seven in climate change, six in multi-focal areas, three in land degradation, two in persistent organic pollutants, and one in international waters<sup>64</sup>.

Kenya is eligible for the Climate Investment Fund (CIF) that provides 63 developing and middle-income countries with urgently needed resources to mitigate and manage the challenges of climate change and reduce their greenhouse gas emissions. In 2016, Kenya received a concessional loan from CIFs Clean Technology Fund (CIF-CTF), cofounding two geothermal projects building on the successful pilot 'Menegai Geothermal Field'<sup>65</sup>. Kenya is a pilot country of CIF's Scaling Up Renewable Energy in Low Income Countries Program (SREP). According to CIF, 80% of the Kenyans live without access to basic energy services and greenhouse gas emissions are expected to increase rapidly. Therefore, the CIF/SREP funding is targeted principally at leveraging Kenya's abundant renewable energy supply and recent government policy initiatives to increase both energy access and attention to climate change. The SREP Investment Plan has allocated 80% of its funding towards geothermal power projects in Menengai, and 20% to energy modernization to improve energy access from mini-grid systems<sup>66</sup>. Kenya is also expected to access the Forest Carbon Partnership Facility (FCPF) and has so far applied for its Readiness Grant<sup>67</sup>. Between 2010 and 2014 Kenya submitted ten projects for Clean Development Mechanism funding, all in the area of reforestation and renewable energy supply.

Kenya was awarded a grant of almost USD 10 million from the Adaptation Fund for a project on building resilience to climate change and adaptive capacity of vulnerable communities with activities in food security, water management, coastal areas, and disaster risk reduction. The approval of Kenya's National Environment Management Authority (NEMA) as an accredited entity enables Kenya to have direct access to potential climate finance from the Green Climate Fund.

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<sup>63</sup> The Republic of Ghana (2002): *National Biodiversity Strategy for Ghana*, <http://www.cbd.int/doc/world/gh/gh-nbsap-01-en.pdf>

<sup>64</sup> GEF - *Country profile Kenya*, [https://www.thegef.org/gef/sites/thegef.org/files/publication/Kenya%20-%20Fact%20Sheet%20-%20Apr2013\\_EN.pdf](https://www.thegef.org/gef/sites/thegef.org/files/publication/Kenya%20-%20Fact%20Sheet%20-%20Apr2013_EN.pdf)

<sup>65</sup> <http://allafrica.com/stories/201604120162.html>

<sup>66</sup> Climate Investment Funds (2015): *Kenya*, <https://www.climateinvestmentfunds.org/cifnet/?q=country/kenya>

<sup>67</sup> Forest Carbon Partnership (2013): *REDD Readiness Progress Fact Sheet, Kenya*, <https://www.forestcarbonpartnership.org/sites/fcp/files/2013/Oct2013/Kenya%20progress%20Sheet%20October%20clean%202013%20.pdf>

## Climate change projects

Projects in Kenya that are involved in climate change adaptation and mitigation in relation to water and food security are numerous. The main programmes under implementation in 2016 include

- UNDP's main programmes in Kenya are 1) 'Low Emission Capacity Building (LECB) Programme' (in finalisation phase), financed by the EU, Germany, and AusAID, primarily focusing on capacity building activities at the national level, including formulation of Low-Emission Development Strategies (LEDS) and NAMAs, as well as establishing the underlying data collection systems<sup>68</sup>; and 2) 'Adapting to Climate Change in Arid and Semi-Arid Lands (KACCAL) in Kenya' (2013–2017) to facilitate adaptation of key national and local level stakeholders to long-term climate change through capacity development, policies and programmes adjustment, and pilots for coping mechanisms for smallholder farmers and pastoralists<sup>69</sup>.
- Sustainable Environment and Restoration Programme' (SERP) (2014–2018) by the Government of Kenya, the Kenya Red Cross Society, and the International Federation of Red Cross and Red Crescent Societies (IFRC), a programme aimed at improving environmental and climate change management in the country<sup>70</sup>.

