



How Small Businesses Can Support Climate-Resilient Value Chains: Lessons from Uganda

Julie Dekens and Angie Dazé
October 2016

This briefing note focuses on investments by domestic seed companies in quality seeds, including climate-resilient varieties, in developing countries and the climate risk management (CRM) benefits for other actors along the value chain. It is designed for researchers and practitioners working on agricultural value chains, food security and climate resilience in developing countries.

Key Points

- Small businesses already support climate risk management (CRM) along value chains by developing new products and providing complementary services that reduce the negative impacts of climate change on their suppliers and clients. Investments in quality seeds by domestic seed companies are one such example.
- However, more can be done to ensure that these new products and services support CRM along value chains.
- Domestic seed companies should facilitate more informed decision making about seed choices; increase knowledge on the benefits of climate-resilient seeds; and strengthen systems for production, distribution and quality control of climate-resilient products and services through standards and partnerships.
- Development practitioners can contribute by: strengthening the broader systems that support value chain development such as infrastructure, information and markets; capacity-building of small businesses on the integration of climate risks into their decision making including on the use of climate and weather information; and helping small businesses access climate finance.
- Researchers should explore the role of small businesses as potential climate knowledge brokers.



Introduction

The role of micro-, small- and medium-sized enterprises (MSMEs) in supporting climate risk management (CRM) is starting to receive increased attention in developed and developing countries (e.g., Dougherty-Choux, Terpstra, Kammila, & Kurukulasuriya, 2016; Green Climate Fund [GCF], 2015; Kuruppu, 2013; Reynolds, L. et al., 2013; GIZ India, 2012a, 2012b). Globally, the recognition of the important role of the private sector in CRM is fairly new. Until recently, initiatives have mostly focused on large companies involved in global value chains, particularly in the context of reducing greenhouse gas emissions (especially centering on renewable energy investments). The recent emphasis on CRM is based on the assumption that it is in the best interests of the private sector to engage in climate change adaptation to reduce costs and stay profitable in the medium and long terms. MSMEs are receiving increasing attention because they account for the majority of enterprises and employment globally and contribute substantially to GDP growth (ILO, 2015). At the same time, they tend be particularly vulnerable to the negative impacts of climate change in part due to their limited resources and capacities.

Value chain analysis for building climate resilience in vulnerable sectors is also becoming increasingly popular (e.g. Dazé & Dekens, 2016a; Lim-Camacho et al. 2016.; International Fund for Agricultural Development [IFAD], 2015; Lemma Jouanjean, & Darko, 2015; Dekens & Bagamba, 2014; Amado, J-C., Adams, P., Coleman, H., & Schuchard, R., 2012). The approach tends to emphasize the interdependency among actors and the need to look at climate impacts and responses beyond the production level for more integrated solutions—a gap identified in the 2015 IPCC Expert Meeting on climate change, food and agriculture (Mastrandrea et al., 2015). In developing countries, most value chain analyses focus on agriculture, given the importance of the sector for economic development.

MSMEs remain the main investors in the agriculture sector in developing countries and play a key role in driving and shaping the development of agricultural value chains. Consequently, they have the potential to direct their investments in ways that enable CRM by different value chain actors, while simultaneously reducing risks to their own bottom line. Different opportunities exist to engage MSMEs in value chain CRM. In addition to actions that reduce the vulnerability of their own business operations, MSMEs can develop and/or market new products and provide complementary services that reduce the negative impacts of climate change on their suppliers and clients. New products and services for CRM include, for example, innovative technologies (e.g., water efficient technologies, climate-resilient varieties), climate-resilient infrastructure, risk management tools, improved climate information systems and awareness toolkits for staff and clients.

Research on domestic private sector investments in value chain CRM was conducted in Uganda. The “Private Sector Investment in a Changing Climate: Resilient Rice Value Chain Development” (PSI-Climate) project explored how domestic private sector investments can enable CRM by different actors along the rice value chain. Led by IISD, the research was implemented in partnership with the Ministry of Finance, Planning and Economic Development and the Economic Policy Research Centre (EPRC) during the period 2014–2016. The study focused on rice value chains, recognizing the current importance of rice in Uganda in terms of food security and employment as outlined in Uganda’s National Rice Development strategy for 2008–2018 (Ministry of Agriculture, Animal Industry and Fisheries [MAAIF], 2012). The research was based on two case studies, of which one focused on domestic private investments in financial products in eastern Uganda (see Dazé & Dekens, 2016b) and one on quality rice seeds in northern Uganda. The analysis presented in this brief is informed by the finding of the latter case study, conducted in collaboration with Equator Seeds Ltd.



