

Burundi



Report Date: January, 2015

Highlights

Burundi's low ND-GAIN score reflects the nation's standing as one of the fifth poorest nations in the world. Because over 30% of Burundi's GDP depends on agriculture, and most of the population lives in rural areas, climate change could have an extremely negative impact on its economy and human living condition, thus exacerbating its already extreme child malnutrition and increasing its dependence on humanitarian aid. This brief study illustrates the utilization of ND-GAIN as an assessment tool that highlights areas in dire need of improvement so a nation can adapt and cope with the current and future effects of climate change and other challenges.

Contents

ND-GAIN	1
Vulnerability	2
Readiness	3
Conclusions and recommendations	4

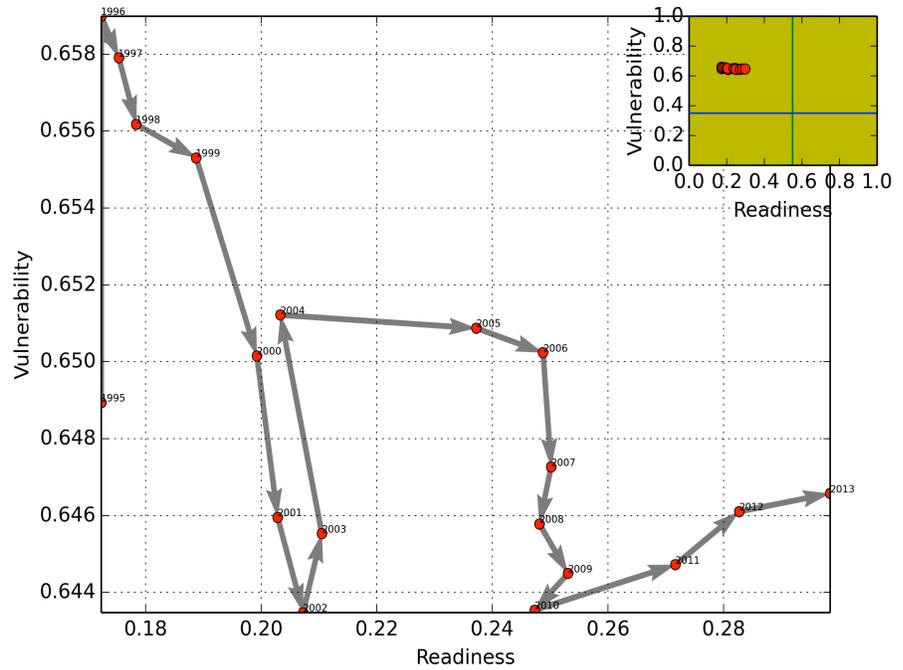


Figure 1. ND-GAIN Matrix trajectory of Burundi. Burundi's vulnerability to climate change has changed less than 0.01 points in 18 years. Its Readiness, on the other hand, has improved more than 0.2 points (on a 0 to 1 scale).

ND-GAIN

Increases in climate-related disasters and other climate change-related stresses will lead to increased costs for governments and businesses, complicate political decisions, and threaten the quality of life, especially for vulnerable populations. Making adjustments to human systems intended to reduce vulnerability and to minimize negative impacts from climate change is referred to as climate change adaptation.

The ND-GAIN index aims to help businesses and the public sector better prioritize adaptation investments to decrease vulnerabilities in the face of global shifts such as natural resource constraints, overcrowding, and climate change.

The Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to accept adaptation investments. A country's ND-GAIN score is composed of a vulnerability score and a readiness score. Thirty-six indicators contribute to the measure of vulnerability. Nine indicators contribute to the measure of readiness. The Index measures vulnerability using a range of indicators that reflect medium or long-term

climate change impacts in six life-supporting vulnerability sectors, as well as the "readiness" of governance, economic stability and social structures. Readiness indicators suggest a country's ability to mobilize and absorb adaptation investment. The calculation of the ND-GAIN score of a nation can be illustrated by:

$$\left(\begin{matrix} \text{Readiness} \\ \text{Indicators} \end{matrix} - \begin{matrix} \text{Vulnerability} \\ \text{Indicators} \end{matrix} + 1 \right) \times 50 = \text{GAIN Index}$$

0-1 Higher is Better
0-1 Lower is Better
0-100 Higher is Better

Each indicator comes from a reliable public data source such as the World Bank, Food and Agriculture Organization, and the United Nations. The selection of the indicators is based on literature survey and consultation with scholars, adaptation practitioners, and global development experts. The chosen indicators must be i) actionable through adaptation, ii) consistent with current knowledge and best practices, iii) potentially downscalable from national to regional or urban, iv) directly representative of the phenomena they measure, and v) must not include broad socio-economic measures such as GDP per capita or Human Development Index. Moreover, the indicators need

to be quantified at the country-level with data that: i) provide global coverage, ii) provide time-series coverage, iii) are transparent and conceptually clear, iv) are freely accessible, and v) are provided by reliable sources that carry out quality checks on such data.

