

Elevating Evidence on the Climate Poverty Nexus

Climate Resilient Policies and Product Options
in Upper Egypt

*SIPA's Economic and Political Development
Workshop in Sustainable Development Practice*



Photo: The Niqab Girl. (2019). #madeinegypt. <https://theniqabgirl.com/tag/madeinegypt/>

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Professor Barbara Magnoni

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من يزرع اللطف يحصد الصداقة، ومن يزرع الطيبة يجمع الحب

"He who sows courtesy reaps friendship, and he who plants kindness gathers love."

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Team members:

Paras Abbasi (pa2643@columbia.edu)

Abbygale González (ag4631@columbia.edu)

Yolanda Ji (mj2777@columbia.edu)

Sara Rashid (sr3981@columbia.edu)

Maggie Rogers (mar2364@columbia.edu)

Tasnima Zaman (tz2448@columbia.edu)

Egypt has been facing climate variability and its effects on agriculture and productivity for the past four thousand years since Joseph (Prophet Yousef) averted the disaster through a series of resource management strategies well documented in history.¹ Joseph was able to develop a flawless mitigation strategy because he had a perfect climatic forecast. In the absence of such perfect forecasts today, Egypt must rely on mitigation and adaptation strategies and analysis of socio-economic systems that are affected by those strategies.

¹ Mahmoud, M. A. (2019). Impact of Climate Change on the Agricultural Sector in Egypt. In A. M. Negm (Ed.), *Conventional Water Resources and Agriculture in Egypt* (pp. 213–227). Springer International Publishing. https://doi.org/10.1007/698_2017_48

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LIST OF ACRONYMS

AAMFI - Alliance of African Multilateral Financial Institutions

AFRICA RE - Africa Reinsurance Corporation

AUC - American University of Cairo

AYII - Area Yield Index Insurance

CARE - Cooperative for Assistance and Relief Everywhere

CEF - CARE Egypt Foundation

COP - Conference of Parties

CSA - Climate-Smart Agriculture

CST - Climate-Smart Technologies

FAO - Food and Agriculture Organization

FEDA - Federation for Economic Development Associations

FIRD - Furrow Irrigated Raised Bed

FRA - Egyptian Financial Regulatory Authority

GERD - Grand Ethiopian Renaissance Dam

ICD - Islamic Corporation for the Development of the Private Sector

IsDB - Islamic Development Bank

IMF - International Monetary Fund

ISF - InsuResilience Solutions Fund

ILO - International Labour Organization

IRI - International Research Institute for Climate and Society

ITDG - Intermediate Technology Development Group

J-PAL - Abdul Latif Jameel Poverty Action Lab

KENAFF USSD - Kenya National Farmers' Federation Unstructured Supplementary Service Data

MENA - Middle East and North Africa

MFI - Microfinance Institution

MPI - Multidimensional Poverty Index

MWRI - Ministry of Water Resources and Irrigation

NGO - Non-governmental organizations

NWFE - Nexus of Water-Food-Energy program

OPHI - Oxford Poverty & Human Development Initiative

RCT - Randomized Controlled Trial

REDEC - Regional Development Center for Small and Medium Enterprises

RSBY - Rashtriya Swasthya Bima Yojana

SDG - Sustainable Development Goals

SFSD - Sawiris Foundation for Social Development

SIPA - School of International and Public Affairs

UNDP - United Nations Development Programme

UNICEF - United Nations International Children's Emergency Fund

USAID - United States Agency for International Development

VSLA - Village Savings and Loan Associations

TECHNICAL TERMS

Climate Change Adaptation: Adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. The changes in processes, practices, or structures to moderate or offset potential damages or to take advantage of opportunities associated with changes in climate.

Climate Mitigation: Actions to limit the magnitude or rate of long-term climate change, typically involving reductions in human emissions of greenhouse gasses.

Climate Resilient Policies: Strategies and policies designed to mitigate the impacts of climate change while ensuring that development efforts can withstand the changes and stresses associated with climate variability.

Climate Smart Agriculture: Comprehensive approach that aims to increase agricultural productivity and incomes, adapt and build resilience to climate change, and reduce or remove greenhouse gas emissions, all tailored to local conditions.

Climate Vulnerability: The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

Desertification: The process by which fertile land becomes desert, typically as a result of drought, deforestation, or inappropriate agriculture.

Financial Inclusion: The availability and equality of opportunities to access financial services, a process that ensures ease of access, availability, and usage of the formal financial system by all members of an economy.

Microcredit: A small amount of money loaned to a client by a bank or other institution. Microcredit is often used to give the poor access to capital for investment in small business or personal enterprises.

Microfinance Institutions: Financial organizations that provide small loans and other financial services to individuals and small businesses that do not have access to traditional banking services. These services are often targeted at low-income or underserved populations.

Multidimensional Poverty Index: A measure of poverty that captures several dimensions of deprivation at the household and individual level, it can include a variety of indicators, such as education, health, and

living standards.

Savings Groups: Informal groups that pool their money to save together and make small loans to each other from those savings. A savings group can provide financial services in areas that formal financial institutions often cannot reach.

Sustainable Development Goals: A collection of 17 global goals set by the United Nations General Assembly in 2015 for the year 2030. These goals are intended to ensure peace and prosperity and encompass social, economic, and environmental development issues.

Water Scarcity: A condition characterized by the insufficient availability of water resources to meet the demands of water usage within a region. It often results from two converging phenomena: decreasing quantity or quality of freshwater resources and increasing demand for water for various uses.

EXECUTIVE SUMMARY

Egypt is a particularly important area of focus in the development space given its position at the crossroads of the climate-poverty nexus. With looming economic challenges and vulnerabilities from climate change-induced water scarcity including food insecurities, the agrarian community in Upper Egypt will need policies and financial opportunities to improve their livelihoods.

The Sawiris Foundation plays an important role in engaging Upper Egypt's lower-income rural communities with microfinance programs. They offer expertise in research and on-the-ground community development work, as well as a long-standing commitment to poverty alleviation, sustainable development, and inclusivity.

The Columbia-SIPA team spent six months working with their client, Sawiris, to address the climate-poverty nexus in Upper Egypt. More specifically, the objective of this research was to determine the climate change related challenges farmers in the Qena governorate experience in regards to their agricultural production and income generation. Then, the goal was to produce multiple microfinance product and policy options for Sawiris to implement into their work.

The methodology put forth by the Columbia-SIPA team consisting of a survey, interviews with farmers and MFIs in Qena as well as experts inside and outside of the country, in-depth desk research, and lastly, the use of the Multidimensional Poverty Index, has helped to identify the critical needs of our target community. From these findings, the team established six clear, actionable partnership-led microfinance product and policy recommendations for the client and other major stakeholders to implement. The outcomes of this study will allow Sawiris to continue to play a key part in supporting the sustainable development goals and climate resilience in the region.

INTRODUCTION

As the global community is threatened by the unprecedented environmental changes brought on by climate change, the intersection of climate and poverty emerges as a critical area of concern, demanding immediate attention and action. The Sawiris Foundation for Social Development (SFSD), with its long-standing commitment to alleviating multidimensional poverty in Egypt, recognizes the urgent need to adapt to these new challenges. The Foundation's mission is further complicated by the climate crisis, which poses significant threats to the development and well-being of the most marginalized communities in Upper Egypt. To tackle these challenges, we as a student team from Columbia School of International and Public Affairs (SIPA), collaborated with SFSD to launch this project.

Problem Statement

The climate crisis has far-reaching implications that transcend environmental degradation, extending to increased poverty, unemployment, water scarcity, food insecurity and displacement, with a disproportionate impact on those already at the margins. In Egypt, particularly in the agriculturally rich yet climate vulnerable Nile Delta, the sea-level rise threatens to submerge critical farmland, exacerbating food insecurity and socioeconomic disparities. The World Bank projects that by 2030, climate change could plunge an additional 130 million people globally into extreme poverty, primarily due to health crises and surges in food prices.² The SFSD has identified the need to integrate climate resilience into the fabric of development strategies, especially for frontline communities whose livelihoods rely heavily on natural resources. Climate change and related water shortages will be the biggest challenge in the foreseeable future.

Objective

With the problem determined, the Sawiris Foundation has engaged our capstone team to forge a path toward climate-resilient microfinance, acknowledging the intricate climate-poverty nexus as reflected in the Multidimensional Poverty Index (MPI) for Upper Egypt. The overarching goal is to identify policy and product options that can empower smallholder farmers and livestock holders, enhancing their ability to withstand and bounce back from climate-induced adversities.

The project entailed a rigorous analysis of the current landscape of microfinance and its interplay

² Sawiris foundation TOR, October 2023.

with climate variables, identifying innovative approaches that could serve as buffers against the shocks of climate change. The team conducted comprehensive desk research, expert interviews, and on-the-ground investigations in rural areas in Upper Egypt as well as Cairo to unravel the complexities of this nexus and to propose actionable microfinance solutions. The project was positioned to contribute significantly to the SFSD’s vision of a sustainable and equitable development framework that not only addresses poverty in its present form but also preemptively fortifies and protects communities and their livelihoods against the looming shadows of climate change.

