

## Case Study

# Assessment of Climate Change Adaptation Measures in Micro-, Small- and Medium-Sized Enterprises

Consultation on development of climate change adaptation strategies for  
companies

## Enterprise URWIBUTSO – Sina Gerard, Rwanda

This report has been developed by adelphi commissioned by GIZ global programme 'Strengthening the Capacity of the Private Sector to Adapt to Climate Change' on behalf of the BMZ.

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## Part A: Introduction and Background

This report has been developed as part of a GIZ global programme 'Strengthening the Capacity of the Private Sector to Adapt to Climate Change'. The report **analyses the vulnerability to climate change impacts of a food & beverage processing company in the Northern Province of Rwanda**. Based on this assessment, **adaptation measures are identified** to allow the company to adapt to these climate change impacts. The report is based on an actual assessment of the enterprise.

The assessment on which this report is based was conducted in July 2015. A team of international experts (GIZ and adelphi) visited the company, URWIBUTSO - Sina Gerard, in Nyirangarama, Rwanda. From URWIBUTSO, the production manager, Mr. Ralf Löper participated. During the half-day visit, an extensive interview was conducted, the production facilities were examined, and climate change risks and opportunities, as well as corresponding adaptation measures, were discussed.



Sina Gerard / URWIBUTSO bakery (adelphi, 2015)

URWIBUTSO is a **food processing company** founded in 1983 in Nyirangarama, Rwanda (SASHA, 2014). It has an annual turnover of around EUR 1.5 million. The **company produces a wide variety of products** including fruit juices (maracuja, banana, pineapple, and strawberry), mineral water, bread and pastries, chili oil, dairy products, banana wine and beer, and even carpentry products.



Chilis for the production of chili oil (adelphi, 2015)

The **company is vertically integrated and has its own distribution channel** as it operates eleven sales outlets. The most important store is located at the headquarters, right next to a main highway where buses and cars stop for shopping. URWIBUTSO also exports a minor share of its products, every year around 8 – 10%, to other countries (a small share is even exported to Europe). With around **400 employees**, the company can be considered medium sized. The company has an ISO certification (social responsibility), but it has no yet received a fair trade or organic certification.

The production of the most important products of the company faces seasonal peaks. The chili oil has a seasonal peak between the months of July and November. Products such as strawberries or bananas also face seasonality and are not always available. For this reason cooling would be critical for the company to store the strawberries or passion fruits. However, the **company does not have any cooling storage areas** in which they could store, for example, the strawberries or passion fruits. The company is currently assessing the possibility of investing in a cooling storage. Ideally, the storage of fruits should occur at a temperature between 4 – 8° C

URWIBUTSO produces 160.000 bottles of fruit juice per month. The company currently has **several problems with its production line**. Due to technical problems with the bottling plant the company only produces at around 15% of its capacity.



Bottling plant (adelphi, 2015)

The most important inputs for the different production processes are fruits, chilies, wheat, corn, peanuts, water, electricity, and labor. The fruits are used for

the juice production: URWIBUTSO requires more than 50 tonnes of passion fruits per year, more than 25 tonnes of pineapple, more than 25 tonnes of strawberries, and more than 50 tonnes of bananas. It further requires chillis for the chili oil production, as well as wheat, corn and peanuts for the production of breads and pastries. Some of the fruits used for the fruit juices are sourced from local farmers. This is the case for strawberry, which is sourced from 800 farmers in the region. The farmers are provided with the strawberry plants and are guaranteed a certain price for their products. The rest of the production inputs is bought from national and to a lesser extent also international suppliers.

The company consumes around 20.000 kWh per month from the grid. Electricity is mainly required for the bakery as well as juice production. There are several daily power outages, but URWIBUTSO has diesel generators.

URWIBUTSO consumes around 500 m<sup>3</sup> of water monthly. The water used in the production is obtained from different sources, including extraction of ground water, as well as water extraction from creeks and a river close to the company's plant.