BURUNDI ANALYSIS

As shown in Figure 2a, Burundi's 2013 ND-GAIN score was 33.8, putting the nation among the ten lowest scoring nations worldwide. This standing reflects its status as one of the five poorest nations in the world. While the nation's ND-GAIN score has consistently increased over the last 18 years (from 27.5 in 1995 to 33.8 in 2013), this raise was due almost entirely to improvement in the country's readiness score; its vulnerability score, on the other hand, has remained nearly constant (unimproved) for the last 18 years. The ND-GAIN Matrix (Figure 1) depicts Burundi's trajectory over time on a vulnerability and readiness plane.

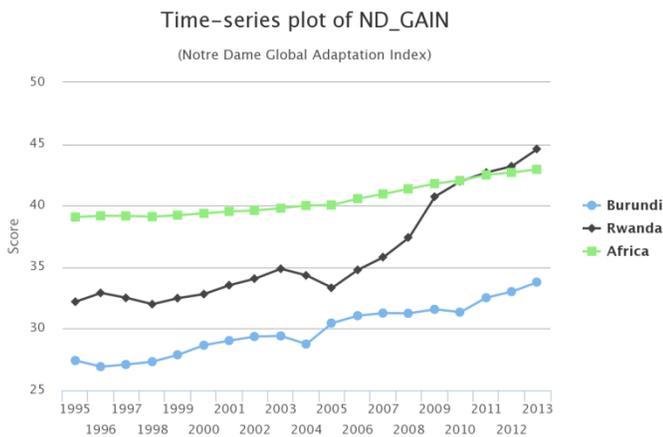


Figure 2a. Burundi's ND-GAIN Index score over time. Rwanda and Africa's average are also illustrated for comparison.

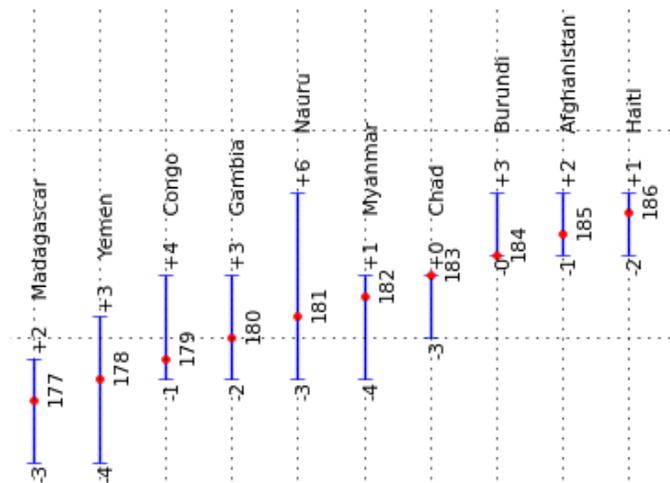


Figure 2b. Results of sensitivity analysis. Burundi's ND-GAIN ranking standing (shown by red dots) experiences little variation (ranks +3 places higher) when all 45 indicators are randomly varied.

Vulnerability

As shown in Figure 3, Burundi's vulnerability to climate change is affected the most by its health and food sectors, corresponding to scores of 0.789 and 0.683 respectively. The high score of its habitat and ecosystems' sectors also play a pivotal role on the nation's high vulnerability standing. The water sector score (0.332) is the least vulnerable of all the sectors and stands below the African average of 0.571. All other areas score above Africa's average, meaning they are more vulnerable.

