



# ***Tools and Frameworks to Assess Climate Change Impacts***

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**KEPSA** represents over 100,000 direct and indirect members through Business Membership Organizations in the private sector. KEPSA's mandate is private sector development through advocacy and forging of international business relations to spur wealth creation in Kenya.

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## **Table of Contents**

1.0	Introduction .....	1
2.0	Climate Impacts on Kenya’s Private Sector .....	3
3.0	Private Sector Experiences in Assessing Climate Impacts .....	5
4.0	Tools and Frameworks to Assess Climate Change Impacts .....	7
5.0	Applying Tools in the Kenyan Context .....	8
6.0	Tools and Frameworks .....	11
6.1	Summary .....	11
6.2	Description of Tools .....	20
	References .....	35
	Annex 1: Additional Resources .....	36

## ***Abbreviations and Acronyms***

BACLIAT	Business Areas Climate Assessment Tool
FAO	United Nations Food and Agriculture Organization
GDP	gross domestic product
Ksh	Kenya Shilling
NRTEE	National Roundtable on the Environment and the Economy
SEI	Stockholm Environment Institute
UKCIP	United Kingdom Climate Impacts Programme
UN	United Nations
UNEP	United Nations Environment Programme

## Executive Summary

Climate change consists of slowly increasing average temperatures, changing weather patterns, and gradually rising sea levels. Climate change and its impacts are not disputed, it is science and its impacts are already being felt in Kenya. Several business sectors in Kenya – such as agro-processing, manufacturing and tourism – are experiencing negative impacts from climate change. Climate change impacts will be felt by every major economic sector and will cut across all aspects of business operations.

This report identifies fifteen tools and frameworks that provide concrete, step-by-step guidance for the private sector to assess climate risk. The identification of those tools most applicable to the Kenyan private sector includes an assessment using the following criteria:

- **Cost:** Is there an expense associated with obtaining the tool or framework?
- **Applicability to Kenya:** To what extent is the tool or framework useful for Kenyan businesses? Has the tool or framework been used by businesses in Kenya or the East African region?
- **Sectoral focus:** Is the tool or framework broadly applicable or specific to businesses within a certain sector?
- **Complexity:** To what extent is special training or skills development required to use the tool or framework? What skills are required?
- **Longevity/history:** When, where and by what businesses has the tool or framework been applied? Has it been used over time with and does it remain applicable for the private sector?

The following tools are identified as most promising for the Kenya private sector context based on their high applicability and low complexity, the suitability to a developing country assessment and other advantages:

- **Adapting to Climate Change: A Business Approach** – developed by the Pew Centre: Global Climate Change.
- **Building Business Resilience in a Changing Climate: Business Primer** – Facing the Elements – developed by the National Round Table for the Environment and the Economy.
- **Business ADAPT (analyse, develop, assess, prioritize and tackle) tool** – developed by Oxfam and Acclimatise.
- **Climate Change Adaptation and Mitigation in the Tourism Sector** – developed by UNEP and University of Oxford.

These tools can help businesses undertake climate risk assessment, and work remains to develop decision-support tools that can help the private sector: identify institutional entry points for adaptation, map actions to investment cycles, undertake cost-benefit and cost-effectiveness analysis, manage uncertainty, and access finance for adaptation and adaptation-related advocacy.

## 1.0 Introduction

This report reviews tools, frameworks and instruments for assisting private sector organizations to assess the potential impact of climate change on their businesses and to identify appropriate responses. The report focuses on tools that could be used by the Kenyan private sector to assess vulnerability to current climate and future climate change, identify options to address key climate-related business risks, increase adaptive capacity, and develop and implement a climate change adaptation strategy.