The following regional programmes with a focus on food security and/or water are currently also being implemented in Kenya:

- The 'Adaptation Learning Programme for Africa' (in finalisation phase), executed by CARE, aims to increase the capacity of vulnerable households in Sub-Saharan Africa to adapt to climate variability and change and is supported by DFID, The Ministry of Foreign Affairs of Denmark, The Ministry of Foreign Affairs of Finland and the Austrian Development Cooperation<sup>71</sup>.
- '2SCALE'<sup>72</sup> funded by the Netherlands Ministry of Foreign Affairs (2012–2017), aiming to improve rural livelihoods and food and nutrition security in Africa by creating partnerships to enable farmers and entrepreneurs to grow together in their agribusiness<sup>73</sup>.
- Several climate relevant regional programmes executed by GIZ, including: 1) 'Tapping into new markets: Project Development Programme' (2012–2016) to support German businesses from the renewable energy sector in accessing the Ghanaian, Kenyan, Mozambican and Tanzanian markets; and 2) 'Support to trans boundary water cooperation in the Nile Basin' (2012–2016) to contribute to consensus building and cooperation in water resources management and development between the Nile Basin's riparian countries<sup>74</sup>.

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<sup>68</sup> UNDP, (2013): *Low Emission Capacity Building Programme*, <http://www.undp-alm.org/projects/dc-low-emission-capacity-building-programme>

<sup>69</sup> UNDP Adaptation Learning Mechanism (2013): *Adapting to Climate Change in Arid and Semi-Arid Lands (KACCAL) in Kenya*, <http://www.undp-alm.org/projects/sccf-kaccal-kenya>

<sup>70</sup> International Federation of Red Cross and Red Crescent Societies (IFRC), (2014): *Greening Kenya to address environmental sustainability and climate change*, <http://www.ifrc.org/en/news-and-media/news-stories/af-rica/kenya/greening-kenya-to-address-environmental-sustainability-and-climate-change--65690/>

<sup>71</sup> CARE Climate Change Information Centre (2014): *Adaptation Learning Programme for Africa*, <http://www.careclimatechange.org/adaptation-initiatives/alp>

<sup>72</sup> 2SCALE is a consortium of the International Fertilizer Development Center (IFDC), BoP Innovation Center (BoPInc.), and the International Centre for development oriented Research in Agriculture (ICRA)

<sup>73</sup> 2SCALE consortium (2013): *Business as unusual, the 2SCALE project - highlights 2013*, <http://ifdc.org/south-sudan/>

<sup>74</sup> GIZ (2015): Kenya, <https://www.giz.de/en/worldwide/317.html>

- EAGLO-net: 'Great Lakes ecosystem services management including climate change adaptation'<sup>75</sup>.

For a list of projects in Kenya 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 are relevant for climate in the coming three years. For Kenya the Bid estimates a climate contribution for 2016–2018 of €15.803.531 to climate finance [2016: €6.029.718; 2017: €5.196.079; 2018: €4.577.733]. All of the climate smart projects contribute to adaptation with one of the projects also contributing to mitigation.