BACKGROUND

Country Overview

Egypt is located in northeast Africa, with its capital in Cairo. The country is bordered by Libya and Sudan and surrounded by the Mediterranean and Red Sea.³ Egypt is the most populous country in the MENA region and the third most populous country in Africa,⁴ with 112.7 million people, about 57 per cent making up the rural landscape. While Arabic is the official language, English and French are also widely spoken. 90 percent of Egyptians are Sunni Muslims, and the rest are Christian, with most being Coptic Orthodox. The government structure is a presidential republic with a bicameral parliament consisting of the Majlis Al-Shuyoukh (the Senate) and the Majlis Al-Nowb (House of Representatives). Women make up almost 28 per cent of the parliament. Abdelfattah El-Sisi has been the president and head of state since June 2014. The head of government, on the other hand, has been Prime Minister Mostafa Madbouly since 2018.⁵

History

Egypt is known for its deep history and rich cultural heritage, known as “Umm Al-Dunya” or “Mother of the World.” The earliest settlements in the Nile Valley began around 7000 BCE. Through a history of various conquests, Egypt is a product of many cultural insertions. In the

³ Egypt - Country Background, UNICEF, <https://www.unicef.org/egypt/country-background>.

⁴ Embracing Change, Achieving Prosperity, *Production Transformation Policy Review of Egypt*, OECD (2021).

⁵ Egypt Country Profile, USAID (2023), <https://idea.usaid.gov/analytical-products#tab-country-profiles>.

mid-19th century, the Suez Canal was built to connect the Mediterranean to the Red Sea, serving as a key trade route between Europe, Asia, and Africa. The canal building eventually led to bankruptcy, enabling the British to take over the project and transform the country into a British protectorate. In 1922, Egypt gained independence, still under heavy British influence.⁶

The remainder of the 20th century saw various regional power struggles. In 1928, the Muslim Brotherhood emerged to reorient Egypt away from Western influence. In 1948, Egypt participated in the Israeli-Arab war. In 1956, Gamal Abdel Nasser became president and nationalized the Suez Canal to fund the Aswan High Dam. This nationalization led to the failed invasion by Britain, France, and Israel. In 1967, Egypt engaged in war with Israel, leading to Israel's takeover of the Sinai and its later return after the 1973 war. In 1975, the Suez Canal was reopened.⁷

At the beginning of the 21st century, Egypt experienced much internal political turmoil. In the 2011 Arab Spring protests, massive demonstrations occurred in Cairo's Tahrir Square, calling for the fall of former president Mubarak and his government. Many protesters were killed as a result. Afterwards, in the first popular elections, Muslim Brotherhood leader Mohamed Morsi was president, only to be ousted following popular protests by his Defense Minister (and current president) Abdel Fattah el-Sisi⁸.

After experiencing a deep economic crisis in 2016 characterized by a low annual growth rate and high public debt,⁹ the IMF approved a three-year \$12 billion loan to Egypt.¹⁰ The Egyptian economy faced new struggles with the arrival of the COVID-19 pandemic, suffering a sudden stop in tourism-which accounted for around 12 percent of GDP and 10 percent of employment.¹¹ Russia's war in Ukraine has led to a massive blow to the economy. Egypt lost Ukraine, a major supplier of affordable cereal grains, contributing to its current economic crisis. The exchange

⁶ Egypt Timeline, BBC, <https://www.bbc.com/news/world-africa-13315719>.

⁷ Ibid.

⁸ Ibid.

⁹ Momani, Bisma, Egypt's IMF program: Assessing the political economy challenges, Brookings Institute, <https://www.brookings.edu/articles/egypts-imf-program-assessing-the-political-economy-challenges/>.

¹⁰ Egypt Timeline, BBC.

¹¹ Egypt: Overcoming the COVID Shock and Maintaining Growth, IMF (2021), <https://www.imf.org/en/News/Articles/2021/07/14/na070621-egypt-overcoming-the-covid-shock-and-maintaining-growth>.

rate began falling, leading to inflation and a rise in food prices, significantly impacting the working classes.¹² Currently, with Israel's renewed violence against Palestinians, Egypt remains in a mediatory role, offering relief across the siege.¹³ The continuing violence will have implications for the capacity of the entire region.

Economy

The World Bank classifies Egypt as a lower-middle-income country. The GDP per capita is about 4,300 USD. The annual GDP growth is 4.2 percent¹⁴ with 2 percent of GDP coming from foreign donors.¹⁵ Trade characterizes about 37 percent of GDP. Foreign direct investment is about 11 billion USD annually.¹⁶ Egypt is Africa's third-largest economy, following Nigeria and South Africa, making up 12.5 percent of the continental GDP.¹⁷ About 1.5 percent of the population lives under the poverty line, which is considered \$1.9/day.¹⁸

Egypt's largest sectors are agriculture, energy, textiles and tourism. The majority of land in the country is arid desert land, with only 3.7 percent of the country's 100 million hectares appropriate for agriculture. The Nile Valley and Delta make up an estimated 6 million acres. Agriculture contributes about 11.3 percent of the country's GDP. The agricultural sector accounts for 28 percent of all jobs and over 55 percent of employment in Upper Egypt. Egypt's agricultural sector mainly consists of small farms using traditional practices to produce crops such as rice, wheat, corn, cotton, sugarcane, tobacco, and onions.¹⁹ USAID has provided \$1.4 billion in investments to the agriculture sector in Egypt since 1978, helping more than 500,000 smallholder farmers to purchase land, improve farm management techniques and access financial services and free markets. This aid is essential to supporting the Egyptian government's goals to combat food security. In the 2023 SDG Summit, Egypt committed to ending poverty and hunger

¹² Egypt in the Balance, International Crisis Group (2023), <https://www.crisisgroup.org/middle-east-north-africa/north-africa/egypt/egypt-in-the-balance>.

¹³ Egypt-Gaza Rafah Crossing Opens, Allowing 20 Aid Trucks Amid Israeli Siege, Al-Jazeera (2023), <https://www.aljazeera.com/news/2023/10/21/rafah-border-crossing-between-gaza-egypt-opens-for-aid-trucks>.

¹⁴ Egypt Overview, The World Bank, <https://www.worldbank.org/en/country/egypt/overview#>

¹⁵ Egypt - Economy, USAID, <https://idea.usaid.gov/cd/egypt/economy>.

¹⁶ Ibid.

¹⁷ Embracing Change, OECD.

¹⁸ Egypt - Economy, USAID.

¹⁹ Ibid.

by 2027.²⁰ Financial and agricultural support to smallholder farmers impacted by food insecurity and multidimensional poverty are thus essential to accomplishing these goals.²¹ In the agricultural sector, the employment rate is about 20 percent, according to the ILO, and child employment (ages 7-14) is 53 percent, according to the World Bank. The country imports about 21 percent of their food and exports about 14 percent.²²

In Egypt, cultivated areas have been steadily expanding in recent years, a trend expected to continue due to government initiatives aimed at increasing agricultural land. Moreover, there are more smallholding agricultural lands. Nearly all cropland relies on irrigation for cultivation. Notably, rice and sugarcane stand out as the primary consumers of irrigation water, owing to their extensive land coverage and high water demands.²³ The major crops in Egypt are wheat (used as a staple food crop), maize (used primarily as coarse grain for animal feed), clover, cotton, rice (which grows only in the Delta and the Fayoum Governorate in Middle Egypt), sugar cane (which grows in Upper and Middle Egypt), fava beans, sorghum and soybeans²⁴.

Climate

Egypt is especially susceptible to climate change due to its geographical location and dependence on the Nile. Egypt experiences various climate hazards such as flooding, heat stress, air pollution, and desertification. An estimated 11,736 hectares of agricultural land is lost to desertification each year.²⁵ Egypt responds to climate change challenges through a multi-sectoral approach. Government agencies such as the Ministry of Water Resources and Irrigation (MWRI) and the Ministry of Agriculture and Land Reclamation build partnerships between public and private institutions, including the government, NGOs, foundations, and research centers.

²⁰ UNIC-Cairo, Egypt Working to End Poverty, Hunger by 2027, <https://www.un.org/africarenewal/magazine/october-2023/egypt-working-end-poverty-hunger-2027>.

²¹ Egypt - Agriculture and Food Security, USAID.

²² Egypt - Agriculture and Food Security, USAID.

²³ Eid, H. M., El-Marsafawy, S. M., & Ouda, S. A. (2007). Assessing the Economic Impacts of Climate Change on Agriculture in Egypt: A Ricardian Approach (SSRN Scholarly Paper 1004407). <https://papers.ssrn.com/abstract=1004407>

²⁴ et al.

²⁵ Egypt, USAID.

The Country is particularly vulnerable to climate change because of its dependence on the Nile River as the primary water source. By 2050, climate change could increase water needs by up to 16 percent for summer crops and decrease them by up to 2 percent for winter crops.²⁶

Egypt joined the UN Framework Convention on Climate Change in 1994. Egypt was also the first country in Africa to host the Conference Of Parties (COP27) in Sharm El-Sheikh in November 2022. They established the “Loss and Damage” Fund for higher-income countries to finance climate mitigation and adaptation programs in lower/middle-income countries. The Nexus of Water-Food-Energy (NWFE) program started at COP27 to mobilize international financial and technological support to address energy, water, and food risks.

Egypt is also implementing various measures to improve climate resilience in agriculture. One such program is designed to transform irrigation systems to restrict water-intensive crops and protect land reclamation. Other water management efforts include expanding and rehabilitating canals, building protective infrastructures, and investing in desalination and aquaculture under the responsibility of the Ministry of Water Resources and Irrigation.

Central Issue

Because of Egypt’s arid climate, 95 percent of Egyptians live on less than 6 percent of the land, mostly around the Nile. This region suffers from additional environmental stresses, including extreme temperatures, irregular precipitation, elevated sea levels, land subsidence, coastal flooding, shoreline erosion, deteriorating soil salinity, and persistent drought.²⁷

Egypt’s water scarcity is an environmental priority. The country faces an annual water deficit of around seven billion cubic meters and may run out of water by 2025.²⁸ Around 90 percent is

²⁶ Sheikh, M. (2017). Environmental Migration From Egypt and Morocco: A Comparative Study. Senior Projects Spring 2017. https://digitalcommons.bard.edu/senproj_s2017/373

²⁷ Amar Hamzawy, Mohammad Al-Mailum, Joy Arrkeh, Climate Change in Egypt: Opportunities and Obstacles, Carnegie Endowment for International Peace (2023), <https://carnegieendowment.org/2023/10/26/climate-change-in-egypt-opportunities-and-obstacles-pub-90854>.