Climate change is generally understood as a significant change of average temperatures over longer periods of time, causing changes in weather patterns and slowly rising sea levels. Climate change is no longer contested – it is science and it is happening with more severe impacts to follow. Kenya’s exposure to climate risk is high, with major implications for the business community. The country experiences major droughts about every 10 years and moderate droughts or floods every three to four years (Downing *et al.*, 2008), among other impacts. Kenya has experienced an increase in mean annual temperatures of 1.0° Celsius since 1960 and changes in rainfall patterns—most notably greater rainfall appears to be occurring during the short rains of October to December (Government of Kenya, 2010). The extreme weather events of droughts and floods have large economic costs to businesses and Kenyan society. The Stockholm Environment Institute (SEI, 2009: 17) estimated that the burden imposed by climate risks on Kenya’s economy to be equivalent to about 2.0 percent of gross domestic product (GDP) each year. The additional net economic cost due to climate change could be equivalent to 2.6 percent of GDP per year by 2030, over and above current losses due to climate variability.

Business planning and financing strategies needs to consider the risks associated with climate change and confront climate change impacts across all sectors. Integrating climate risk into business planning has implications for all facets of business processes, including:

- **Human Resources** – This can cut across many dimensions, including improved staff training and businesses practices for coping with more frequent severe weather events, such as heat waves that impact employees in the agriculture, transport and construction sectors. It also encompasses higher-level staff training on reorienting business strategy and risk assessments to address climate change and more severe weather impacts. Larger firms may want to consider training their existing risk analysts in climate risk assessment and adaptation, as well as creating a clear, dedicated leadership and point of contact within their organization.
- **Procurement** - The most competitive and forward-thinking businesses will procure assets that have greater resilience and longevity in terms of climate-related hazards, which can include heat waves, increased or decreased precipitation, flash floods, more frequent forest and bush fires, and coastal inundation.
- **Supply Chains** – It is often said that a supply chain is only as strong as its weakest link, and this will become all the more true with the impacts of future climate change on just-in-time delivery services. Firms will have to identify contingency plans for supply chain disruptions

from weather events, potentially including diversifying supply sources, processing facilities and transport modalities.

- **Distribution** – Similarly, businesses will need to enhance the resilience of and diversify their distribution networks in order to retain their profits and market share. It can also help to ensure that their reputation for reliable goods and service delivery remains intact.
- **'Value proposition' or branding** – A firm that boasts greater resilience across all core business functions, especially relating to supply chains and distribution, can enhance their brand by demonstrating they are ready to meet the challenges for networked, interdependent supply and distribution chains in an era of increasingly erratic and severe climate impacts.

Climate risk management involves the systematic use of climate information in business decision-making to minimize the potential harm or losses associated with climate variability and change.<sup>1</sup> For climate risk management efforts to be successful, high quality climate data and information must be available, and sufficient resources (human, technical and financial) available to use information effectively (Hellmuth *et al.*, 2007).

Several tools, frameworks and planning instruments have been developed to examine climate impacts, and many of these tools are targeted at the private sector. These tools aim to assist the private sector in assessing vulnerability and risk and increase adaptive capacity to protect business's profitability and competitiveness in an era of erratic weather events. This report reviews fifteen tools and frameworks to assess climate risk that have been developed for use by the private sector.

The report briefly reviews the climate impacts that will affect Kenya's private sector in Section 2. Section 3 discusses private sector experience using these tools, and Section 4 sets out the methodology to identify and assess the climate assessment tools, as well as the process to identify fifteen tools of greatest relevance for the Kenyan private sector. Section 5 includes a table that sets out information about the various tools, which are elaborated in greater detail in Section 6. Annex 1 includes a list of additional resources that did not fit the criteria as private sector tools for assessing climate risk, but would be helpful to the private sector in providing background information, case studies and a deeper understanding of vulnerability, risk and adaptation to climate change.