<b>Company Facts:</b>	URWIBUTSO / Sina Gerard
<b>Location</b>	Nyirangarama, Rwanda
<b>Products</b>	Processed foods & beverages including fruit juices (passion fruits, banana, pineapple, and strawberry), mineral water, bread and pastries, chili oil, dairy products, banana wine and beer, carpentry products.
<b>Employees</b>	400
<b>Supply chain</b>	Downstream supply chain: 800 strawberry farmers in the region, suppliers from other countries such as Uganda & Burundi. End-user market: <ul style="list-style-type: none"> <li>• The products are sold in the region and are available at the company's stores.</li> <li>• Only 8 – 10 % of the products are exported</li> </ul>
<b>Technology level</b>	Medium: machine-supported processes
<b>Inputs</b>	Fruits, chillies, wheat, corn, peanuts, water, electricity, and labour
<b>Past climate change</b>	Shifting of seasons - the rainy season starts later than it used to. However, it is unclear how this actually affects production quality and quantity In 2013, a landslide blocked the road to Kigali for one week. Small landslides in the surroundings of the company are also common but do not have significant effects on the enterprise.
<b>Future climate change</b>	Increased number and intensity heavy rain events resulting in landslides; continuation of shift in seasons with potentially adverse effects on fruit and other agricultural product supply

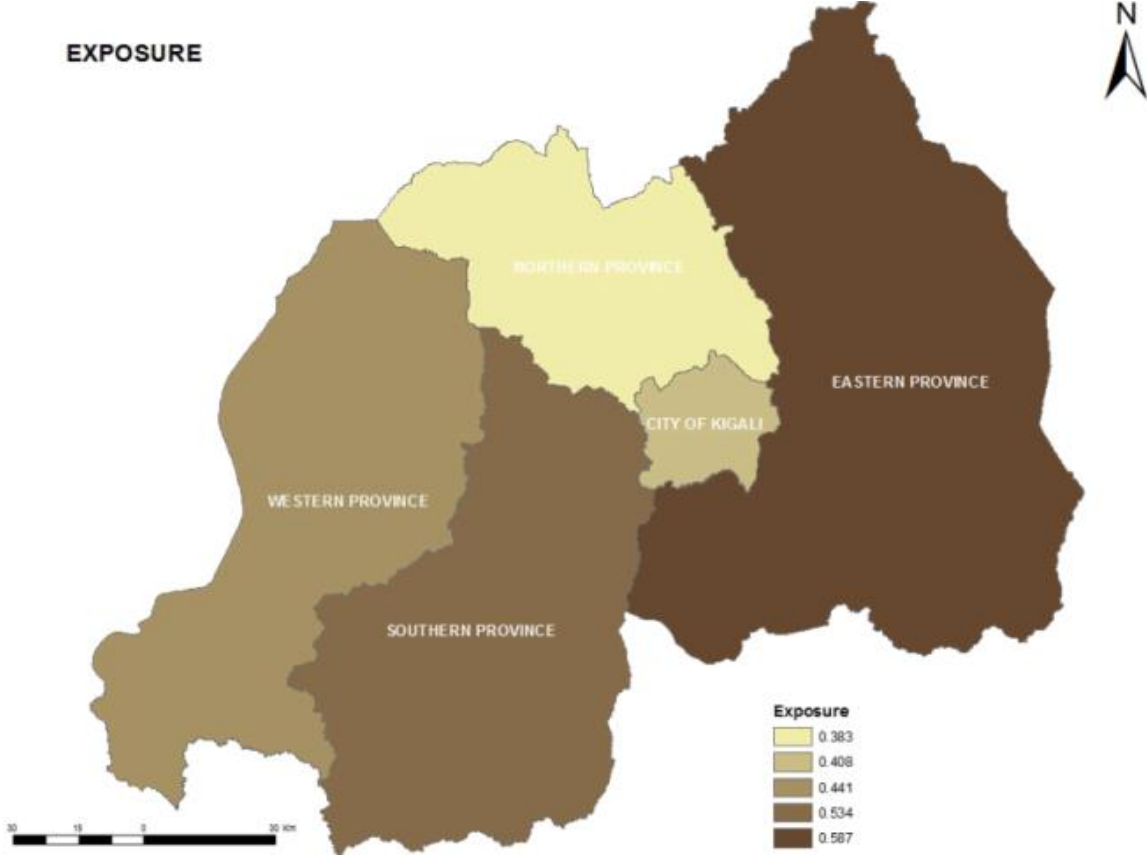
This report begins with an analysis of how Rwanda is affected by climate change (**Part B: Climate Change Impacts in Rwanda**). The following section describes how the company is affected by climate change. Relevant climate change related risks are analysed (**Part C: Climate change impacts and potential adaptation measures for the company**) and possible adaptation measures are suggested. The last section (**Part D: Conclusion**) includes some concluding remarks regarding the assessment and the reasons why there is no ripeness for focusing on adaptation measures at this stage.