The Case Study: Equators seeds in Northern Uganda

Uganda has one of the lowest agricultural productivity levels in the world due to the low use of inputs (fertilizers, quality seeds, machinery) which results in low yields—a challenge that is being further heightened with climate change. Observed climate trends in Uganda show that temperatures have been increasing. Future projections indicate that the country will likely continue to experience rising temperatures as well as changes in the distribution of seasonal rainfall and an increase in the frequency and intensity of extreme weather events. Uganda has among the highest population growth rates (3.1 per cent in 2015) and fertility rates in the world (5.9 per cent in 2015) leading to an increasing demand for food (Population Reference Bureau [PRB], 2015). But land area for agriculture decreased by 8.6 per cent between 2005 and 2010 (Uganda Bureau of Statistics [UBOS], 2015). While agriculture remains the backbone of Uganda’s economy, especially in terms of food security and employment, public investments in agriculture are not only low but have stagnated over the past 10 years (MAAIF, 2015).¹

Equator Seeds is a young and growing domestic seed company that invests in producing, processing and marketing quality seeds, including climate-resilient varieties, for vegetables, legumes and cereals—including rice. The company was established in 2012 within the vicinity of the Gulu Municipality, the main commercial and administrative town centre in northern Uganda and the fifth largest urban centre in the country (UBOS, 2016). Equator Seeds presents itself as a social enterprise, looking for co-benefits across its value chains: its business model integrates the rural poor in a post-crisis context (the region was affected by 20 years of war between 1986 and 2006) and serves markets with latent demand since the majority of farmers in Uganda prefer to use home-saved seeds from traditional and newly released varieties. Like most domestic seed companies in Uganda, Equator Seeds buys foundation seeds from the National Agricultural Research Organization (NARO) and partners with farmer cooperatives and commercial farmers who multiply seeds on their land. The company trains the contracted farmers in agronomic practices to ensure a high-quality and stable seed supply. The seeds are then transported to the factory for processing (i.e., cleaning, grading, chemical treatment, drying and packing) and sold at the company’s small shop located within the premises of the factory and through a network of contracted agro-dealers to help reach a large number of clients (mostly farmers but also NGOs and the government).

¹ However, in 2016/17, the budget allocation to the agricultural sector increased by 60 per cent.





Figure 1 presents a simplified model of Equator Seeds' rice seed value chain (from seed multiplication to seed processing and marketing) and how it is embedded in the broader rice grain value chain. Realizing the full potential of quality seeds depends on a range of factors and actors along the seed value chains and beyond. For example, high-quality seeds may translate into both low quantity and quality of rice grains due to improper storage and processing, among other factors.