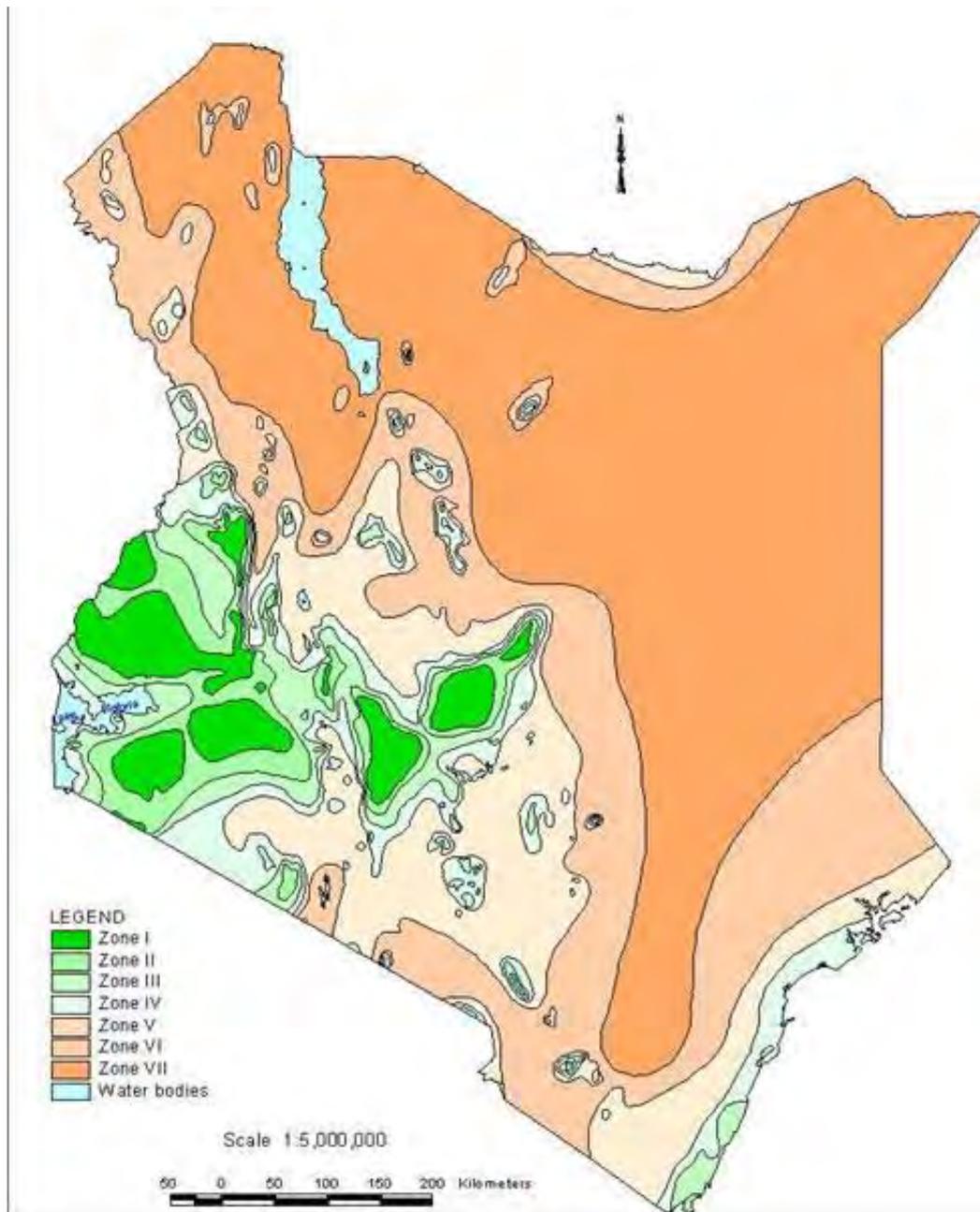
The Embassy's Pitch & Bid indicates the following focus areas to reduce vulnerability to the impacts of climate change and escalating climate risks by increasing resilience and adaptive capacity through:

- Sustainable value chains: investing in sustainable value chain development and market oriented agricultural entrepreneurship which will contribute to:
  - diversifying sources of household income and improve market access;
  - improved agricultural techniques, such as integrated soil management, improved seeds, enhanced food safety and reduction in post-harvest losses;
  - crop diversification through horticultural crop rotation;
  - commercialization of fodder for continuous forage supply even in dry seasons;
  - introduction of appropriate water efficient irrigation technologies.
- **Conservation:** bringing an additional 250,000 ha in the semi-arid areas under sustainable conservation management that will provide a buffer to climate shocks.
- **Integrated water resources management:** introducing and strengthening integrated water resources management approaches to improve water security; investing in improved access to water for domestic, agricultural and industrial production and consumption; improving water accessibility in areas where there is enhanced water stress.