## 2.0 Climate Impacts on Kenya's Private Sector

Assessing climate risks and impacts is important for Kenya's private sector because climate change poses a real threat to Kenya's business community and can undermine business competitiveness by threatening their assets, as well as the reliability of their supply chains and distribution networks, all of which may affect their profitability and investments. Notably, average temperatures are rising, rainfall patterns are changing and the incidence of extreme weather events such as droughts and floods is increasing. Droughts in Northern Kenya and across the Horn of Africa have led to loss of

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<sup>1</sup> Definition adapted from Hellmuth *et al.* (2007) and the definition of risk management included in International Strategy for Disaster Reduction (2009).

crops and livestock, and rising food and deteriorating livestock prices. Floods have had devastating consequences also, including property damage and damage to infrastructure. Given the networked nature of transport infrastructure, damages to even a small amount of road or rail infrastructure can undermine the timeliness and reliability of their supply chains and distribution networks. Some estimates place the cost to Kenya of droughts and flooding at about 2.0 percent of GDP per year (SEI, 2009).

The exact processes that affect Kenya's climate are not fully understood and predicting future climate trends remains difficult. Nonetheless, business can improve their planning by critically assessing potential climate hazards. Research suggests that temperature will increase, and the frequency of hot days and nights will rise, with cold days and nights becoming rare. Precipitation is expected to increase in many areas, with the largest growth in rainfall occurring in the highland districts and the coastal region. Precipitation will decrease in other areas, with Northeast Kenya expected to become significantly drier. In addition, climatic variations may affect the timing and duration of the short and long rains, potentially having a profound effect on agriculture (Parry, *et al.*, 2012).

Water availability is an especially critical factor in Kenya, one of the most water scarce countries in Africa. Access to this basic resource is likely to become more difficult because of population growth, economic expansion, unsustainable management of water and forest resources, and changes in rainfall patterns. At the same time water is the core economic input for many business activities: irrigated and rain-fed agriculture; supply of hydroelectric power, which currently constitutes over half the installed capacity of electric power; and as an indispensable ingredient for the food and beverage industry.

Climate change risks and impacts for Kenya's private sector are discussed below:

- A large percentage of electricity is generated by hydropower, which poses major risks to the manufacturing sector because of unreliable electricity supply resulting from reduced generation capacity of hydropower dams because of droughts and reduced rainfall. For instance, the 1998-2000 droughts caused extended power cuts across the country; with lost industrial production due to inadequate power amounting to Ksh 110 billion (LTS International and Acclimatise, 2012).
- Adverse weather events will also impact local and regional trade and can have significant impacts on supply chains and distribution networks. One example is the eight-month 1997-1998 El-Niño rains, which caused Ksh 62 billion in damages to transportation infrastructure (Ngecu and Mathu, 1999).
- Rising temperatures are expected to strengthen coastal winds and storms, which will affect ship navigation and other port operations. Motor vehicle assembly, machinery, electronics and other industries that depend on export and import services for their supply chains and distribution networks are likely to be adversely affected.
- Some industries such as agro-processing are major consumers (and polluters) of water. Water resources are generally scarce and are likely to become more so with climate change. Unpredictable precipitation during both the short and long rains, together with extreme events,



particularly increased frequency of droughts, causes a decline in agricultural productivity. Certain sectors or businesses may be able to capitalize on new opportunities posed by a changing climate - for instance, higher average annual temperature causes shifts in tolerable limits for some crops (such as tea and coffee). However, even in such favourable cases there are likely to be new challenges for these sectors or businesses to respond to, such as low temperatures causing frost in the tea estates, thereby increasing the sector's risk exposure and lowering its productivity.

- The tourism sector could be also be negatively impacted. Coastal inundation and erosion damaging coastal infrastructure and ecosystems can impact tourist establishments situated close to the coast. Changing environmental conditions caused by climate change can seriously hamper the attractiveness of some tourist destinations through the increased transmission of infectious disease, as well as more frequent wildfires, and insect or water-borne pests (jellyfish and algae blooms). Extreme weather events can also render tourist destinations inaccessible due to damage to road infrastructure, as was the case in the Maasai Mara in 2011 due to flash flooding. Disrupted supply and distribution networks for popular goods at hotels and restaurants can leave visitors dissatisfied with their tourism experience. Increases in average annual temperature are likely to severely compromise or eliminate certain ecologically sensitive tourist destinations, such as the snowcap of Mount Kenya, sensitive marine ecosystems and coastal rainforests. Bleaching of Kenya's coral reefs has been observed, which has potential to remove an important coastal attraction. Wildlife based-tourism may also be exposed to climate risks, since gradually changing temperature and precipitation patterns can change species habitat ranges and migration patterns, thereby affecting key seasonal tourist attractions. Some businesses may be able to capitalize on new opportunities posed by these changing habitat ranges and migrations, but the disruptions for established businesses could be significant and the overall impacts for wildlife tourism sector may be negative.