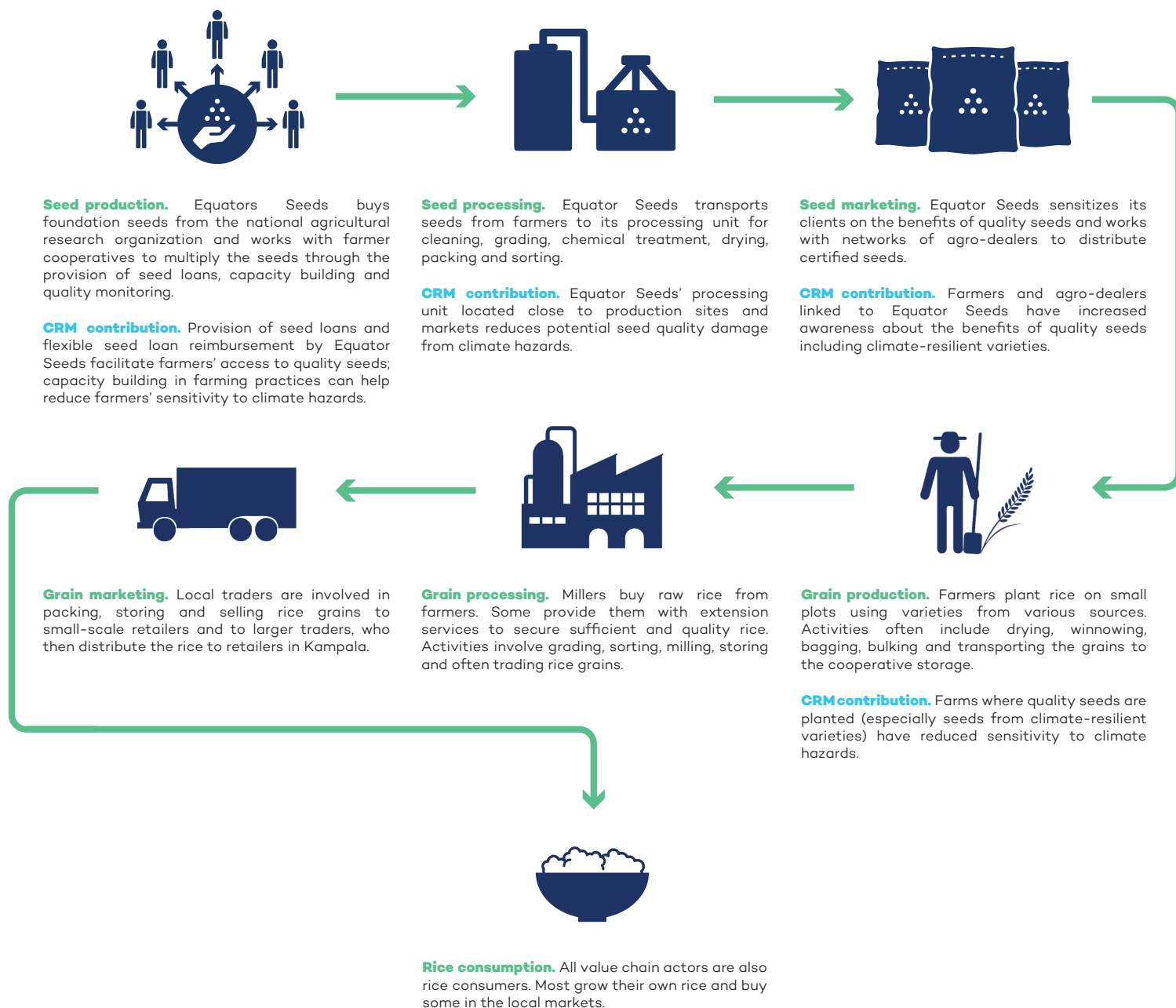


Figure 1: How Equator Seeds activities along the value chain contribute to climate risk management (CRM)

Equator Seeds’ investments were assessed vis-a-vis their contribution to CRM. The company was interested in participating in the study because it had already identified climate variability as one of the main risks in its business plan, and it saw an opportunity to better understand its relationship with different value chain actors. The case study research focused specifically on actors along particular rice value chains in northern Uganda that are linked to Equator Seeds. The area of the value chains includes the district of Gulu, including Gulu municipality which is the major regional trade hub where Equator Seeds’ processing unit is located, and the rice growing districts of Amuru and Nwoya, where value chain actors are linked to Equator Seeds either directly (i.e., they obtain rice seeds from Equator Seeds) or indirectly (e.g., they buy rice seeds and/or grains from farmers who are linked to Equator Seeds) (see Figure 2 for the location of the districts). A qualitative, participatory approach was developed and piloted based on a five-step process described in Table 1.



Figure 2: Location of case study research in Uganda

Table 1: Overall five-step approach of the PSI-Climate Initiative

Steps	Purpose	Methods
1. Climate analysis	Analysis of the current climate hazards affecting the selected value chains, their impacts on the activities of the different actors and the factors that contribute to their vulnerability; analysis of the results in the context of increased climate uncertainties.	<ul style="list-style-type: none"> Literature review Semi-structured interviews and focus group discussions with value chain actors
2. Analysis of benefits and challenges associated with Equator Seeds’ investments	Document the general benefits and/or constraints associated with Equator Seeds’ investments as perceived by the different actors along the value chains and analysis of the results from a CRM lens.	<ul style="list-style-type: none"> Semi-structured interviews and focus group discussions with value chain actors
3. Identification of additional investment options by Equator Seeds (and other seed companies) to support CRM along the value chains	Identify options for improving Equator Seeds (and other seed companies) investment impact in terms of CRM along the value chains.	<ul style="list-style-type: none"> Key experts workshop
4. Prioritization of investment options by domestic agricultural input companies	Test options against decision-making criteria of different actors along the value chains and determine what option, or combination of options, will be most robust to support CRM.	<ul style="list-style-type: none"> Multi-criteria analysis with value chain actors (incl. seed companies)
5. Identification of policy options to support domestic agricultural input companies’ investments	Identify policy actions that enable domestic private sector, especially agro-input providers, to support value chain CRM.	<ul style="list-style-type: none"> Policy analysis National policy workshop