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<sup>75</sup> DSU (2013)

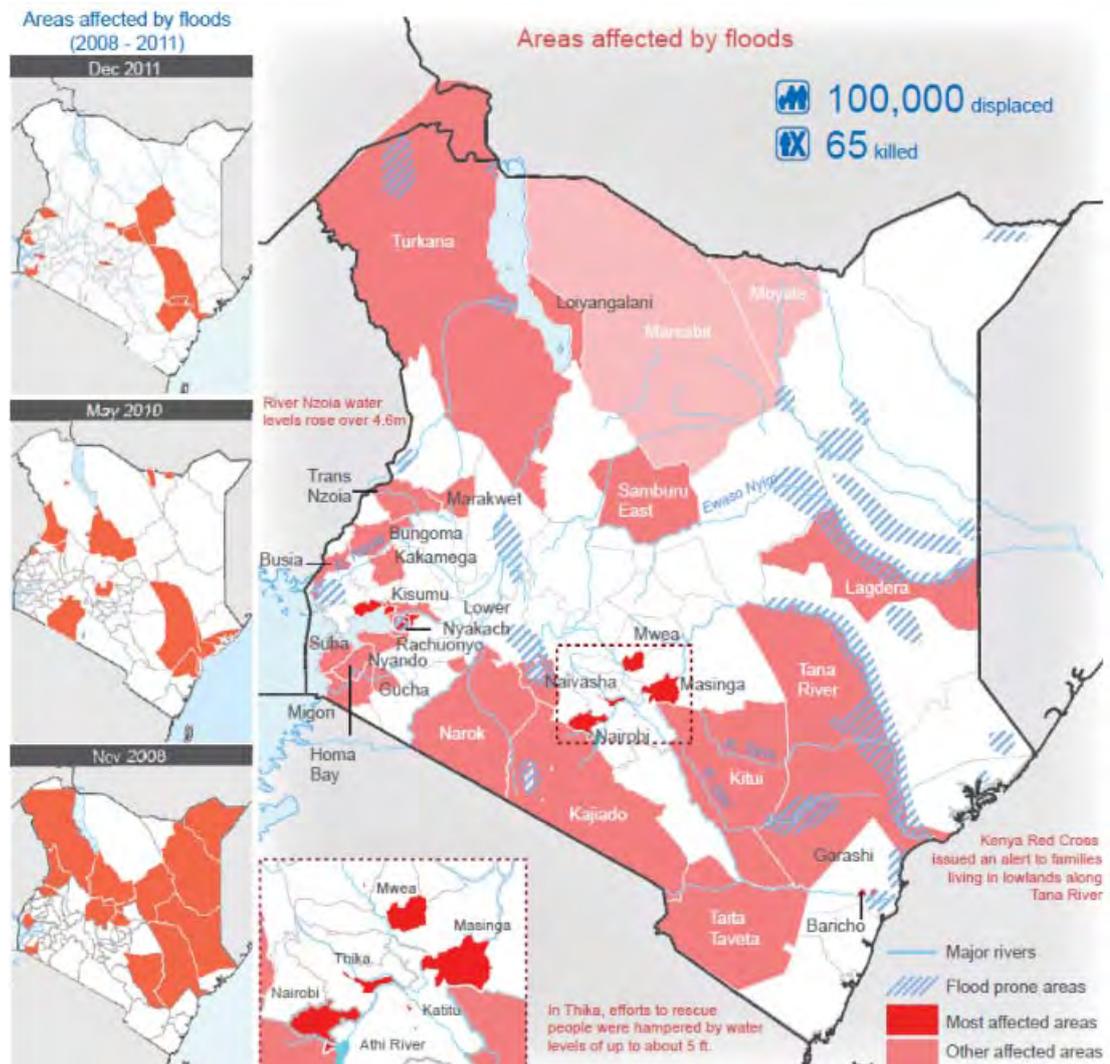
Map 1: Agro-ecological zones of Kenya, including ASALs