# Part B: Climate Change Impacts in Rwanda

Climatic changes, anomalies and weather extremes are already a reality in Rwanda today. The country has experienced irregular climate patterns in the past that include greater variability in rainfall intensities and frequencies, unusually heavy rains in the North and more severe droughts in the East and South (REMA, 2009). The decade between 1991 and 2001 has been the driest on average since 1961 (ibid). The recorded annual average temperatures of four weather stations across Rwanda reveal a clearly increasing trend of +0.35°C per decade for the period between 1971 and 2010 (MINIRENA, 2011). Heat waves have also become more severe. The maximum temperature recorded between 2001 and 2010 was as high as 35.4°C compared to 32.8°C in the preceding decade (Rwanda Meteorological Center quoted in Rwanda Focus, 2012).

Projections estimate that large parts of the country will experience an **increase in precipitation with more intense rainfall particularly during rainy seasons**, which will **increase the intensity and frequency of floods and landslides**. The Southern, Northern and Western provinces present the main “flood and landslide risk zones” (MINITERE, 2006, cited in REMA, 2009). On the other hand, extended **droughts are expected to become more frequent** in the country (NAPA-Rwanda, 2006; IIED, 2013). Average temperatures are expected to increase up to 2.5°C by 2050 and up to 4°C by 2080.

The company is located in the Northern Province of Rwanda. Not all of the general country trends described above are relevant for the location of URWIBUTSO. According to a vulnerability baseline report by REMA, the **Northern Province is especially exposed to climate impacts from a change in the amount of rainfall and a shift in seasons** - especially the beginning of the rainy seasons (REMA, 2015). The Northern Province is less exposed to a change in temperature, heat waves, flooding and drought (ibid.). The general exposure of climate change of the Northern Province ranks lowest among all five provinces in Rwanda (ibid.).



Map of exposure to climate change (REMA, 2015)

The exposure in the map above is composed of the following individual impacts (REMA 2015). The numbers represent the position of the impact on an index from 0 to 1 - 0 being absolutely no exposure to the impact and 1 being complete exposure to the impact. The individual impacts are not weighted.

	Change in temperature	Change in rainfall amount	Shift in rainfall start date	Drought episode	Flooding events	Wind events	Heat	Thunder
Northern Province	0.365	0.66	0.685	0.12	0.18	0.415	0.085	0.55

It should be considered that despite the availability of some climatic information, country-specific climate data for Rwanda is scarce, and some studies contradict each other regarding estimates of overall changes in precipitation. Besides temperature recordings, trends of precipitation changes are difficult to observe due to spatial variability and inter-annual rainfall variability.

URWIBUTSO has experienced few impacts of climate change on the production processes. The company is affected by the change of seasons. In the past, heavy rain events have also led to small landslides of in the surroundings of URWIBUTSO's facilities with no significant effects on the company. Workers are also not affected by heavy rains as they generally live close by the facilities of the company.

## Part C: Climate change impacts and potential adaptation measures for the company

As mentioned in the introduction, the consultant team assessed the expected impacts of climate change on the company through a multi-step process. Before engaging personally with the company, information on past and future climate change trends was obtained through desk research. Based on the information collected beforehand, the discussion with the company personnel as well as the visit to the company's facilities, a few risk as well as opportunities arising from climate change could be identified. Following the assessment of the company's exposure to climate change risks as well as opportunities for the company arising from climate change, adaptation measures to mitigate the risks and realise the opportunities were identified.

The most important climate change phenomenon in the region where the company is located is the **shifting of seasons**. For some time now the **rainy season** starts later in the year. However, it is unclear how it actually affects the quality and quantity of URWIBUTSO's products. One possible negative impact may be a fluctuation in the availability of inputs (fruits & chilies) for the production of juices and oils. But so far input availability has not been so relevant. The company is currently facing other problems in the production processes and storage of products that seem more critical than the effects associated to climate change events.