Key Findings

Climate change provides new challenges and opportunities for small agricultural businesses. The research shows that climate hazards, and especially droughts, already negatively impact all actors along the rice value chains but in different ways and to different degrees—these findings are further documented in Dazé and Dekens (2016a) and are generally in line with previous research conducted by IISD in the coffee sector (Dekens & Bagamba, 2014). Climate hazards can affect the quantity and quality of seeds, with cascading impacts along the entire value chain through reduced quality and quantity of rice grains. Smallholder farmers are often the most vulnerable actors due to their limited resources. Most actors are responding to these risks by diversifying their activities. Because its business largely depends on the multiplication of seeds by farmers, Equator Seeds experiences indirect negative effects of climate hazards at the seed-production level through reduced income. As already noted, the company has identified climate variability as one of the main risks in its business plan, and it produces and distributes both traditional and newly released seed varieties, including climate-resilient varieties. Most newly released rice varieties available in Uganda have climate-resilient attributes, particularly in terms of heat tolerance and shorter maturation time, and their uptake is supported by the Government of Uganda.²



Photo credit: Julie Dekens

Climate change heightens the need for high-quality and diverse products and services. In general, any business's reputation depends on its ability to deliver diverse (or specialized) and quality products that can be accessed in a consistent, flexible and timely manner. Indeed, this is a central objective of Equator Seeds (Equator Seeds Limited, 2014). In the context of climate change, these characteristics are becoming even more important to business continuity due to the increasing uncertainties associated with it. Quality seeds can be defined as seeds that meet criteria of high germination percentage, physical and genetic purity, absence of disease and disease organisms and proper moisture content and weight. For these reasons, these seeds have the potential to generate higher yields and are less sensitive to pests and diseases and climate hazards. Farmers planting quality seeds—and particularly quality seeds from newly released varieties with climate-resilient attributes—have reduced sensitivity to climate hazards. In addition, farmers and agro-dealers need to access a wide range of seed varieties and crops (both from traditional and newly released varieties) to best respond to uncertainties arising from climatic and non-climatic factors. For example, some seeds are better for drought conditions, while other are better suited to wet conditions.

Consistent, flexible and timely delivery of products and services can make a significant contribution to managing climate risks. In general, the delivery of products and services is as important as the nature of the products and services. The ability to provide an adequate and consistent supply of quality seeds (e.g., through having stocks to buffer fluctuation in seed quantity) is important to help farmers plan for crop production and maximize benefits when conditions are favourable. Value chain actors in the case study area are already observing a change in rainfall patterns, and this calls for increased flexibility and timeliness—i.e., making requisite seeds immediately available whenever needed—in the supply of seeds to help farmers manage associated risks. Timely supply of seeds can also help farmers recover more rapidly in case their harvest has been affected in the previous season by a climate hazard. Compared to large companies, small agriculture businesses are often located closer to

² For example, Nerica 4 has a four-month maturation period compared to five to six months with traditional varieties such as Sindano and Nylon.



their business partners and clients, which can help them with flexibility and timeliness. Flexible seed loans reimbursement is also important because often if yield is affected by a climate hazard, farmers also do not have the money to buy seeds and will resort to the local grain market to buy rice seed, as it is cheaper and they are cash-strapped.

Small agricultural businesses provide complementary services (such as training) to their business partners and clients, thereby offering more comprehensive solutions that can support value chain CRM. Private agricultural extension services play a key role in ensuring quality and stable products and services particularly in countries with limited public extension services such as Uganda. For example, Equator Seeds invests in capacity building in agronomic practices, seed loans and regular quality monitoring through field inspections to farmer cooperatives, thereby contributing to improved relationships with suppliers and customers. Figure 1 illustrates how Equator Seeds' investments support the management of climate risk—especially at the production level of the value chain—with potential benefits for other value chain actors in terms of rice quality and quantity. Our case study shows that the provision of these services benefits farmers, including in terms of supporting their capacity to deal with climate risks, and can create a domino effect, with farmer cooperatives and agro-dealers gaining increased access to other service providers thereby improving the overall business ecosystem, which is a prerequisite to supporting CRM.