Zone	
I. Agro-Alpine	
II. High Potential	
III-IV. Medium Potential	
V. Semi-Arid	ASALS
VI. Arid	
VII. Very arid	

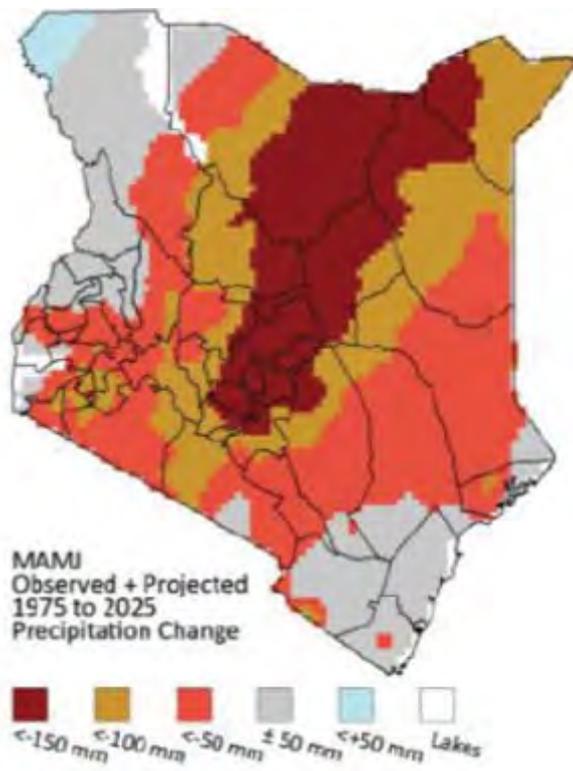
Source: <http://www.infonet-biovision.org/default/ct/690/agrozones>

Map 2: Flood-prone and flood-affected areas

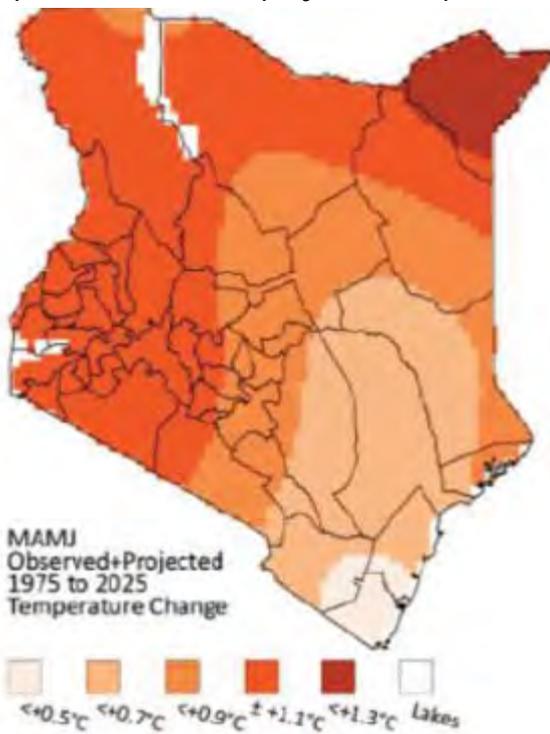


Source: OCHA (2012), [http://reliefweb.int/sites/reliefweb.int/files/resources/map\\_2170.pdf](http://reliefweb.int/sites/reliefweb.int/files/resources/map_2170.pdf)