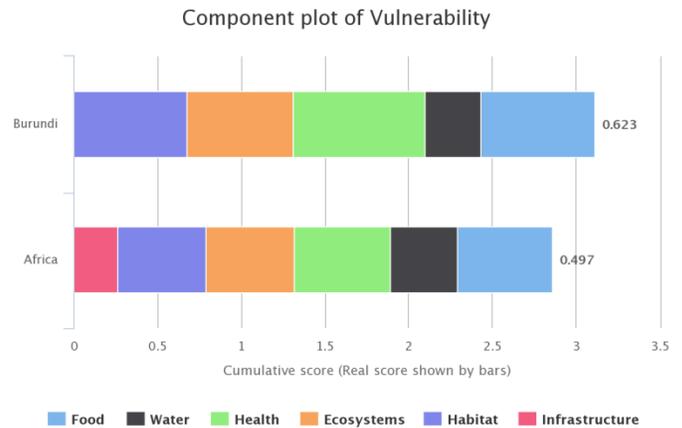


Figure 3. Burundi's vulnerability component versus Africa's average. Note the high vulnerability of the health (green) and Food (blue) sectors, compared to the African average.

According to FAO, rice, wheat and maize make up two thirds of human food consumption. Projected change in yield of these three crops in a country is an indicator of how climate change may affect that country's agriculture sector. According to a Representative Country Pathway 4.5 emission scenario (a measure of greenhouse gas concentration trajectories) and the application of the ND-GAIN scoring framework, by 2050, Burundi will become more vulnerable in the food sector due to decreased cereal yields (see Figure 4). Increases in cereal yields (corresponding to lower scores) are generally favorable for lessening a nation's vulnerability. Please refer to the methodology document at <http://index.nd-gain.org> for detailed rationale on vulnerability indicator direction and overall index computation.

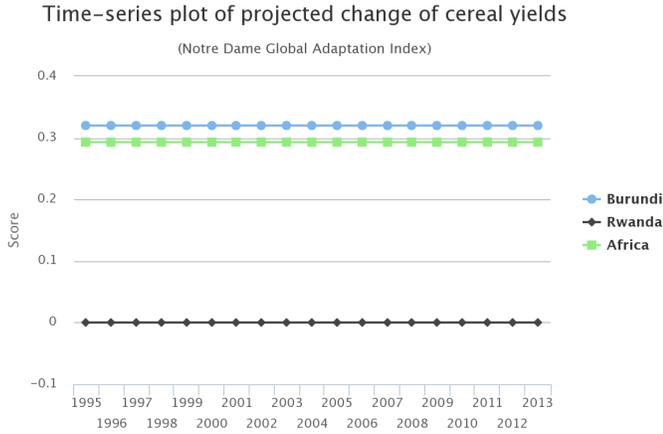


Figure 4. Projected Change of Cereal Yields indicator. Comparison with the US and Africa's average. Projected impacts are invariant over time in ND-GAIN.

The effects of the change of cereal yields in worsening the nation's vulnerability could be attributed to a combination of several factors, including:

- i. more than 87% of Burundi's population live in rural areas, which are mostly agricultural or pastoral (see Figure 5)
- ii. this population is expected to grow from 6.2 million today to 27 million by 2050 (see Figure 8), and
- iii. Burundi's agricultural capacity has not progressed significantly over the last 18 years and this trend might continue (see Figure 6)
- iv. Agriculture is the nation's largest industry, accounting for over 30% of the GDP

Although Burundi's percentage of rural population is expected to lessen (as shown in Figure 5), the rate of this decrease is not enough to lessen its high rural density, which is the cause of deforestation, soil erosion and habitat loss. These, in turn, are contributing to the chronic malnutrition of 56.8% of children under age 5. See Figure 7.