Priority Investment Options for Small Agriculture Businesses

The research further identified a combination of investment options for small agricultural businesses—particularly seed providers³—to support CRM along the value chains and their own operations. These options are win-win solutions that have been prioritized by all value chain actors.

✦ **Support farmers and agro-dealers in making more informed decisions about seed choices, helping them understand and assess trade-offs and manage climate risks.**

The research highlights that having the “right” quality seed, or combination of seeds, to sell or obtain at the “right” time and place, can make a significant contribution to managing climate risks. But seed choices can be complex because different variables influence decision making—including climate, taste, yield and demand. Different varieties of rice have one or more than one attribute (e.g., high yield, heat tolerance, aroma, ease of post-harvest processing). Seed choices may involve trade-offs among different objectives and seed attributes (e.g., high yield versus aroma). Different actors may prioritize different seed attributes depending on their role along the value chain (e.g., processors may favour high milling percentage and low breakage qualities while distributors may favour grain colour, shape and size). Some seed types may be high yield at the production level but generate a low yield at the processing level due to vulnerability to breakage.

Support for informed decision making related to seed choices can include which variety is most appropriate for what geographical conditions and the particular weather patterns projected for the growing season; markets where the seed may be obtained; and appropriate farming practices needed to reduce the impacts of climate hazards on seed production. For example, climate-resilient varieties may not always be the most appropriate seed to promote depending on the context.

³ As the research in Uganda was conducted with a seed company, the information gathered was focused on seed providers instead of agricultural inputs providers in general. Other inputs (e.g., fertilizer, machinery) are likely also important but may involve different opportunities and challenges.



✦ **Raise awareness of suppliers and customers on the benefits of climate-resilient products and services.**

In Uganda, as in other developing countries, various seed varieties exist, including both traditional varieties (or “local,” indigenous varieties) and newly released varieties (or “improved” varieties).⁴ The research shows that value chains actors do not always prioritize newly released varieties with climate-resilient attributes. The majority of the farmers in Uganda prefer to use home-saved seeds, primarily from traditional rice seed varieties. Rice is a self-pollinated crop which allows seeds to be saved by farmers from one season to the other while maintaining genetic purity. Farmers recycle seeds from one season to the other instead of getting new parent materials from domestic seed companies and agro-dealers. Recycling home seeds is less expensive in the short term, but these seeds are generally more sensitive to pests and diseases and climate hazards and generate lower yield. Over time, the quality of these recycled rice seeds tends to decrease, which increases farmers’ sensitivity to the negative impacts of climate hazards. Different factors explain the preferences for home-saved seeds, including the lack of knowledge and information on the characteristics of newly released varieties.

Farmers and agro-dealers need to understand the benefits associated with the use of climate-resilient seeds. The research findings show that using radio programs and demonstration plots to raise farmers’ and agro-dealers’ awareness may be particularly relevant in the Ugandan context.

✦ **Strengthen systems for production, distribution and quality control of climate-resilient products and services through standards and partnerships.**

To support high-quality, consistent and timely supply of products and services, small agriculture businesses need to invest in appropriate production and distribution systems. Field inspections and certification are particularly important to ensure quality seeds. Counterfeit seeds, which remain a major issue in Uganda, lead to low yield and are most susceptible to pests and diseases and the negative impacts of climate hazards. Strong quality-assurance systems also allow seed companies and agro-dealers to secure their credibility with their customers. This often calls for improved coordination and partnerships among small agricultural businesses.

Small businesses have limited resources, and the development and promotion of their products (including products that support CRM) often rely on the resources and services (e.g., land, transport, information) of other value chain actors. The value chains in which they operate tend to be fragmented, with many actors and intermediaries. For example, Equator Seeds needs to collaborate with: researchers for accessing foundation seeds; farmer cooperatives for seed multiplication; agro-dealers for seed distribution, the Ministry of Agriculture for inspections and certification, and other seed companies and the media to raise awareness of new products. For climate-resilient seeds to reach isolated communities, domestic seed companies need to collaborate with sales agent networks located closer to their clients.