Map 3: Observed and projected precipitation changes, 1975–2025

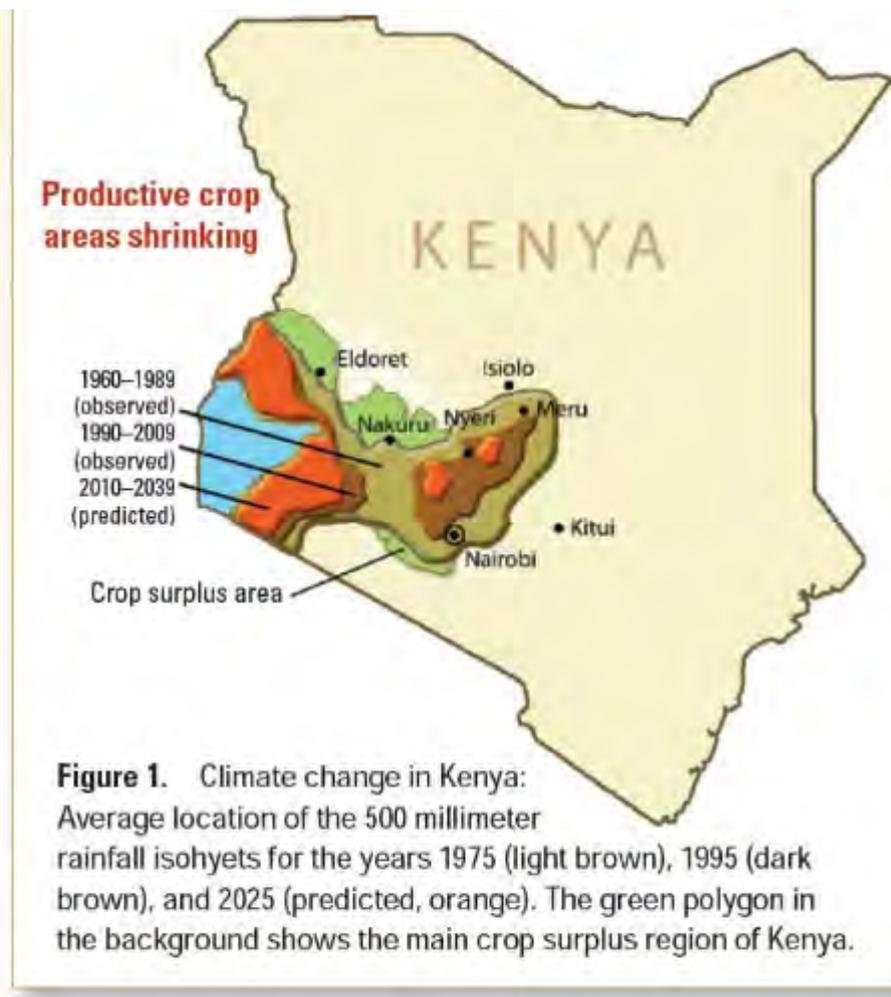


Map 4: Observed and projected temperature changes, 1975–2025



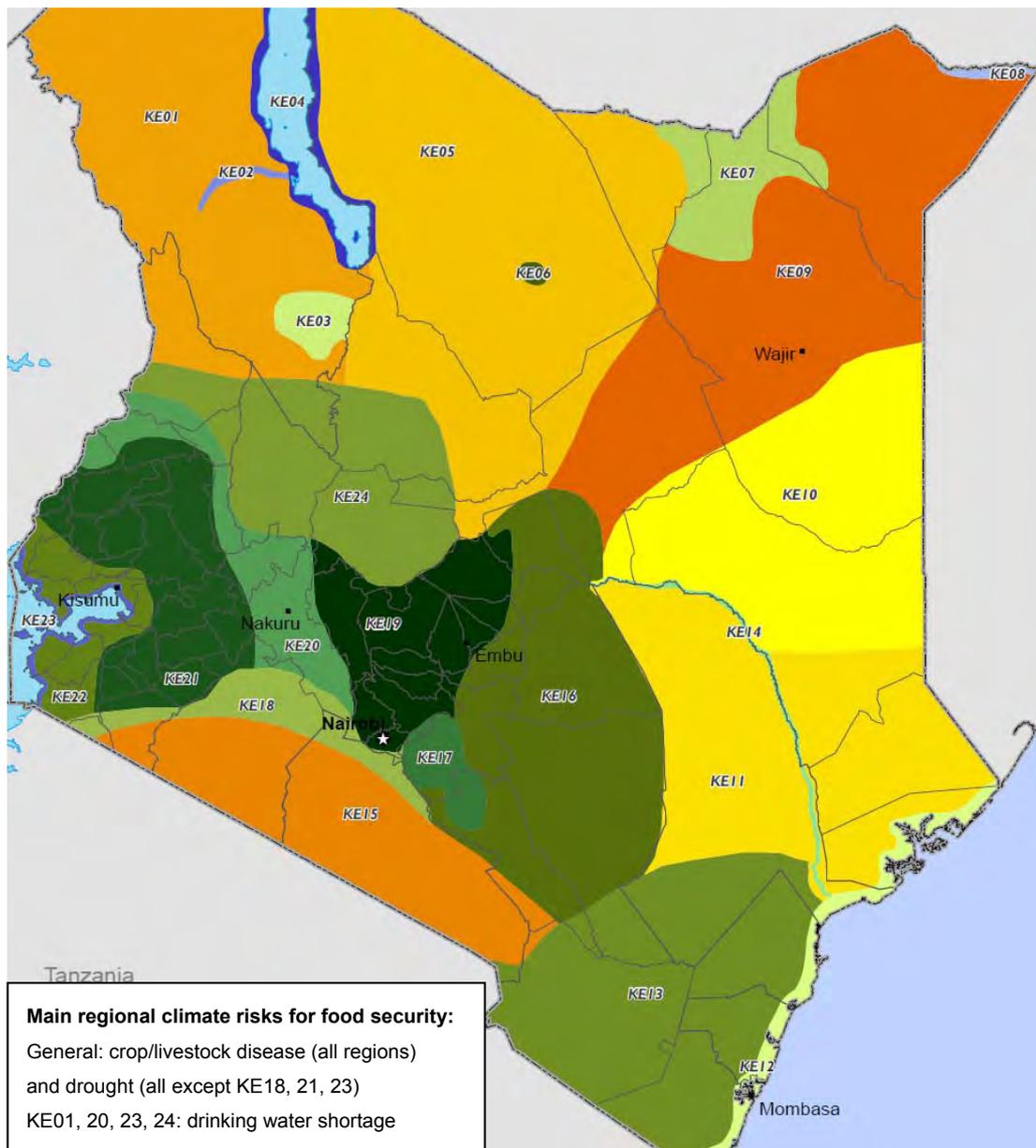
Source: Parry et al. (2012)

Map 5: Reduction of a selected crop production area due to climate change



Source: USGS and USAID (2010)

Map 6: Climate risks for food security



**Main regional climate risks for food security:**  
 General: crop/livestock disease (all regions)  
 and drought (all except KE18, 21, 23)  
 KE01, 20, 23, 24: drinking water shortage  
 KE02, 07, 11-14, 16, 23: floods  
 KE03: landslides  
 KE08: bush fires

- KE01 - Northwestern Pastoral Zone
- KE02 - Turkwell Riverine Zone
- KE03 - Northwestern Agropastoral Zone
- KE04 - Lake Turkana Fishing Zone
- KE05 - Northern Pastoral Zone
- KE06 - Marsabit Marginal Mixed Farming Zone
- KE07 - Northeastern Agropastoral Zone
- KE08 - Manderia Riverine Zone
- KE09 - Northeastern Pastoral Zone
- KE10 - Eastern Pastoral Zone
- KE11 - Southeastern Pastoral Zone
- KE12 - Coastal Medium Potential Farming Zone

- KE13 - Coastal Marginal Agricultural Mixed Farming Zone
- KE14 - Tana Riverine Zone
- KE15 - Southern Pastoral Zone
- KE16 - Southeastern Marginal Mixed Farming Zone
- KE17 - Southeastern Medium Potential, Mixed Farming Zone
- KE18 - Southern Agropastoral Zone
- KE19 - Central Highlands, High Potential Zone
- KE20 - Western Medium Potential Zone
- KE21 - Western High Potential Zone
- KE22 - Western Lakeshore Marginal Mixed Farming Zone
- KE23 - Lake Victoria Fishing Zone
- KE24 - Western Agropastoral Zone