Hydroelectricity generation, agriculture, tourism and several other sectors will be affected directly by changes in temperature and precipitation. All are key business sectors, several of which also have important knock-on effects for supply chains and the reliability of core business operations for firms in other sectors. These sectors also lie at the very heart of the economic well being of many Kenyan communities. Recent weather events have demonstrated that businesses in both urban and rural areas are dependent on infrastructure to supply water, energy and transport services, and these are all exposed to the vagaries of climate. Capitalizing on new business opportunities while addressing climate risks will require a smart, agile and forward-thinking strategy.

### **3.0 Private Sector Experiences in Assessing Climate Impacts**

Business engagement in climate change initially focused on reducing energy consumption and their associated greenhouse gas emissions, as well as other ways to mitigate climate change such as planting trees to store carbon. This was partly encouraged by opportunities to improve business profitability through cost savings related to reductions in energy consumption and hence

greenhouse gas emissions. In addition, the international climate change negotiations tended to emphasize mitigation in the early years, including business opportunities through the Clean Development Mechanism. Adaptation has emerged as a more serious consideration for the private sector since agreement on the Bali Action Plan in 2007, which emphasized the importance of integrating resilience and risk management through adaptation, as well as energy savings and new market opportunities through climate change mitigation.

The private sector is beginning to recognize the importance of assessing climate risk, building climate resilience for its core operations and supply chains, and adapting to climate change. Adaptation for the business community means minimizing risk and vulnerability arising from supply chain and distribution disruptions or negative impacts on its value proposition, as well as proactively responding to the negative impacts of climate change. Some industries may be impacted more than others, and there will likely be winners and losers within the business community through the challenges and opportunities posed by a changing climate. For example, several analyses have concluded that Kenya's agro-processing industry is more vulnerable than other sectors.

The United Nations (UN) Global Compact (2012) reports that companies are largely aware of the risks associated with climate impacts but most have not yet developed adaptation strategies and plans. Indeed, many companies in Kenya are adapting, with actions very often driven by cost considerations, rather than clear decision or strategy to minimize risk or reduce vulnerability for core business functions. While most companies are addressing adaptation “as aspects of their business strategy and risk management” (Chartered Accountants of Canada, 2008), adaptation can also be understood in terms of accessibility to new “adjustment opportunities” for businesses (The Pew Centre, 2004).

Many businesses have identified the importance, value and opportunity in assessing, and responding to, climate change impacts, as outlined in Figure 1. Benefits include the ability to better manage and avoid risk, decreased operating and recovery costs, increased profits, and new product and market development. In addition to issues related to improving the bottom line, business adaptation activities provide an opportunity for government, academia and non-governmental organizations to see companies as key partners in aiding vulnerable communities with climate change risks and impacts, which can enhance the brand and corporate reputation (UN Global Compact, 2012).

Certain sectors are more responsive in proactively tackling climate change risks and impacts. Nitkin, Foster and Medalye (2009) determined that the insurance industry is leading in risk assessment, while the agriculture and tourism sectors are in leaders in awareness of impacts. The energy sector is adopting leading-edge adaptation strategies through technological innovation, updated infrastructure and new market strategies. In addition to these few early movers, some companies have been taking a no-regret approach to adaptation, undertaking actions that are good for business regardless of climate impacts.