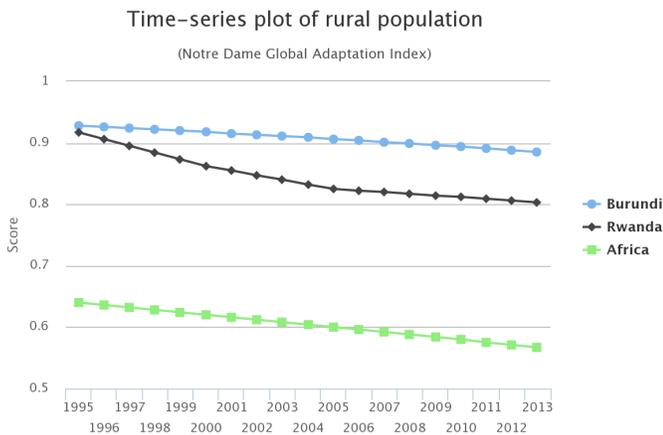


Figure 5. Percent of total population living in rural areas

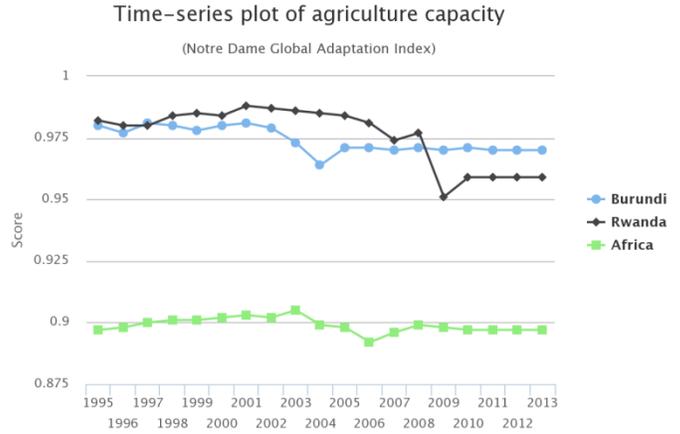


Figure 6. The measure of agricultural technological capacity is the average of the 2 best scores (lowest vulnerability scores), out of amount of fertilizer use, amount of pesticide use, ability to equip agriculture area with irrigation, and frequency of tractor use. The indicator reflects a country's capacity to acquire and deploy agriculture technology.

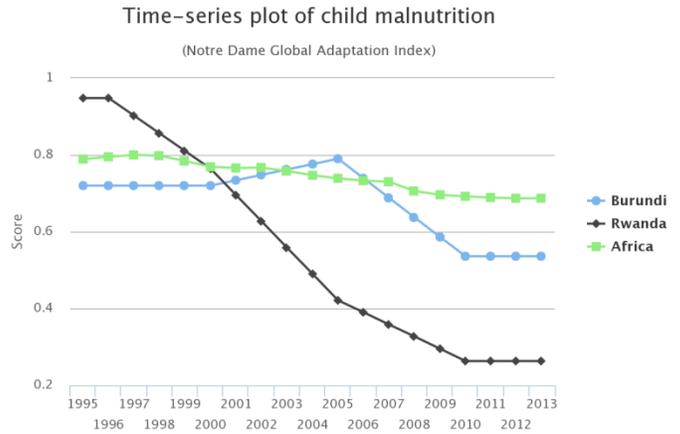


Figure 7. The proportion of children under 5 whose weight to height ratio is more than two standard deviations below the median

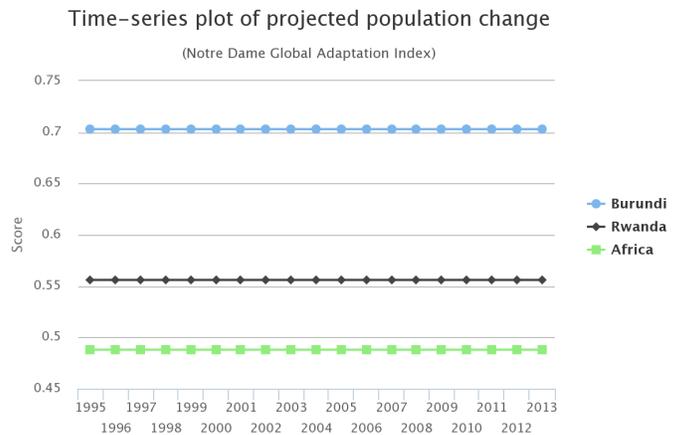
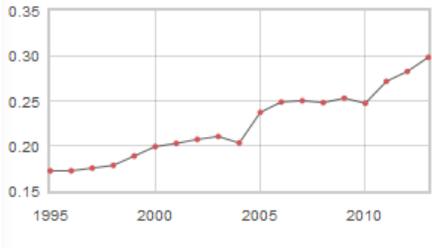


Figure 8. The projection of population change is a simple approximation of food demand in the future. The projected population change is calculated by comparing the average population size from 2020 to 2050 versus the 2010 population.

Readiness

As illustrated in Figures 1 and 9, Burundi's ND-GAIN readiness component has improved consistently from 1995 to 2013. However, Burundi's readiness score is the 17th lowest score worldwide, at the same level of Afghanistan and Nigeria. This makes Burundi unprepared to leverage finances (from foreign investment, development funds or other sources) to build up adaptive capacity.

Readiness score over time



Similar Countries	Readiness
Iraq	0.306
Nigeria	0.300
Angola	0.292
Afghanistan	0.292
Sudan	0.287

Figure 9. Time-series readiness score of Burundi

As illustrated in Figure 10, Burundi's 2013 Readiness score is impacted the most by its economic component, followed by its social and governance readiness components.