Source: USAID and FEWS NET (2011)

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

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

Name of Project	Fund	Funding Approved (USD millions)	Dis-bursed (USD millions)	Fund Type
Climate Resilient Agricultural Livelihoods Programme (KCEP-CRAL)	Adaptation for Small-holder Agriculture Programme (ASAP)	10	0	Multilateral
Adaptation to Climate Change in Arid Lands (KACCAL)	Special Climate Change Fund (SCCF)	6.8	6.8	Multilateral
RLACC – Rural Livelihoods' Adaptation to Climate Change in the Horn of Africa (PROGRAM)	Special Climate Change Fund (SCCF)	2.6	2.6	Multilateral
Building Resilience To Climate Change & Adaptive Capacity Of Vulnerable Communities	Adaptation Fund (AF)	10	5	Multilateral
Market Transformation for Efficient Biomass Stoves for Institutions and Small and Medium-Scale Enterprises	Global Environment Facility (GEF4)	1	1	Multilateral
Development and Implementation of a Standards and Labeling Programme in Kenya with Replication in East Africa	Global Environment Facility (GEF4)	2	2	Multilateral
Energy Modernisation Project	Scaling-Up Renewable Energy Program for Low Income Countries (SREP)	7.5		Multilateral
Sustainable Conversion of Waste into Clean Energy for GHG Emission Reduction	Global Environment Facility (GEF5)	2	2	Multilateral
Readiness preparation grant	Forest Carbon Partnership Facility (FCPF)	3.8	0.2	Multilateral

Name of Project	Fund	Funding Approved (USD millions)	Dis-bursed (USD millions)	Fund Type
Menengai Geothermal Development (AfDB)	Scaling-Up Renewable Energy Program for Low Income Countries (SREP)	25	1.5	Multilateral
REACT Kenya	UK's International Climate Fund	1.6		Bilateral
Strengthening adaptation and resilience to climate change in Kenya (StARCK)	UK's International Climate Fund	11.9		Bilateral
Mass Rapid Transport System for Nairobi (under appraisal) <sup>76</sup>	KfW	20		Bilateral
Adaptation Learning Programme for Africa (regional project) <sup>77</sup>	DFID, Ministry Foreign Affairs of Denmark, Ministry of Foreign Affairs of Finland, Austrian Development Cooperation			Multilateral
Sustainable Environment and Restoration Programme (SERP)	International Federation of Red Cross and Red Crescent Societies (IFRC)			Multilateral
Promoting biogas as sustainable clean cooking fuel for rural households in Kenya	World Bank	4.6		Multilateral
Kenya Agricultural Carbon Project	World Bank	1		Multilateral
CF Kengen, hydropower Kiambere, Tana, Eburru	World Bank	2,8		Multilateral
Kenya water security and climate resilience project	World Bank	155		Multilateral
Additional financing water security and climate resilience project		58		

<sup>76</sup> <http://www.nama-facility.org/projects/kenya.html>

<sup>77</sup> CARE Climate Change Information Centre (2014): *Adaptation Learning Programme for Africa*, <http://www.careclimatechange.org/adaptation-initiatives/alp>

<b>Name of Project</b>	<b>Fund</b>	<b>Funding Approved (USD millions)</b>	<b>Dis-bursed (USD millions)</b>	<b>Fund type</b>
Coastal Region Water security and climate resilience project	World Bank	200		Multilateral
Kenya Agricultural carbon project	World Bank	1		Multilateral
Kenya Agricultural productivity and sustainable land management project (KAPSLMP)	World Bank	10		Multilateral
Coastal Management Project	World Bank	35		Multilateral
National Agricultural and rural inclusive growth project	World Bank	219		Multilateral