**Figure 1: The Business Case for Climate Change Adaptation**



*Source: United Nations (UN) Global Compact and United Nations Environment Programme (UNEP) in cooperation with the CEO Water Mandate. (2012). Business and Climate Change Adaptation: Towards Resilient Companies and Communities. New York: UN Global Compact Office. Page 10.*

While much of the private sector is generally aware of the potential impacts of climate change, most businesses have yet to undertake substantial adaptation measures, preferring to assume a wait-and-see approach. Furthermore, there is a gap between businesses conducting risk assessments and those actually taking concrete action to manage exposure to climate risk. Key obstacles identified by businesses towards assessing and responding to climate change impacts include the lack of “data about anticipated impacts in specific geographic areas; considerable uncertainty about the timing of anticipated impacts; lack of cost-benefit information; unsupportive policy environments; lack of understanding within the company about climate change adaptation; and lack of consensus about the level of focus the company should give to adaptation, and the approach that should be taken” (UN Global Compact, 2012, page 9).

#### **4.0 Tools and Frameworks to Assess Climate Change Impacts**

Several tools and frameworks have been developed to examine climate impacts and risks, with most of the impact assessment targeted at the public sector. A limited number of tools have been developed to assist the private sector in assessing vulnerability and risk, and how to protect business’s bottom line through managing risks in supply chains, core business strategies and adapting to new realities posed by climate change. The tools primarily have been developed by environmental consultants, non-governmental organizations and UN agencies, rather than private sector firms themselves. However, tool development is often informed through stakeholder

engagement, such as workshops and interviews with various industry experts, which ensures continuity with the interests of the business community.

Use of tools is more prevalent in developed countries, and most private sector-oriented tools have been developed for use in Europe and North America. Climate assessment in developing countries tends to be undertaken by companies that are a subsidiary body of a developed country firm, or those that have attracted foreign investment. Climate risk assessment in developing countries tends to offer perspectives through case studies.

This report reviews fifteen tools and frameworks to assess climate risk that have been developed for use by the private sector. A comprehensive literature review identified more than 40 sources on climate risk assessment with relevance to the private sector (listed in Annex 1: Additional Resources). Fifteen were considered tools or frameworks because they provided step-by-step guidance for businesses, rather than a discussion of climate risk assessment. These fifteen sources were then reviewed to identify those most applicable to the Kenyan private sector, using the following criteria:

- **Cost:** Is there an expense associated with obtaining the tool or framework?
- **Applicability to Kenya:** To what extent is the tool or framework useful for Kenyan businesses? Has the tool or framework been used in Kenya or the East African region?
- **Sectoral focus:** Is the tool or framework broadly applicable or specific businesses within a certain sector?
- **Complexity:** To what extent is special training or skills development required to use the tool or framework? What skills are required?
- **Longevity/history:** When, where and by what businesses has the tool or framework been applied? Has it been used over time with and does it remain applicable for the private sector?

## 5.0 Applying Tools in the Kenyan Context

The following tools or frameworks have high applicability and low complexity, and some are specifically tailored towards the needs of developing country businesses. As such, they are identified as the most likely to be used by private sector firms in Kenya interested in assessing climate risk:

- **Adapting to Climate Change: A Business Approach** – developed by the Pew Centre: Global Climate Change. This a straightforward but highly pertinent tool for business because of the 'risk disk' methodology and the analysis of risk in terms of coping operations, value chains, and supply and demand networks.
- **Building Business Resilience in a Changing Climate: Business Primer – Facing the Elements** – developed by the National Round Table for the Environment and the Economy. The sections on Accessing and Managing Risks and Opportunities, as well as Building Climate Resilience Across the Enterprise, should be particularly helpful for businesses.

- **Business ADAPT (analyse, develop, assess, prioritize and tackle) tool** – developed by Oxfam and Acclimatise. This tool is relevant for business because of its value chain approach, the discussion of institutional entry points for climate adaptation and resilience, and the modules on the food, beverage, agricultural and utilities sectors.
- **Climate Change Adaptation and Mitigation in the Tourism Sector** – developed by UNEP and University of Oxford. Highly relevant in light of tourism's importance to Kenya's economy, as well as offering a specific approach for tourism professionals in developing countries.