**Heavy rains may affect the production process in the future.** No major damages from storms or heavy rains have affected the company or its processes in the past. Similarly, worker absenteeism has not presented itself as a consequence of climate change events. Workers arrive at the facilities of the company even in case of heavy rains as they live close-by. Nevertheless, as heavy rains intensify, this could become a risk in the future. **In such case, creating financial incentives for workers to attend work in cases of heavy rain** would be an option to ensure the continuity of the production process. Another option would be to **organise the transport of workers** from central points in residential areas to ensure production continuity and avoid material destruction.

**Heavy rains and resulting landslides have led to the disruption of road connections** in the past. In 2013, a landslide blocked the road to Kigali for one week. Other small landslides in the surroundings of the company occurred in the past, but these have not had significant effects on the company. For the occurrence of landslides resulting from heavy rain, the company can prepare by **developing emergency plans for the most frequented and/or most vulnerable routes**. Such an emergency plan would contain alternative routes for potentially blocked routes. In addition, off-road vehicles could be made available that could pass / by-pass the blocked roads. Where absolutely no passing of vehicles is possible workers could be asked to manually transport the goods from one side of the roadblock to the other. Delays in processing of certain fruits could lead to a deterioration of quality.

The company consumes around 20.000 kWh per month from the grid. Electricity is mainly required for the bakery as well as juice production. There are several **power outages** per day. In response, URWIBUTSO has installed diesel generators. **Heavy rain events in the future could lead to more**

**frequent or longer power outages.** A **potential adaptation measure** to reduce electricity consumption from the grid could be the installation of a micro-water-energy plant. This will reduce the risks of stopping the production processes due to electricity outages.

As mentioned in Part B, the **Northern Province is less exposed to a change in temperature, heat waves, flooding and drought** than other regions (REMA, 2015). Heat waves or high temperatures are not a critical problem in the region and do not affect the production process. The company does not face water shortages and has not been affected by floods. The water for production is sourced from ground water, from small creeks and a river close to the company plant. There have never been any major floods on the company premises.

As consumers become more aware that not only fair wages or ecological agro-practices are relevant criteria for sustainable agriculture but also climate resilience, the **demand for “climate-proof” products may increase.** Although this does not seem to be the case for the domestic demand (Rwandan consumers focus on the price, quality and the fact that URWIBUTSO products are produced in the country), it could be relevant for the export markets. As customers, especially in Europe or the United States, are very sensitive about the issue, these products could be sold with a premium. The company could benefit from a potential increase in demand for products with the label “climate-proof” or “climate resilient”.

In the table below, the main risks, as well as the corresponding adaptation measures, are summarised:

<b>Climate change risk / opportunity (<i>climate change impact</i>)</b>	<b>Adaptation measure</b>
Power outages ( <i>heavy rain / drought</i> )	Installation of a micro-water-energy plant
Road connection disrupted due to landslides ( <i>heavy rain</i> )	Develop an emergency plan with alternative routes, off-road vehicles, manual worker support in case of landslides
More demand for “climate-friendly” products ( <i>various</i> )	Market products as “climate-proof” showing the adaptation strategy developed and the adaptation actions undertaken
Workers not attending their shift ( <i>heavy rain</i> )	Set-up a financial incentive scheme for workers to show up to work during heavy rains  Organise the transport of workers to the company premises during heavy rains

## **Part D: Conclusion**

Given the past as well as expected climate change impacts in the Northern Province as well as the specific location of URWIBUTSO and its production processes, **few risk as well as opportunities arising from climate change could be identified.** However, during the assessment the team found that the company is currently facing several problems in the production process, as well as cash-flow, storage and machinery problems. These problems related to the production process itself **result in fluctuations of production and sales that are far greater than the fluctuations from climate change** and weather impacts.

Due to this situation, the team concluded that it may not be the most suitable moment for an in-depth climate change adaptation assessment. Before such an assessment is undertaken, it should be ensured that the basic business problems are solved. Once this has been achieved it will be much easier to clearly identify if and at which points in the production process climate phenomena affect the company bottom-line.

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