Component plot of Readiness

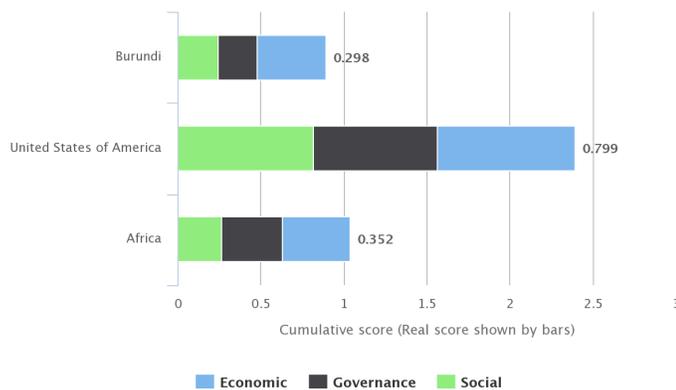


Figure 10. Burundi's Readiness components as compared to Africa and USA.

It is important to note that Burundi is landlocked and is one of the smallest countries in Africa. The country has historically suffered from warfare, corruption, poor access to education, and lack of innovation, all of which are problems that still plague the nation, as illustrated in Figures 11 and 12.

Component plot of Governance

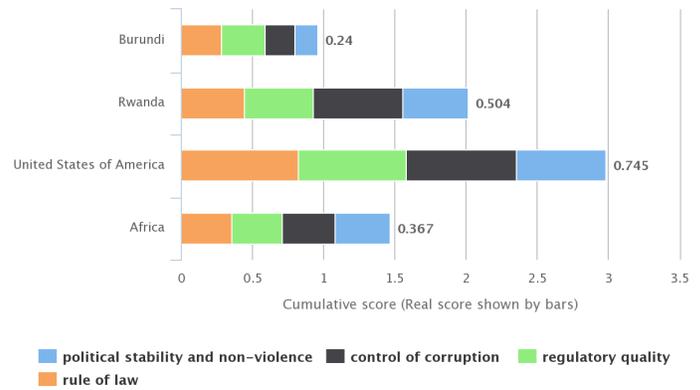


Figure 11. A detailed look into Burundi's governance component, as compared with Africa's average and the USA.

Figure 12 highlights the nation's lack of Information and Communications Technologies (ICT) infrastructure, which plays an important role in the nation's low social score. The lack of ICT infrastructure, the basis for the provision of other ICT services, could be considered alarming at a period when technology is a tool that drives economic growth and innovation. Perhaps one of the underlying reasons for the nation's poor ICT score is its under-dependence on electricity, as less than 2% of the nation enjoys household electricity. Similarly, its poor education indicator might play an important role in the lack of use and demand of ICT services. Burundi has an excellent social inequality score, far above Africa's average, which might reflect its relatively homogeneous population as a result of its separation from Rwanda.

Component plot of Social

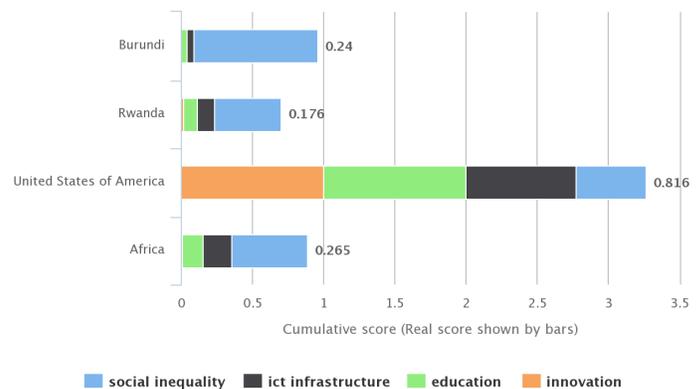


Figure 12. A detailed look into Burundi's governance component, as compared with Africa's average and the USA.

RECOMMENDATIONS

In the context of agriculture and livelihoods, we have identified Burundi's ND-GAIN sectors and indicators that contribute to the nation's poor standing worldwide. Only two countries (Eritrea and Chad) rank worse than Burundi

on the ND-GAIN Index in terms of the countries' vulnerability to climate change and readiness to adapt.