These priority investment options are interlinked; none of them will be particularly effective on its own, so a combination of these priority options would likely be the most helpful in enabling value chain actors to manage climate risks.

⁴ All newly released rice varieties are improved varieties; some—but not all—traditional varieties can also be improved varieties.





Recommendations for Researchers and Practitioners

Moving forward, there are a number of areas for further research and action to strengthen small agricultural businesses—and particularly agricultural input providers—to further support CRM by different actors along agricultural value chains:

Strengthening the enabling environment for the adoption of climate-resilient products and services. The research case study shows that quality seeds matter; they are a prerequisite to building climate-resilient value chains because all value chain actors are dependent on the quantity and quality of seeds among other factors. But quality seeds alone do not automatically lead to climate-resilient agricultural value chains. Realizing the full potential of quality seeds (including climate-resilient varieties) that support value chain CRM depends on the functioning of the broader system that supports value chain development, such as infrastructure, information, and markets. The research shows that while the seed system in Uganda is already quite well developed compared with other countries in Africa, it is not yet operating effectively (e.g., in terms of access to foundation seeds, control for quality seeds, information about new seeds) and this prevents farmers and other actors from fully benefiting from the advantages of using new technologies such as climate-resilient varieties.

Enhance the capacity of small agriculture businesses to integrate climate risks into their decision making using a value chain approach. Small agriculture businesses tend to have fewer resources to adapt to climate risks compared to larger businesses. They also have limited time and resources to take a more integrated, collaborative approach and fully understand the impacts of their investment decisions in the long term. Many actors lack an understanding of the interconnection between all actors along the value chains; as a result, a lack of trust, transparency, exchange of information and competition—rather than cooperation—are common and tend to lead to suboptimal results along entire value chains. Small agriculture businesses need to be supported to access relevant weather and climate information, to understand the implications of this information for their operations and their clients and suppliers and take necessary actions accordingly.

Explore the role of small agriculture businesses as potential climate knowledge brokers. Building on the previous point, it may be particularly strategic to focus capacity-building efforts on those who have the potential to influence multiple actors at important decision points. For example, Equator Seeds influences farmer cooperatives, agro-dealers and service providers in their everyday decisions. Integrating CRM into their private extension services in ways tailored to the needs of different clients could have powerful multiplier effects. Similarly, agro-dealers can play a brokering role between seed companies and farmers by helping farmers make more informed decisions when it comes to seed choices, including on the advantages of using climate-resilient seeds in specific contexts. Agro-dealers can facilitate timely seed supply, promote awareness of climate-resilient seeds and thus increase seed uptake and demand. In case of a climate hazard, they can inform the company about the needs of their clients to help them adjust their activities and provide products and services better tailored to their clients' needs. However, agro-dealers need to be trained to offer accurate information. Investments by the government, NGOs and seed companies should therefore also concentrate on improving on the knowledge and skills of agro-dealers in CRM.

Support small businesses' access to, and use of, climate and weather information. The timely supply of climate and weather information, in formats that are accessible and relevant for decision making, remains a barrier to actors wanting to invest in CRM. This includes Equator Seeds, as well as other service providers and actors along the value chains. Addressing this challenge is beyond the role of small agriculture businesses and would require further investment and capacity building for national meteorological agencies.



Help MSMEs access climate finance from development assistance to build the business case for value chain CRM to domestic financial institutions. Bilateral and multilateral development agencies are increasingly interested in supporting MSMEs' engagement in climate adaptation. For example, as part of its Private Sector Facility, the Green Climate Fund (GCF), a new multilateral fund under the UN Framework Convention on Climate Change, has established a USD 200 million pilot program in support of MSMEs' climate adaptation and mitigation activities in developing countries. The program aims to offset MSMEs' lack of access to affordable finance, which remains a major gap in most developing countries, including in Uganda (GCF, 2016). Access to affordable financing is important for facilitating investment in climate-resilient products and services. For examples, farmers need access to affordable quality seed, especially after climate hazards, when they do not have cash to buy grain as seed; traders and millers need access to finance to use storage and transport systems that protect seeds from heat and humidity. However, seed companies indicated that banks' understanding of the seed sector is limited. Delays in accessing cash-flow lead to delayed seed multiplication, seed stocks and timely supply to farmers, thus increasing both the company and its clients' vulnerability to the impacts of climate hazards. Helping MSMEs to document the benefits of investing in new products and services that support value chain CRM could help make the business case to commercial banks and facilitate MSME's access to affordable financial products in the long term.