²⁸ Water Scarcity in Egypt: Growing Concerns and Partnerships, UNICEF (2021), <https://www.unicef.org/egypt/documents/water-scarcity-egypt#:~:text=Egypt%20is%20facing%20an%20annual,key%20part%20of%20the%20problem>.

generated by the Nile²⁹ and there are few alternative renewable freshwater resources. Water shortages already plague villages nationwide, and rising global temperatures will only worsen drought and competition for water resources. Increased temperatures also lead to increased salinization. Rising sea levels cause seawater from the Mediterranean Sea to come further inland, contaminating water and soil around the Nile Delta and potentially displacing communities. A 2018 study predicts that over 280 square miles of the Nile Delta could be inundated by 2050. Water shortages are common in communities in the Nile Valley and the Delta. During a 2010 water shortage, some villages received running water for only two hours daily. To irrigate, village farmers now rely on using wastewater from nearby towns made of agricultural drainage and sewage.

Long periods of drought and the increasingly hot and arid climate have reduced the Nile River, further compounded by the construction and use of the Grand Ethiopian Renaissance Dam (GERD). Critics have said that the dam's construction will divert essential water from Egypt. Ethiopia began the \$4 billion project in 2020. By the time the project is complete, Egypt could lose access to its main water source. The Egyptian government has increased its efforts to improve its country's irrigation systems by lining canals and encouraging farmers to adopt drip and spray irrigation, which uses less water. The government also placed restrictions on the cultivation of water-consuming crops and threatened to fine farmers who grow crops in undesignated areas.³⁰

Water shortage causes many other problems, namely food insecurity.³¹ Food demands continue to rise because of the annual 2 percent population growth.³² Over 80 percent of Egypt's water supply goes towards agriculture and irrigation; thus, water scarcity directly threatens Egyptian farmers. Periods of drought and excessive flooding make it difficult to maintain agricultural

²⁹ Eliora Goodman, Dual Threats: Water Scarcity and Rising Sea Levels in Egypt, The Tahrir Institute for Middle East Policy (2021), <https://timep.org/2021/08/20/dual-threats-water-scarcity-and-rising-sea-levels-in-egypt/>.

³⁰ Samy Magdy, Water Already Dwindling, Egypt's Farmers Fear Impact of Dam, AP (2020), <https://apnews.com/article/ap-top-news-middle-east-international-news-fc117ce69bfd9d4f5bcdc700c04cc73c>.

³¹ Menna Farouk, Egypt's Farmers Fear Rising Social Tensions Over Scarce Water, Reuters (2022), <https://www.reuters.com/business/cop/egypts-farmers-fear-rising-social-tensions-over-scarce-water-2022-10-31/#:~:text=%22This%20could%20affect%20agricultural%20productivity,own%20water%20shortages%2C%20he%20said>

³² Maria Christoforidou, Gerlo Borghuis, *et al.*, Food Security Under Water Scarcity: A Comparative Analysis of Egypt and Jordan. *Food Security*, (2023), pp. 171–185.

lands. This year, mango farmers in Ismailia lost over 80 percent of their crops due to high temperatures and water shortages.

Climate change is predicted to cause a decrease in wheat and corn output by 15 percent and 19 percent, respectively, by 2050 due to climate-change related crop diseases. Some estimates predict Egypt may suffer up to a 47 percent decrease in overall agricultural output by 2060, supplemented with higher food prices.³³ This will impact smallholder farmers the most by reducing the quality and quantity of food production and agricultural produce for sale, which threatens the risk of greater food insecurity. Egypt already experiences levels of food insecurity because the 2008 world food crisis reduced Egypt's domestic cereal production by 18 percent. The current Russia-Ukraine conflict has further spiked food prices. Extreme temperatures and increased water scarcity have also diminished food production and increased food insecurities, especially for rural communities in Upper Egypt. These issues also lead to prolonged conflict and loss of income and livelihoods. Last year, Egypt launched the 300 billion Egyptian pound New Delta project to develop a 1-million-acre coastal agricultural area to reduce land pressures. However, the project costs will be paid by taxes and higher prices, further stressing Egyptians.

Qena

With Sawiris's financial and agricultural support reaching various communities in Upper Egypt, the foundation hopes to increase and improve its services in the Qena governorate, specifically in responding to climate-related challenges. Therefore, our project was based in Qena, which is located on the east bank of the Nile River. While Qena is governed by the central government based in Cairo, it is divided into separate administrative districts, each with their own local governmental officials who oversee activities in the region. Qena consists of a predominantly Muslim community, with a significant Coptic Orthodox community. The population of the area is fairly young. However, one of the biggest challenges faced by the community is a high unemployment rate, compounded with varying levels of poverty. This gives way to limited access to education, healthcare and adequate infrastructure. Agriculture and livestock are vital parts of the local economy. Farmers in Qena primarily focus on crops such as sugar cane, cotton, grains and vegetables. Small scale farming is prevalent as many families own small plots of land

³³ Goodman. (2021). Dual Threats.

in which they cultivate for subsistence and then sale. Many farmers also utilize traditional farming methods including manual labor and irrigation systems reliant on groundwater from the Nile. In Qena, water scarcity is classified as a high risk with droughts expected to occur on average every five years. Additionally, fluctuations in weather patterns and water availability as well as market prices affect agricultural productivity and income, making farming a risky endeavor for many farmers without appropriate intervention.³⁴

Client Background

Sawiris Foundation for Social Development (SFSD) was founded in 2001 with an endowment from the Sawiris family and a commitment to sustainable philanthropy. Their mission is to “support sustainable development solutions to alleviate poverty and social and economic exclusion, as well as provide equitable educational opportunities for the most marginalized groups in Egypt.” From 2001-2021, Sawiris has provided over 2 billion EGP in development financing, reaching 700,000 beneficiaries.³⁵

By working with relevant stakeholders from civil society and private and public sectors, SFSD supports improving access to education, increasing income, developing communities, and encouraging creativity. Earlier this year, SFSD published their 2023-2028 strategy, highlighting their commitment to supporting projects that directly reduce multidimensional poverty using the Multidimensional Poverty Index (MPI) through grassroots approaches and evidence-based interventions.

Since their founding, Sawiris Foundation has prioritized building and expanding partnerships with development actors in Egyptian society to collaborate on amplifying and enhancing the desired impact of their projects across different sectors. In 2015, they established the Foundation's Partnership Sector as a practical application of their philosophy in the principle of expansion and building new partnerships, not only to maximize material impact but also to enrich the intellectual and developmental level of joint programs through the exchange of experiences and development knowledge between the Foundation and its local and international partners. Their international partners includes The World Bank, UNDP, Institute Francais,

³⁴ Qena, <https://www.sis.gov.eg/Story/68570>.

³⁵ Economic Empowerment, <https://www.sawirisfoundation.org/en/economic-empowerment>.

Kingdom of the Netherlands, among others; private sector partners include J-PAL, Brac, Orange, Alex Bank, among others; national and government sector partners include Shorouk MISR, Star Care, Ministry of Agriculture, Ministry of Investment and International Cooperation, only to highlight a few.

SFSD’s Economic Empowerment team is working to “support 20,000 households living in multidimensional poverty to cover their basic needs by 2028”. This work includes 100 projects that reach over 23,000 beneficiaries in 25 governorates. The microfinance work sits in this sector, where through a partnership with MFIs, SFSD is looking for “innovative microcredit products,” including evidence-backed low-interest microcredit, for the most vulnerable communities in Egypt. This includes an Agricultural Development Program directed toward smallholder farmers.³⁶

SFSD realizes the threat posed by the climate crisis and the increasing susceptibility of marginalized and vulnerable communities in Egypt. Thus, Sawiris Foundation shares the responsibility with its partners to push forward agendas that work to improve the understanding of climate-related issues that affect those populations. This project is in continuity with the existing goals and objectives of SFSD with the aim of finding urgent and sustainable solutions that address the climate-poverty nexus in an effort to mobilize much-needed effective altruism.

Multidimensional Poverty Index

The global Multidimensional Poverty Index (MPI) developed by Oxford Poverty & Human Development Initiative (OPHI) and the United Nations Development Program (UNDP) measures acute multidimensional poverty across more than 100 developing countries. It does so by measuring each person’s overlapping deprivations across 10 indicators in three equally weighted dimensions: health, education and standard of living.

The health and education dimensions are each based on two indicators, while standard of living is based on six. Figure 1 details each indicator. All the indicators needed to construct the MPI for a country are taken from the same household survey.

³⁶ Sawiris Foundation for Social Development, <https://www.sawirisfoundation.org/>.