For the nation to considerably improve its capability to cope with these challenges, there will need to be adequate and prompt improvements on the indicators that are actionable in the short and medium-term, and the establishment of adequate platforms for a gradual improvement of the indicators that are actionable in the long term.

In this context, ND-GAIN's adaptive capacity component describes the availability of social resources to put adaptation into place. Figure 13 illustrates how Burundi compares to Africa's average and Rwanda, highlighting the adaptive capacity indicators that can be prioritized. A comparison of Burundi and Rwanda illustrates that there are four indicators that can be improved: child malnutrition, access to improved sanitation facilities, disaster preparedness, and protected biome.

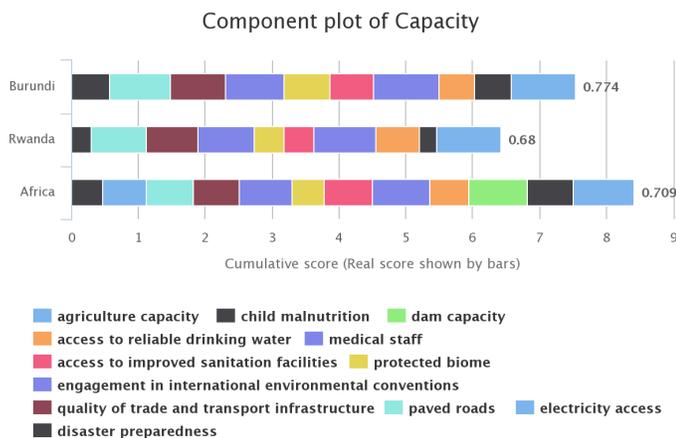


Figure 13. Adaptive capacity describes the availability of social resources to put adaptation into place. The Figure illustrates how Rwanda has better adaptive capacity indicators than Africa's average.

About ND-GAIN

ND-Global Adaptation Index is the world's first private nonprofit organization created to save lives and improve livelihoods in developing countries by promoting the understanding and importance of adapting to global changes brought about by climate, population shifts, urbanization and economic development. It is the leading index showing which countries are best prepared to deal with security risks, droughts, superstorms and other disasters and is the only free and open-source index to measure a country's vulnerability to climate change and other global forces, as well as its readiness to accept private and public sector investment in adaptation.

Decision-makers use ND-GAIN's country-level rankings to determine how vulnerable countries are to global changes and how ready they are to adapt, thus informing strategic operational and reputational decisions regarding supply chains, policy choices, capital projects and community engagements. The Index helps leaders avoid costs, manage liabilities and build resilience. ND-GAIN also informs market expansion by identifying which countries are ready for products and services that increase adaptation. Key elements of the metrics behind ND-GAIN include water, energy and transportation availability, along with economic, governance and human health factors. The Index was created in consultation with world-class scientists, civil society representatives and business leaders. The Global Adaptation Institute was founded in 2010, and moved to the University of Notre Dame from Washington, D.C. in April 2013, becoming the Notre Dame Global Adaptation Index.

Because Burundi's GDP is overly dependent on agriculture, climate change could exacerbate and complicate its already very bad economy, human conditions, child malnutrition, and over dependence on humanitarian aid. While urgent humanitarian aid will focus on the most pressing issues such as child malnutrition and health, medium and long-term international development interventions will need to focus on the provision of a stable basis for development of areas such as control of corruption and political stability and non-violence. Aid is more effective when the policy and institutional environment is "good", because aid is then more likely to be used rationally, and not wasted.

In spite of the steady improvement of the nation's ND-GAIN readiness component and its positive effect on the improvement of the ND-GAIN score, the nation's rate of improvement is not enough for coping with urgent issues that are complicated by climate change. Improvement in readiness components is necessary but not sufficient.

Nevertheless, given Burundi's overdependence on agriculture, the introduction of electricity and ICTs could be a tool that helps in the betterment of education, empowerment of the citizen, and economic diversification. Indeed, given Burundi's high rural population density and small territory, the introduction of reliable electricity and ICTs is feasible under a framework that empowers the citizens, heightens education, and fosters growth of small and medium size enterprises.

Bordering nations such as Rwanda (with similar social and geo-political contexts) are able to demonstrate that better rates of improvement and considerable betterment of vulnerability sectors and indicators are also possible.

BIBLIOGRAPHY

All information encountered (including illustrations) in this document is obtained from ND-GAIN data found at <http://index.gain.org>. Please refer to the Methodology document found at that address for further insights on the methodology and computation of the ND-GAIN index.