Acknowledgments

The authors would like to thank Annette Kuteesa, Paul Lakuma and Miriam Katunze (Economic Policy Research Centre) and Tonny Okello (Equator Seeds) for their contribution to the field research in Uganda. We also thank Anne Hammill (IISD) and Astrid Mastenbroek (Wageningen University) for providing useful comments to initial draft of this briefing note.

Cover photo: IISD

References

- Amado, J-C., Adams, P., Coleman, H., Schuchard, R. (2012). *Value chain climate resilience. A guide to managing climate impacts in companies and communities*. Acclimatise, Oxfam and BSR. Retrieved from https://www.bsr.org/reports/PREP-Value-Chain-Climate-Resilience_copy.pdf
- Dazé, A. & Dekens, J. (2016a). *Enabling climate risk management along agricultural value chains: Insights from the rice value chain in Uganda*. IISD. Climate-Resilient Value Chains and Food Systems Briefing Note Series. Retrieved from <http://www.iisd.org/sites/default/files/publications/crm-insights-from-rice-value-chain-uganda.pdf>
- Dazé, A. & Dekens, J. (2016b). *Financial services for climate-resilient value chains: the case of the Centenary Bank in Uganda*. IISD. Climate-Resilient Value Chains and Food Systems Briefing Note Series. Retrieved from <https://www.iisd.org/sites/default/files/publications/climate-resilient-value-chains-case-centenary-bank-uganda.pdf>
- Dekens, J. & Bagamba, F. (2014). *Promoting an integrated approach to climate adaptation: Lessons from the coffee value chain in Uganda*. IISD. Climate-Resilient Value Chains and Food Systems Briefing Note Series. Retrieved from https://www.iisd.org/sites/default/files/publications/value_chains_coffee_uganda_briefing_note.pdf
- De Kok, J., Deijl, C. & Veldhuis-Van Essen, C. (2013). *Is small still beautiful? Literature review of recent empirical evidence on the contribution of SMEs to employment creation*. GIZ and ILO. Retrieved from http://www.enterprise-development.org/wp-content/uploads/Is_Small_Still_Beautiful.pdf
- Dougherty-Choux, L., Terpstra, P., Kammila, S., & Kurukulasuriya, P. (2015). *Adapting from the ground up. Enabling small businesses in developing countries to adapt to climate change*. World Resources Institute (WRI) and UNDP. Retrieved from http://www.unclearn.org/sites/default/files/inventory/adapting_from_the_ground_up.pdf
- Equator Seeds Limited. (2014). *Business Plan 2014-2018. Five Year Business Plan for Production, Processing, Marketing of Farm Seeds and Agro-Inputs*.
- Green Climate Fund (GCF). (2015). *Private sector facility: Working with local private entities, including small and medium-sized enterprises*. Meeting of the Board, 24-26 March 2015, Songdo, Republic of Korea. Retrieved from https://www.greenclimate.fund/documents/20182/24949/GCF_B.09_12_-_Private_Sector_Facility__Working_with_Local_Private_Entities__including_Small_and_Medium-Sized_Enterprises.pdf/60efa4f5-a68e-4111-8239-9fb492d7a996
- GCF. (2016). *Establishing a programmatic framework for engaging with micro-, small- and medium-sized enterprises*. Meeting of the Board, 28-30 June 2016. Songdo, Incheon, Republic of Korea. Retrieved from https://www.greenclimate.fund/documents/20182/226888/GCF_B.13_15_-_Establishing_a_programmatic_framework_for_engaging_with_micro_-_small-_and_medium-sized_enterprises.pdf/558ec8ba-f0f8-455a-a8ce-8544de51f719



GIZ India. (2012a). Facing the Impacts of Climate Change: Indian MSMEs and Adaptation. Prepared by Adelphi for GIZ. Retrieved from <https://www.giz.de/en/downloads/giz2013-en-climate-risk-study.pdf>