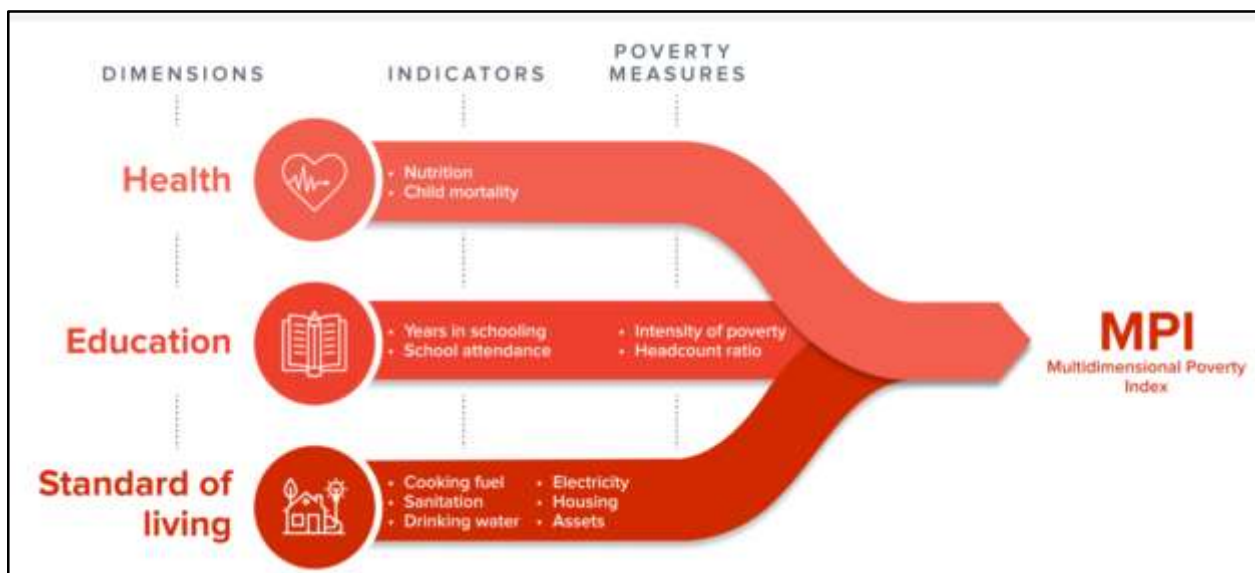


Figure 1: Multidimensional Poverty Index Framework, UNDP

The MPI is the product of the headcount or incidence of multidimensional poverty (i.e. the proportion of people who are multidimensionally poor), and the intensity of multidimensional poverty, or in other words, the average share of weighted deprivations, or average deprivation score, among multidimensionally poor people. This measurement is therefore sensitive to changes in both components.³⁷

The MPI ranges from 0 to 1, and higher values imply higher multidimensional poverty. The MPI complements the international \$2.15/ day poverty rate by identifying who is multidimensionally poor and showing the composition of multidimensional poverty.³⁸

The most recent survey data that was publicly available for Egypt's MPI estimation refers to 2014. According to UNDP estimates, 5.2 per cent of the population in Egypt (5,724 thousand people in 2021) is multidimensionally poor while an additional 6.1 per cent is classified as vulnerable to multidimensional poverty (6,654 thousand people in 2021). Similarly, the intensity of deprivations in Egypt, which is the average deprivation score among people living in multidimensional poverty, is 37.6 per cent.³⁹

³⁷ UNDP, Global Multidimensional Poverty Index 2023.

³⁸ Ibid

³⁹ Ibid

The MPI value, which is the share of the population that is multidimensionally poor adjusted by the intensity of the deprivations, is 0.020. However, since the most recent data available for Egypt’s MPI is of 2014, it is not reflective of the current situation of multidimensional poverty in Egypt. Linking the aim of SFSD’s objective to fund microfinance initiatives that aim to support multidimensionally poor business owners to sustain their livelihoods and generate sustainable incomes, we compared MPI scores of major countries where microfinance products are being used in rural areas with that of Egypt. These countries include India, Bangladesh, Vietnam, Philippines, Cambodia, Bolivia, Peru, Morocco, and Algeria. The results showed that Egypt’s MPI score was better than all of the aforementioned countries excluding Vietnam and Algeria (see Figure 2). However, since Egypt’s MPI statistics are from 2014, the situation might have changed and may not be reflective of the current poverty index.⁴⁰

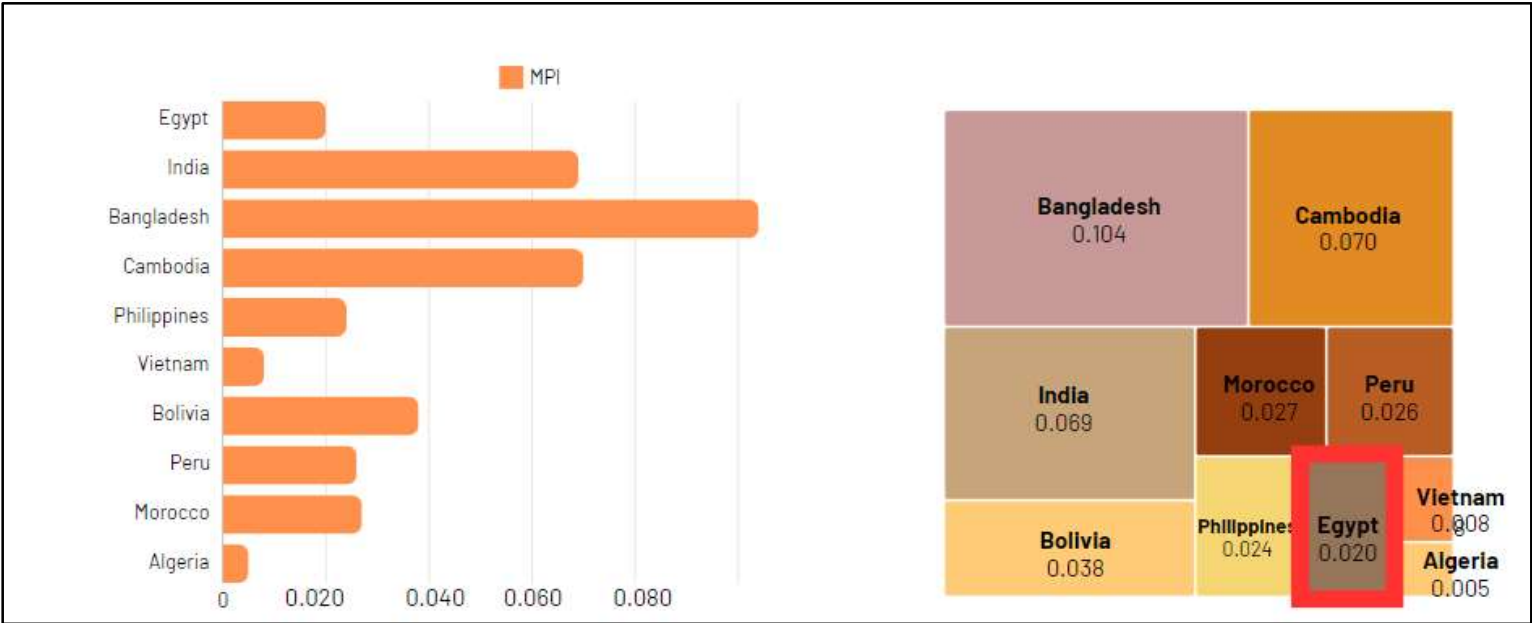


Figure 2: Multidimensional Poverty Index, Egypt Comparison

⁴⁰ UNDP, Global Multidimensional Poverty Index 2023.

MPI and Our Sample Population

Our sample population consists of small farmers in the Qena region who also keep livestock as an additional earning option. Although these farmers are low-income and they struggle to save, most irrigate their own land and use financial services from the MFIs, often acting as repeat customers; thus, they are not considered poor as per the international poverty line. Yet, these farmers may be considered susceptible to poverty conditions due to changes in the climate leading to decreased crops, loss of yield, decreased productivity of livestock among other struggles.

Arab MPI

In December 2020, the League of Arab States Social Ministerial Council approved the adoption of a revised Arab Multidimensional Poverty Index (MPI) framework. This new framework, endorsed by the Economic and Social Commission of Western Asia, aims to better measure and track poverty in Arab countries. The Arab MPI focuses on refining its methodology for cross-country comparisons, consistency over time, and accurately reflecting different aspects of poverty in middle-income Arab nations. It involves collaboration among various agencies to ensure inclusivity and relevance, aligning with human rights principles and Sustainable Development Goals.

The revised Arab MPI consists of two main pillars: material living conditions and social wellbeing, each with equal weights. It includes five dimensions and 14 indicators (See Figure 3). Poverty is classified based on a deprivation score of 20%, meaning households deprived in at least one dimension or more than one-fifth of all indicators are considered multidimensionally poor.

The five dimensions are as follows:

1. Health, including child mortality, child nutrition (considering underweight), and child pregnancy.
2. Education, including school attendance, age schooling gap, and adults' educational attainment.
3. Housing, including housing adequacy (overcrowding) and type of dwelling.
4. Access to Services, including improved drinking water, sanitation, and access to electricity.