The above tools are useful for undertaking climate risk assessment; this is only a first step towards concrete planning and action towards adaptation and enhanced resilience. Taking next steps to use the outcomes of the risk assessments includes:

- **Finding institutional entry points** – Oxfam and Acclimatise's BUSINESS ADAPT (analyse, develop, assess, prioritize and tackle) tool discusses existing avenues to mainstream climate risk assessment. Additional analysis of potential entry points and case studies highlighting best practices, particularly among developing country businesses, would be an asset.
- **Mapping to investment cycles** – Identifying the best point in time, from a particular business's perspective, in investment cycles (and their consequences in accessing credit) for the firm to invest in actions that will foster climate resilience. Attention is also needed to determine how enhanced resilience may affect future performance throughout the investment cycle.
- **Cost-benefit and cost-effectiveness analysis** – Many of the most severe climate change impacts are likely to come in the future, whereas businesses may view preparatory adaptation as a current cost. Cost-benefit analysis can help businesses navigate these risks and minimize overall costs, by identifying (where possible) the range of potential climate impacts, their probability and potential severity, and the firms' likely exposure to these impacts. It can help also identify which climate resilience actions have the greatest benefit and are most cost-effective, and which can generate long term savings for the company in terms of losses averted, accounting for initial upfront costs (and a markdown or discounting of future benefits).
- **Managing uncertainty** – High-quality information on the likelihood and magnitude of certain climate impacts may be difficult to obtain. Businesses will need assistance in proactively addressing climate-related uncertainties (or lack of certain knowledge about the probability of positive or negative climate impacts). While no regret actions are easier to assess in a cost-benefit analysis, further guidance is required on whether and how to address high-impact, but low or uncertain probability events, while still keeping costs manageable and operations flexible.
- **Accessing finance for adaptation and adaptation-related advocacy** – Limited access to financial and capacity building support can prevent businesses from taking action to build climate resilience. For example, select windows of the Africa Enterprise Challenge Fund (ACEF) provide support for adaptation innovation and leadership, but this funding tends to

be directed at adaptation technologies, rather than preparing a business for climate change. Informing businesses of funding options and providing advice on criteria and good practices for accessing these grants could help to support the building of climate resilience among businesses. While not adaptation financing *per se*, another important avenue is finance and support for adaptation-related government advocacy. Because supply and distribution networks often are reliant on government funded and maintained transport infrastructure, business organizations may choose to advocate for measures that would enhance the resilience of these networks. A case study approach could be used to highlight successful business advocacy and collaboration with government on fostering climate resilience for important goods such as basic infrastructure.

Moreover, a specific adaptation tool for the Kenyan private sector would be very useful in meeting the specific needs of Kenya's business community. Such a tool could include climate data, typical business practices, supply and distribution networks, and vulnerability indicators tailored to the Kenyan context. Tools for the most vulnerable sectors, such as hydroelectricity generation, agriculture and agro-processing, would be particularly useful. Because of vulnerability to climate change, these sectors tend to be more progressive in terms of their engagement on climate change impact assessments and building resilience. In the agricultural sector, for example, Nokia developed a mobile phone application tool to assess impacts and build farmers' resilience in Kenya. The mobile survey application is used for efficient data gathering, analysis, and decision making to build community resilience. The Sygenta Foundation for Sustainable Agriculture also uses Nokia Data Gathering to survey climate-vulnerable smallholder farmers to enhance food security (UN Global Compact, 2012). The tea industry has also been active in assessing climate impacts and improving adaptive capacity of smallholder producers (Ethical Tea Partnership, 2013).

A next step could be the compilation of available information on climate vulnerability in the agro-processing sector, which has some experience in assessing vulnerability, as a starting point for using the climate risk tools. The recent review of climate change adaptation information compiled for the National Climate Change Action Plan and the draft National Adaptation Plan could be a strong starting point. Once this underlying information has been assembled, an assessment could be undertaken to determine if the information could be incorporated into an existing tool to begin to develop a Kenyan-specific climate risk assessment tool. Vulnerability and climate information could also be assembled for other vulnerable sectors.