GIZ India. (2012b). *The advantages of adaptation: Big opportunities for small business– climate change adaptation innovatioN: Opportunities for Indian micro-small & medium sized business (MSMEs)*. Prepared by E&Y India for GIZ. Retrieved from <https://www.giz.de/en/downloads/giz-2012-climate-opportunity-study-en.pdf>

International Fund for Agricultural Development (IFAD). (2015). How to do climate change risk assessments in value chain projects. IFAD. Retrieved from <https://www.ifad.org/documents/10180/30b467a1-d00d-49af-b36b-be2b075c85d2>

International Labor Organization (ILO). (2015). *Small and medium-sized enterprises and decent and productive employment creation*. International Labour Conference. 104th Session. Report IV. International Labor Office, Geneva. Retrieved from http://www.ilo.org/wcmsp5/groups/public/@ed_norm/@relconf/documents/meetingdocument/wcms_358294.pdf

Kuruppu, N. Murta, J., Mukheibir, P., Chong, J., & Brennan, T. (2013). Understanding the adaptive capacity of Australian small-to-medium enterprises to climate change and variability. National Climate Change Adaptation Research Facility. Gold Coast. Retrieved from <https://www.weadapt.org/sites/weadapt.org/files/legacy-new/knowledge-base/files/1206/51a73ec26dd8dfinal-report-understanding-the-adaptive-capacity-of-australian-small-to-medium-enterprises-to-climate-change-and-variability.pdf>

Lim-Camacho, L. Crimp, S., Ridoutt, B., Ariyawardana, A., Bonney, L., Lewis, G., Howden, S.M., Jeanneret, T., & Nelson, R. (2016). *Adaptive value chain approaches. Understanding adaptation in food value chains*. CSIRO. Retrieved from <https://adaptivevaluechains.com/assets/Adaptive-Value-Chains-Final-Report.pdf>

Lemma, A., Jouanjean, M.A., & Darko, E. (2015). *Climate change, private sector and value chains: Constraints and adaptation strategies*. ODI. Retrieved from <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9824.pdf>

Mastrandrea, M. D. et al. (2015). *IPCC Expert Meeting on climate change, food and agriculture. Meeting report*. Dublin, Ireland. 27-29 May 2015. Retrieved from https://www.ipcc.ch/pdf/supporting-material/Food-EM_MeetingReport_FINAL.pdf

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). (2012). *Uganda National Rice Development Strategy (NRDS) 2008-2018*. Republic of Uganda, Kampala.

MAAIF. (2015). *Agriculture Sector Strategic Plan 2015/16-2019/20*. Final draft. Government of Uganda.

Population Reference Bureau (PRB). (2015). *2015 World Population Data Sheet*. PRB, Washington, DC.

Reynolds, L. M.J. Bradley & Associates, LLC. (2013). *Climate change preparedness and the small business sector*. Small Business Majority and the American Sustainable Business Council. Retrieved from http://asbcouncil.org/sites/default/files/small_business_climate_report.pdf

Uganda Bureau of Statistics (UBOS). (2016). *The national population and housing census 2014 – Main report*. Kampala, Uganda.

© 2016 The International Institute for Sustainable Development
Published by the International Institute for Sustainable Development.

INTERNATIONAL INSTITUTE FOR SUSTAINABLE DEVELOPMENT

The International Institute for Sustainable Development (IISD) is one of the world's leading centres of research and innovation. The Institute provides practical solutions to the growing challenges and opportunities of integrating environmental and social priorities with economic development. We report on international negotiations and share knowledge gained through collaborative projects, resulting in more rigorous research, stronger global networks, and better engagement among researchers, citizens, businesses and policy-makers.

IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States. IISD receives core operating support from the Government of Canada, provided through the International Development Research Centre (IDRC) and from the Province of Manitoba. The Institute receives project funding from numerous governments inside and outside Canada, United Nations agencies, foundations, the private sector, and individuals.

Head Office

111 Lombard Avenue, Suite 325
Winnipeg, Manitoba
Canada R3B 0T4

Tel: +1 (204) 958-7700

Website: www.iisd.org

Twitter: @IISD_news

Geneva Office

International Environment House 2
9 chemin de Balexert, 1219 Châtelaine
Geneva, Switzerland

Tel: +41 22 917-8683

Website: www.iisd.org

Twitter: @IISD_news



IISD.org