5. Assets, covering communication, mobility, and livelihood assets.

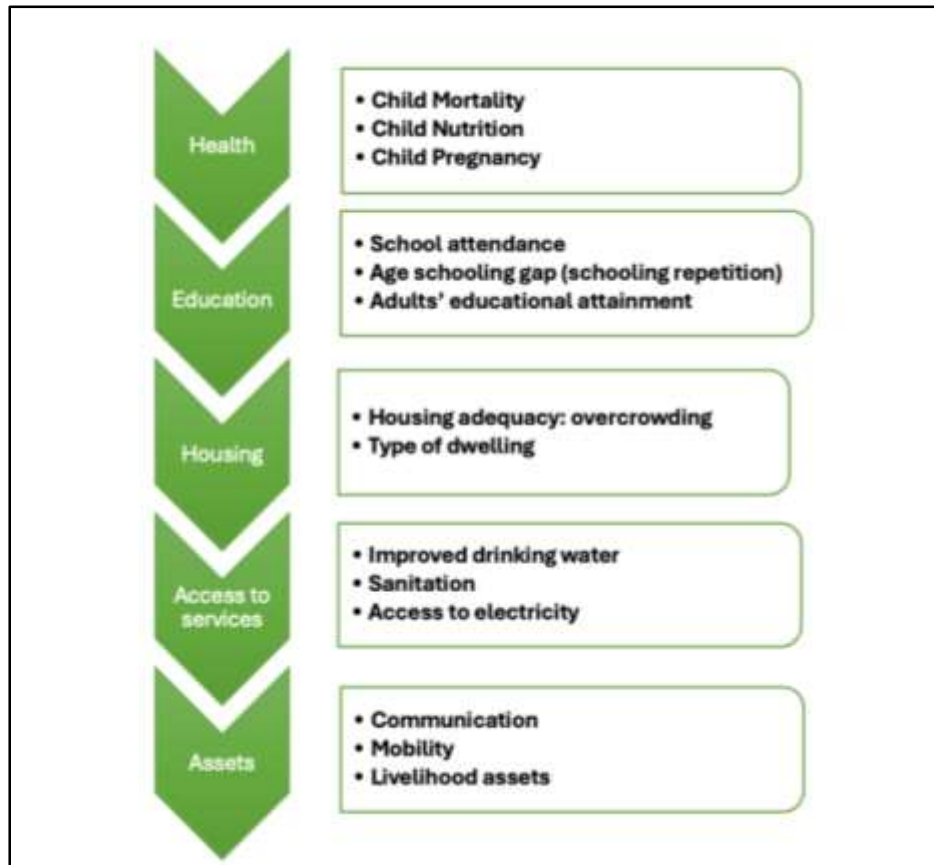


Figure 3: Revised Arab MPI - OPHI

Compared to the original Arab MPI, revisions include omitting certain indicators due to data coverage issues and refining others for better regional relevance and data availability. The revised index aims to capture multiple aspects of poverty more comprehensively, address data limitations effectively, facilitate improved inter-country comparisons, and maintain consistency over time.⁴¹

The revised Arab MPI focuses on addressing moderate levels of deprivation, aligning with national poverty thresholds to remain policy-relevant. It exhibits favorable characteristics in

⁴¹ MPPN. (2021, June 16). *The Revised Arab MPI: Multidimensional Poverty Index for Arab countries* / MPPN. <https://www.mppn.org/the-revised-arab-mpi-multidimensional-poverty-index-for-arab-countries/>

terms of indicator validity and stability of country rankings. Currently, the revised MPI includes 11 Arab countries:

1. Jordan
2. Palestine
3. Egypt
4. Tunisia
5. Algeria
6. Iraq
7. Morocco
8. Yemen
9. Comoros
10. Sudan
11. Mauritania

Finally, a comparison between the original and revised MPI shows improvements in poverty headcount and deprivation intensity, with Egypt's MPI score improving under the revised standards, indicating a decrease in overall poverty levels and deprivation intensity, though limitations exist due to outdated survey data for Egypt. For more information, see Appendix 1 (including Figure 4, comparing the original and revised Arab MPI).

METHODOLOGY

The research methodology for this project is mixed methods—a mixture of qualitative and quantitative methods (See Figure 5). The qualitative portion of our methodology entails an in-depth literature review to understand Egypt's climate and microfinance ecosystem, interviews with key stakeholders and experts, as well as focus group discussions with farmers and livestock holders in Qena. The goal of this focus group discussion was to determine the major challenges with respect to climate change the farmers and livestock holders in Qena experience, and how they address such challenges. The participants of the focus groups discussion are also currently recipients of loan programs of microfinance institutions (MFIs) affiliated with SFSD. The quantitative portion of our methodology encompasses a survey that we designed and administered to the managing officers of the MFIs. The purpose of this survey is to identify the target population portfolio of the affiliated MFIs and the products they offer.

Below, Figure 5 provides a detailed breakdown of our qualitative and quantitative research

sections used to analyze our findings.

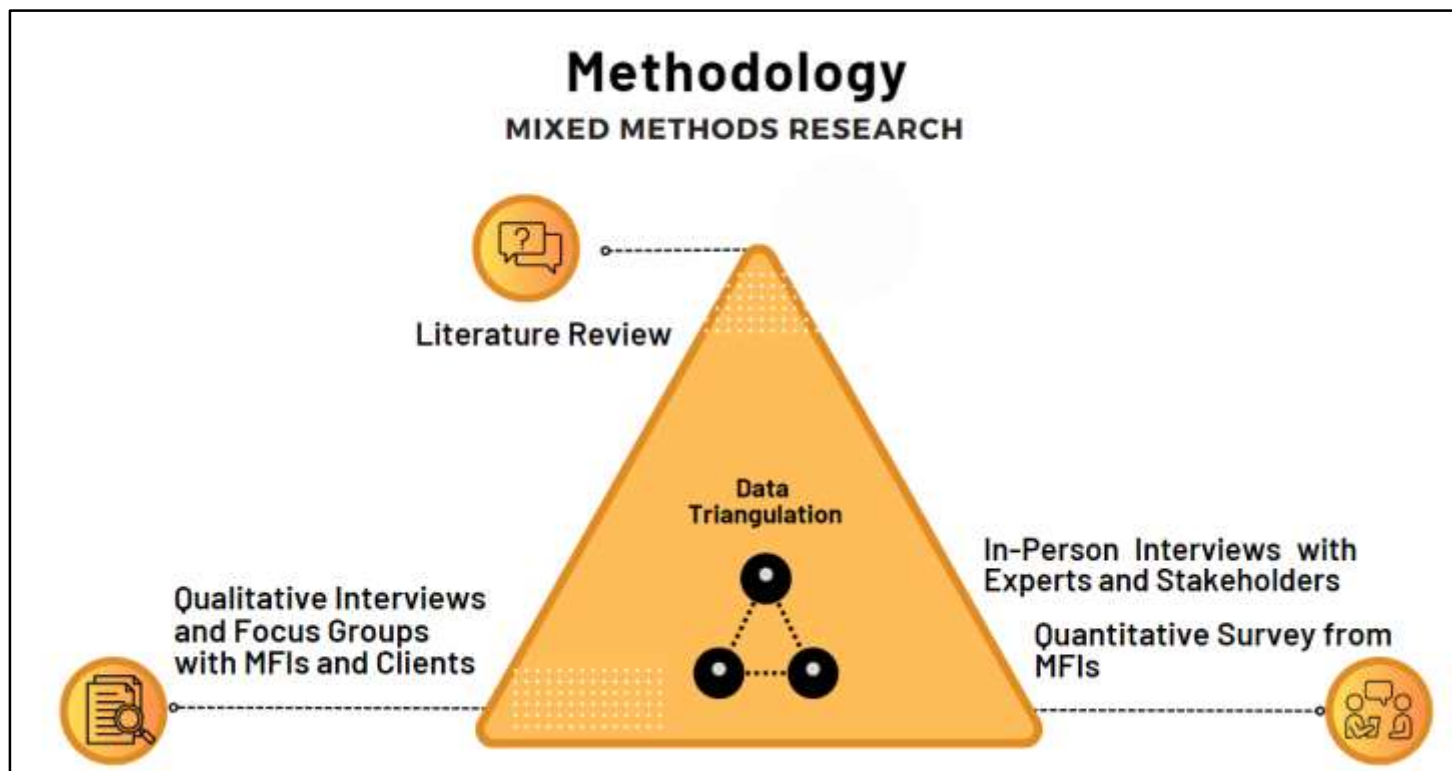


Figure 5: Mixed Methods Research Methodology

1. Qualitative Research

The findings of this project are majorly based on our in-depth qualitative research. We divided our qualitative research in four main parts:

- I. Literature review to study the country, region and climate context, the measurement of Multidimensional Poverty Index (MPI) in Egypt and MENA region at large, agricultural context of Egypt, microfinance products being offered in Egypt and MENA region and effects of climate change and water scarcity in Egypt.
- II. Primary data collection from our target population sample in the form of focus groups.
- III. Primary data collection from MFIs who work with SFSD in the form of focus groups and interviews.
- IV. Primary data collection from various experts, and organizations in the form of interviews to learn more about the landscape of Egypt and more narrowly Qena; climate change

issues faced by the farmers and livestock holders; and which financial and non-financial solutions are available and can be offered to our target population to combat climate change.

i. Literature Review

For the literature review, we researched on the themes of microfinance, climate change, water scarcity, agriculture and irrigation practices in Egypt, and in the MENA region. Various research journals, book sections, news articles and research organizations' pieces were referred to and have been incorporated in the research throughout the report in addition to the literature review below.

Microfinance

Our literature review reveals that there is a huge potential of microfinance products and services in the MENA region and by extension, in Egypt. The MENA microfinance industry is only 30 years old with a high growth potential. The majority of MFIs are south of the Mediterranean such as Egypt, Jordan, Lebanon, Morocco, Palestine, Tunisia and Syria, as well as some microfinance programs in Yemen, Algeria, Iraq, Bahrain, Sudan and Saudi Arabia.⁴² Currently, microfinance is an important source for financing income-generating activities, replacing employment initiatives funded by the government. Microfinance thus offers a way of financial inclusion, facilitating access to enhanced economic prospects and improving the quality of life. A notable distinction between Arab MFIs and their global counterparts likely stems from the historical deregulation of the sector in the MENA region.⁴³

Microfinance is still limited in scale in much of the MENA region. The market coverage ratio for specialized microfinance providers is only half the proportion of the adult population as is the case for South Asia or Latin America. The number of active borrowers compared to working age

⁴² Pearce, D. (2011). Financial inclusion in the Middle East and North Africa: Analysis and roadmap recommendations. The World Bank. <https://doi.org/10.1596/1813-9450-5610>

⁴³ Abdelkader, I. B., & Mansouri, F. (2019). Performance of microfinance institutions in the MENA region: A comparative analysis. *International Journal of Social Economics*, 46(1), 47–65. <https://doi.org/10.1108/IJSE-06-2017-0242>

adults is much smaller than all regions except Sub-Saharan Africa. Microcredit loan portfolios in the MENA region represent a significantly smaller proportion of total credit than any other area. Microfinance in the MENA region was first initiated in Egypt in the early 2000s. However, in Egypt, five years of political upheaval have taken a toll on the economy. Increased unemployment, lower tourist arrivals, dwindling foreign currency reserves, and a weaker Egyptian pound has meant that 26 percent of Egypt's 90 million people live under the poverty line.⁴⁴ At the same time, there are some success factors: diversification of loan products through group lending especially for women, targeted attention towards women empowerment, bank sponsorships such as from the Banque du Caire, and the integration of Islamic finance concepts in microfinance which has attracted poorer communities, and thus has contributed to growth of the microfinance sector.⁴⁵ Currently, there are a handful of innovative microfinance products being offered in the MENA region which include loans for business and consumer business, home improvement, employees, and special needs. Other services provided by MFIs include collective savings, group and individual loans, micro-leasing activities, domestic money transfer services, basic social protection coverage and loan guarantee schemes along with others.

Irrigation Practices in Egypt in the face of Water Scarcity

To overcome the issue of water scarcity in the Nile Delta, Egyptian farmers are employing a range of innovative and traditional strategies, which range from community-managed irrigation, recycling of drainage water, night-time irrigation, crop selection adjustments to adoption of high-tech agricultural practices.⁴⁶ These adaptive strategies illustrate the multifaceted response required to tackle water scarcity in agriculture. The communal rules for irrigation demonstrate a grassroots approach to resource management, emphasizing the importance of collective action in sustainability efforts. Meanwhile, the integration of modern technologies and practices, such as the use of solar panels and efficient irrigation systems, reflects a forward-looking strategy that

⁴⁴ Ghafar, A. A., & Masri, F. (n.d.). The persistence of poverty in the Arab world. Brookings. Retrieved May 2, 2024, from <https://www.brookings.edu/articles/the-persistence-of-poverty-in-the-arab-world/>

⁴⁵ Alattas, N. F., & Tayachi, T. (2021). Microfinance in the Middle East and North Africa. *PalArch's Journal of Archaeology of Egypt / Egyptology*, 18(13), Article 13.

⁴⁶ Omar, M. E. D. M., & Aly, M. M. (2021). Assessment of water resources system in Qena governorate, Upper Egypt under different hydrological and agronomic conditions. *Water Supply*, 22(3), 3015–3026. <https://doi.org/10.2166/ws.2021.413>

leverages innovation to address environmental challenges.⁴⁷ However, the dependence on drainage water for irrigation underscores the urgency of enhancing water quality management to mitigate soil degradation and associated health risks. This underlines the importance of striking a balance between innovative water use solutions and environmental preservation for sustainable agricultural practices.⁴⁸

The implementation of agricultural projects in the Sharq El-Owainat region, situated in the Sahara Desert of southwest Egypt, presents an intriguing case study in sustainable land utilization and crop management. With the Nubian Sandstone Aquifer serving as the sole irrigation source in this arid environment, innovative approaches were used to enhance soil fertility and maximizing crop yields, which included two-year and three-year crop rotations, and a sprinkler system to deliver water to the cultivated crops. This led to increased yield of the cultivated crops. Another study in Sharq El-Owainat looked at increasing the crop yield of cotton, soybean, sunflower, maize, and flax through intercropping. Results showed that the cultivated area of cotton could be increased by relay intercropping with wheat and onion. The suggested crop rotation could also be implemented in the marginal lands of Egypt to increase the yield of edible oil crops and reduce its production–consumption gap.⁴⁹

Water Scarcity Mitigation in Sudan

By looking a little outside of Egypt to the neighboring country of Sudan which also struggles with drought and climate vulnerability, we can see various climate adaptation strategies employed by agrarian communities that can be potentially useful in the Egyptian context. In 1998, the Intermediate Technology Development Group (ITDG) developed a project that harnessed indigenous knowledge on water-harvesting techniques to address climate induced food insecurity in the North Darfur State. One of the practices promoted in this project was the use of *jabrikas*, or home gardens, which women mostly operate. These gardens focus on

⁴⁷ Ghazouani, W., Molle, F., Swelam, A., Rap, E., & Abdo, A. (2014). Understanding farmers' adaptation to water scarcity: A case study from the western Nile Delta, Egypt. International Water Management Institute (IWMI). <https://doi.org/10.5337/2015.200>

⁴⁸ International Water Management Institute. (2015, March 24). How Egyptian farmers are adapting to water scarcity up and down a canal. <https://landportal.org/node/10110>

⁴⁹ Zohry, A., & Ouda, S. (2018). Crop Rotation Could Diminish Summer Feed Gap in Egypt. In S. Ouda, A. E.-H. Zohry, & T. Noreldin (Eds.), *Crop Rotation: An Approach to Secure Future Food* (pp. 89–109). Springer International Publishing. https://doi.org/10.1007/978-3-030-05351-2_6

cultivating fast maturing crops such as okra, eggplant and tomatoes, which can be harvested up to five months after the rainy season.⁵⁰

ii. Focus Groups with Farmers and Livestock Holders

Over the course of our field research, we conducted two focus group discussions with farmers and livestock holders of Qena who receive loans, training, guidance and assistance services from MFIs affiliated with SFSD. These farmers and livestock holders also have supplementary streams of income to support their households, especially during periods when they are waiting for the harvest or are not actively working on farming. The first focus group consists of eleven people, two women and nine men. The second focus group consists of six people, two women and four men. In the two groups, the women and men work as both farmers and livestock holders (chicken and cows).

iii. Focus Groups and Interviews with MFIs

Another source of primary data collection to learn about the issues farmers and livestock holders face is through focus group discussion and interviews with various MFI personnel. SFSD has two main MFIs as partners in the Qena region, Regional Development Center for Small and Medium Enterprises (REDEC) and Federation for Economic Development Associations (FEDA). We conducted interviews with the heads of both MFIs in Qena region, including Chairman REDEC, Qena, Chief Operating Officer, REDEC, Sustainable Financing Activity Officer REDEC, and Director of Financing FEDA, and visited their Qena branch offices. In addition, we also conducted focus groups with loan officers, credit officers and data management officers of both MFIs to learn about their services, programs, monitoring and evaluation methods, and environmental and financial issues that their customers face that hurt their agricultural production and income generation.

⁵⁰ Osman-Elasha, et al. (2007). Community Development and Coping with Drought in Rural Sudan. *Climate Change and Adaptation* (1st ed.). Routledge. <https://doi.org/10.4324/9781849770750>

iv. Interviews with Field Experts and Research Organizations

We conducted extensive interviews with experts in the fields of microfinance and climate change resilience in Egypt and the MENA region. These included interviews with the following:

- a. **Adam M Osman**
- b. **Enock Sing'oei**
- c. **Carmelo Armetta**
- d. **Daniel Osgood**
- e. **Dr. Ahmed Elsayed**

More details on each of the experts can be found in the Annex section.

2. Quantitative Research

Quantitative research was carried out in the form of a pre-travel survey to Egypt to gauge an overview of the profile of our target population, i.e. farmers and livestock holders in Qena. SFSD translated the survey into Arabic and then disseminated it to the MFIs –REDEC and FEDA, whose loan officers provided responses. This survey consisted of 12 questions focused on the number of customers in the Qena region for each MFI, their client base's means of earning, types of loan offered with the levels of interest, and their approximate household incomes. The focus groups and interviews conducted in Qena helped validate the results obtained through this survey. We also found some limitations in our survey responses since we designed the survey pre-travel and had limited insight on the issues affecting farmers and livestock holders; however, we then resolved any discrepancies through data triangulation.

3. Data Triangulation

Triangulation refers to the use of multiple methods or data sources in qualitative research to develop a comprehensive understanding of cross-cutting themes and findings. Triangulation is a research strategy to test validity through the convergence of information from different sources. In some ways, mixed method research is in itself a concrete way of data triangulation. Since our

research is based on mixed methods, we developed methodological triangulation⁵¹ to validate our data from various sources and methods. Thus, focus groups, interviews and surveys from various stakeholders came together to validate data, confirm findings, highlight issues, challenges, and limitations, based on which analyses and recommendations have been made.

4. Limitations

i. Focus Group Limitations

The project started off with working on improving the preparedness and resilience against climate change for small and micro businesses in rural areas. However, since the main source of income of the population in rural Qena region is agriculture and livestock, the focus was narrowed down to farmers and livestock holders in Qena region, Qena being the focus of SFSD for research with the potential of scalability.

One of the biggest limitations of the focus groups was the sample size. Since the travel schedule was restrictive based on university guidelines along with cultural sensitivities, namely that we traveled during Ramadan, which meant less people were willing to be interviewed, we had to limit our two focus groups to farmers and livestock holders as well as the loan officers from the MFIs, REDEC and FEDA. The MFIs ensured that the participants of the focus groups were representative of the population, i.e. customers of their loan programs and other services such as training and guidance. However, this might limit the external validity of the study in terms of the scope of their financial problems since we focused on a smaller range of income generating activities.

Another limitation was the coverage of MFI branches. The study focuses on two main branches of both of the MFIs which limits our understanding of the other parts of the population the other branches cover. More challenges could have been assessed with greater external validity had the team had a chance to interview more MFIs and/or their branches.

⁵¹ Bhandari, P. (2022). Triangulation in Research | Guide, Types, Examples. Scribbr. <https://www.scribbr.com/methodology/triangulation/>.

ii. **Survey Limitations**

The survey has several notable limitations. Firstly, the questionnaire only reached two MFIs, both of which are located in Qena, Upper Egypt. This limits the external validity of the results, which need to be carefully validated before extrapolating to other organizations or regions. Additionally, the respondents were not randomly selected, and 72 per cent of the responses received came from representatives from REDEC, skewing the sample size. Furthermore, the survey questions were developed based on the Terms of Reference that SFSD originally provided. This led to some biased questions that were deemed inapplicable after further research was conducted. Moreover, after speaking with the MFI representatives and target clients, a huge difference in findings was observed. For example, the questions were written to specifically ask about water scarcity and products provided directly related to improving access to quality water. However, upon further understanding, it became apparent that the MFIs do not specifically provide water-related products. This suggests the survey questions may have been too narrowly focused on water scarcity, when in reality the clients' main challenges and needs are not directly related to water access. Finally, responses may be biased as SFSD introduced the survey, and there may be motivation for respondents to answer in a way that satisfies the funding organization. The introduction to our survey was also shared via email, which may have potentially minimized engagement

Overall, while the survey provides valuable insights on the capacity of MFIs in Qena, Upper Egypt and the needs of their clients, the limitations of the study suggest that further research is needed to fully understand the true reality.

FINDINGS

This section contains the survey results as well as the findings from the interviews conducted with Sawiris Foundation, local MFIs, loan officers, research organizations, academics, male and female farmers and focus group discussions in Qena and Cairo. We then analyzed the findings to understand the challenges the farmers in Upper Egypt face, and then produce informed recommendations and climate resilient microfinance solutions that Sawiris Foundation can provide to farmers who are impacted by climate change.

Survey Results

SFSD disseminated the translated survey to two MFIs in Qena, Upper Egypt: REDEC and FEDA. They received 65 responses from multiple branches, mostly coming from loan officers and branch managers. This survey focused on assessing the capacity of these NGOs to address water scarcity through microfinance programs as well as to gain insight on client demographics and their experiences.

The results indicate that these MFIs are well-equipped for microfinance programs: 66 per cent of the financial products and services that they provide are micro-loans, followed by financial education campaigns, group loans, and special needs loans. The microloans are mostly set at or below market average, suggesting potential room to lower interest rates further.

Additionally, the survey results demonstrate that these MFIs serve a diverse portfolio of clients. According to the 10 branch manager respondents (likely the group of respondents best equipped to provide accurate insight on the client demographics), over 50 percent of the MFIs' portfolios are made up of clients who are both livestock owners and farmers. Additionally, 1 out of every 2 clients owns a small business. This means that most of the target population in Qena who work in agriculture manage risk by diversifying their income sources, particularly by raising livestock and owning small businesses. It also shows that the microfinance programs are not directed to those who rely solely on agriculture, likely because they are not eligible to take on loans. In other words, these programs are not serving the region's poorest people; less than 50 percent of clients are below the poverty line.

Interestingly, 85 per cent of respondents reported that their clients do not struggle with water scarcity. This may be because most crop irrigation in Qena comes from groundwater as the majority of clients are over 40 KM from the Nile River, signifying that clients are less prone to immediate shocks to the Nile. This highlights the need for education and awareness since we know that groundwater levels will decrease and be increasingly difficult to access as climate change worsens. Additionally, survey respondents report that most client production is used for both household and non-household consumption, with the main income stream being related to livestock, followed by small business and then agriculture. This means that livestock is a particularly promising area for investment due to its high profitability.

Interview and Focus Group Analysis:

The interview and focus group analysis included recording, transcribing, and summarizing the key takeaways from the interviews and focus groups. The interviews and focus groups were categorized into the following categories: local MFIs, farmers in Qena, loan officers, research organizations and academics.

Problems faced by clients:

1. **Lack of awareness about climate change resulting in an ill-preparedness to mitigate and cope with its effects:** Our interviews showed that a large percentage of the farmers did not have the tools to comprehend evolving climate conditions, which was coupled with a lack of access to timely information and resources to guide their decision-making process. Most farmers were severely affected by volatile weather conditions, leading to severe crop infestation and damage, and changes in water tables, resulting in decreased access to water for irrigation and consumption. In one focus group, a farmer shared: “Our crops are severely damaged and often completely destroyed due to unpredictable weather fluctuations, which causes us to suffer from low agricultural yield and reduced household income. We are feeling the impact of volatile temperatures daily but do not understand the cause or how to address it”. Interviews with loan officers and NGOs corroborated our findings and showed that due to minimal education and awareness about climate change, farmers are not aware of the cause of persistent and prevalent temperature changes, and do not have the tools to mitigate these challenges. The lack of knowledge not only impedes the farmers’ ability to recognize the early warning signs of climate related change, but also inhibits their capacity to implement proactive measures to mitigate risks and adapt their farming practices accordingly. This deficiency in adaptive tools is a result of absent comprehensive outreach and education programs on climate change, leading to a severe decline in crop yield, generated income, and livelihood standards.

The lack of awareness and knowledge about climate change is caused by factors including barriers to understanding scientific concepts necessary to fully gauge the impact of this phenomenon, limited technical expertise and a lag in prioritizing

immediate needs which lead to farmers focusing on short term strategies rather than long term adaptation methods. Additionally, government programs are designed to help farmers address urgent fiscal concerns, which leads to an insufficient number of programs aimed at climate change awareness and adaptation. With such little information on the onset and impact of climate change, farmers are severely under-qualified and under-prepared to address these challenges.

2. **Reduced yield for farmers due to volatile weather conditions:** The findings for both focus groups the SIPA team conducted presented recurring opinions and highlighted challenges that were faced largely by all members. The most pressing climate change issue that impacted farmers was volatile temperatures that severely damaged their crops. Many farmers described how unpredictable weather patterns led to both high and low temperatures in a short span of time, a phenomenon that the farmers had previously not experienced. The fluctuating temperatures led to stunted growth, reduced yielded and poor crop quality. In several instances, the volatile weather conditions led to a prevalence of pests and diseases in the crops to such an extent that the farmers could not save them, which led to a complete loss of seasonal yield. Several farmers mentioned that the crop diseases were so extreme and incurable that they had to abandon crops like onions, corn and clovers altogether, which is a more recent and recurring phenomenon that leads to a complete erasure of the season's crops.
3. **Water scarcity leads to reduced yield for farmers:** Although the farmers did not directly mention water scarcity or drought as a threat to their agricultural practices, most mentioned challenges in accessing water for both household consumption and crop production due to decreasing water table levels. The interviews revealed that one of the primary concerns that farmers held was declining water table levels which directly impacted their ability to secure sufficient groundwater for irrigation. As water tables recede, the sources that farmers rely on for access to water become increasingly unpredictable. Some farmers reported having to use new machinery in order to access sufficient water for their crops, but these machinery are often costly to acquire or maintain, and in most cases, because of their high costs, will not be accessible to smallholder farmers. Due to the changing water availability, farmers are required to adapt their irrigation strategies which is time consuming, costly and resource intensive.

One farmer shared that “water tables are dropping, making it more difficult and costly for us to access sufficient levels of water for both household and agricultural purposes. New and more expensive methods of groundwater irrigation need to be utilized for us to get the desired level of water for our needs, which several of us cannot afford.” The lack of access to water poses a dangerous threat to growth rates resulting in reduced yields. Water scarcity also compels the farmers to prioritize certain crops over others, which can impact crop health and productivity. Unpredictable weather patterns disrupt planting schedules and crop cycles, leading to suboptimal crop growth and development. Temperature changes may also lead to psychological shocks in plants, which consequently make them more susceptible to environmental shocks and diseases. From the interviews, it is evident that water scarcity and weather volatility has significantly reduced crop yields for farmers, which has negatively impacted both their income sources as well as their household food consumption.

4. **Climate change leads to reduced livestock yield resulting in lower income and increased food insecurity:** Water scarcity and climate change directly affects the availability of drinking water and feed for livestock, leading to dehydration and malnutrition, decreased milk production and overall poor health among livestock. Volatile temperatures, including extreme heat waves, can subject livestock to heat stress and impair animal health and productivity, reducing feed intake, milk production and reproductive efficiency. Several of the farmers in the focus groups breed livestock as an additional source of income, and mentioned how livestock including chicken and cows have been subject to widespread diseases due to climate change related issues. Volatile temperature and droughts lead to decreased availability of pasture and forage crops, which are essential feed sources for livestock. This limits the livestock's grazing ability, and forces farmers to supplement feed with other alternatives, which are often too costly for them to afford.

Climate change also leads to health challenges for the livestock, making them more susceptible to diseases and infections. The cumulative effects of water scarcity and volatile temperature reduce livestock yield and result in significant economic losses for the farmers in Qena. Reduced milk production, lower fertility rates and increased

mortality not only significantly hamper the farmer's revenue generation, but also lead to lower household consumption. Oftentimes, when animals are severely ill, farmers are unable to bear the costs of veterinary care, which ultimately results in their untimely death, leading to decreased profitability and income from livestock farming.

5. **Lower crop production leads to reduced income and negatively impacts livelihood of rural communities:** Through interviews and focus groups with farmers in Qena, it was evident that most farmers diversify their income streams because of the seasonal quality of agricultural production. The male farmers mentioned that they engage in breeding livestock and seek employment in urban areas, whereas the female farmers sell items they make from baking, knitting, and artifacts and handicraft production in order to mitigate economic risks. Although income diversification is meant to secure the farmers' living standards and allow them additional income outside of farming, due to the lower yields from climate change, most of the income that is generated through other sources is used to sustain their agricultural practices. Additionally, due to lower crop production, farmers have fewer resources to invest in alternative income generating activities or to explore non-agricultural livelihood options. This lack of diversity exposes households to greater economic vulnerability and reduces their resilience to other shocks such as crop failures or fluctuations in market prices.

During the interview, a female farmer shared her concerns: "My husband and I rely on farming, selling chicken, and livestock. We own six animals, not counting the chickens, which are a staple in every household here. We're trying to support our family, however, the interest rates for loans are becoming extremely high, and it's illogical to invest in projects only to see most of our earnings swallowed up by interest payments. Even something as basic as chicken feed is getting expensive. Cheaper feed would mean cheaper chicken, benefiting both us and consumers. Extending the loan payment period would certainly ease our financial burden." Additionally, due to the volatility of climate change and its impact on crop yield, she has had to channel the revenues from her livestock business to assist her husband in paying off his loans, which were too high for him to cover himself due to lower income from smaller yields. Not only does this make agriculture an unstable source of income, but it also negatively impacts and reduces other

income generating streams these rural communities depend on. Lower crop production further decreases the demand for labor, affecting employment opportunities in rural areas.

The instability of crop production due to climate change not only impacts income from agriculture, but also compels farmers to divert revenues from alternative income sources toward crop production, which includes purchasing fertilizers, pesticides, and renewing irrigation systems among others. In the interview, it was evident that most, if not all, farmers have to streamline incomes from their secondary jobs or small businesses in order to sustain their agriculture production and this downward spiral traps the farmers in a vicious cycle of poverty, reducing their economic mobility and increasing their overall vulnerability.

6. **Lack of access to essential agricultural inputs like fertilizers, seeds and pesticides hampers yield and income:** During the interviews, farmers highlighted that pesticides are an essential input for all farmers due to volatile weather conditions that damage crops. Onions, corn, clove and wheat are among some of the staple crops the farmers in Qena grow. They are also amongst the crops that get impacted the most due to diseases from fluctuating temperatures, leading to reduced produce and income. During the interviews, almost all farmers mentioned that they were unable to purchase pesticides to attend to their crops due to exorbitant prices. Certain pesticides are provided by the government or are heavily subsidized, however, the unanimous complaint of farmers was that the quantity provided by the government was too minimal to make an impact on crops that are vulnerable to diseases. Some farmers mentioned that the inadequate quantity of pesticides provided by the government required them to buy additional pesticides from the market; however, the prices were between three to eight times higher when purchased from private companies, which made it unaffordable for them. Furthermore, the absence of pesticides leaves crops vulnerable to pests and diseases, which compromises yield potential, prevents farmers from achieving optimal harvests and diminishes income from agricultural activities.

In addition to pesticides, farmers also shared a lack of access to quality seeds and fertilizers. This directly impacts their plant growth and yields; however, due to the high cost and limited availability of the resources, farmers are unable to use them on their

crops. One farmer mentioned that his biggest cost in farming was purchasing fertilizers. Another farmer mentioned that fertilizers that are provided by the government are heavily subsidized and cost 350 EGP for one bag, but given the limited quantities provided by governments, they need to purchase it from the market where the retail price is at least as much as 700 EGP. Without quality seeds and fertilizers, the crops struggle to obtain essential nutrients and are more susceptible to climate change induced diseases. The challenge to acquire quality seeds, fertilizers and pesticides is especially prevalent among small-scale farmers, who do not have the resources to afford the upfront costs of purchasing these essential items, which results in them resorting to informal or substandard sources that further compromise their crop production. Additionally, the government prioritizes large-scale farmers in their distribution and subsidization of fertilizers, and oftentimes the small hold farmers are not even eligible to receive these fertilizers. One farmer mentioned that they prioritize planting sugarcane given its popularity and high demand in Egyptian markets. However, sugarcane requires the maximum number of fertilizers, which they are unable to obtain due to high costs and lack of subsidies aimed at farmers of their size, leading to missed income potential for them. It was evident from the interviews that the effects are interconnected, which means that a lack of access to seeds, fertilizers and pesticides in Qena poses a significant barrier to agricultural productivity, income generation and food security.

7. **Lower crop yield and volatile income lead to food insecurity for farmers:** During the focus group interviews, several farmers mentioned that the yield from their agriculture production has two uses which include household consumption and income generation. Lower crop production impacts food security in two primary ways. Firstly, reduced yield results in diminished income for farmers as they have fewer crops to sell and less revenue to earn from agricultural activities. In addition, the financial strain also impacts the farmers' ability to purchase food from external sources to supplement what they produce in-house. Secondly, for farmers whose agricultural produce is used for household consumption, a reduced yield leads to an inability to access a sufficient diet for themselves and their families. This leads to an increase in expenses related to food, which becomes difficult to sustain for farmers since their income from agricultural production is significantly reduced by water scarcity, temperature changes and subsequent crop diseases.

The combination of lower crop production, reduced income and dependence on agriculture for both household consumption and income generation increases the vulnerability of farmers to food. Chronic food insecurity ultimately leads to malnutrition and other adverse health outcomes. From the interviews, the correlation between lower yield, lower income and food insecurity was evident amongst all farmers. Food insecurity perpetuates a cycle of poverty and vulnerability within these farming communities that then need to focus on immediate needs, thus hampering their long-term investments in agricultural productivity or resilience-building measures.

Situating MPI alongside World Bank Income Classification

Because MPI data in Egypt is significantly outdated and based on our survey and interviews, SFSD partners do not effectively track MPI among their own clients, we used the World Bank Group's income level classification to benchmark client socioeconomic status. This international poverty line stands at \$2.15 a day. The lower middle-income tier starts at \$3.65 a day, and the upper middle-income tier starts at \$6.85 a day. Our survey found that, as per majority of the loan officers, 82% of the clients fall below the upper middle-income level, whereas 75% of respondents reported that less than 50% of their clients are below the international poverty line. Figure 6 provides a visual breakdown of these client demographics. The results suggest that most clients (>50%) are above the international poverty line and fall in the upper middle or lower middle-income tier. Additionally, given that Egypt's national MPI score from 2014 is relatively low (0.02), we can infer that our target clients may not be considered multidimensionally poor.

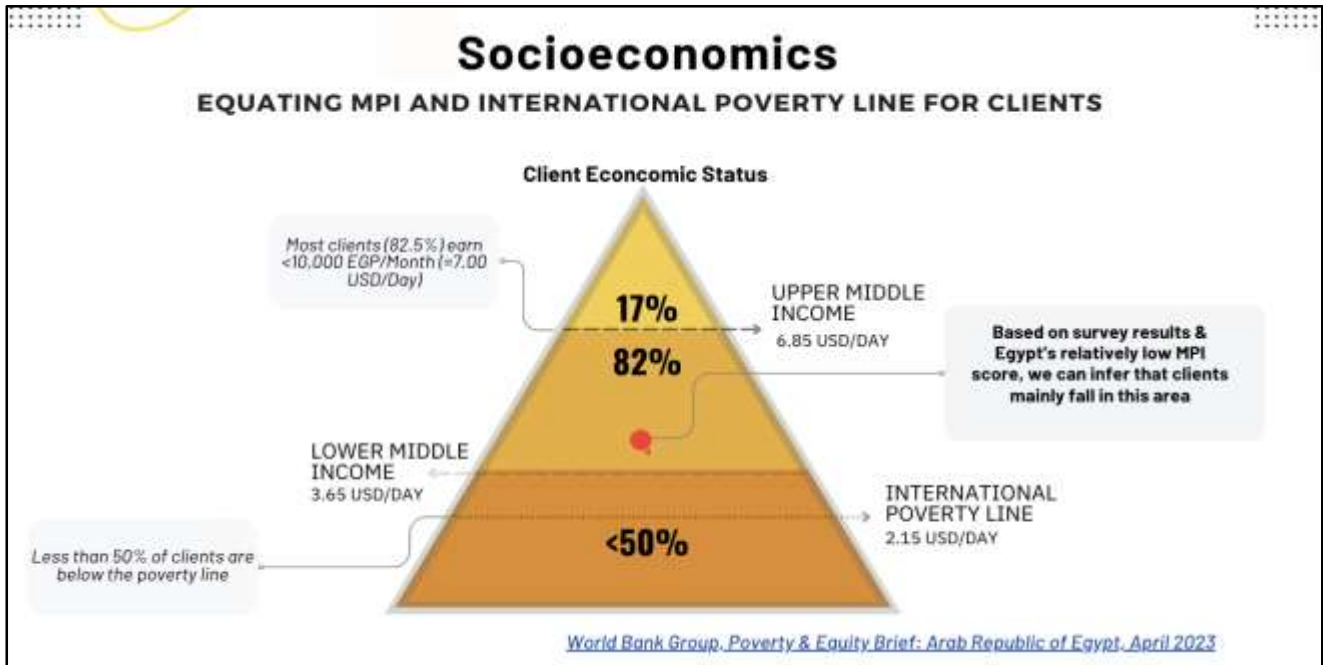


Figure 6: Client Economic Status

CURRENT PRACTICES

This section outlines our findings from our focus group discussions with the MFIs as well as our interviews with Sawiris’ different teams to understand the various partnerships and services they offer.

1. Partnerships with local MFIs to offer micro loans to farmers:

In collaboration with local MFIs like REDEC and FEDA, Sawiris designs microloan products that cater specifically to the needs of the farmers in Qena. In order to help farmers maximize benefits from these loans, Sawiris and the MFIs work together to structure loans based on the unique challenges that farmers face. Given the volatility faced in agricultural yield by several farmers, loans taken out through these entities offer flexible payment plans. Often, loan repayments are done through agricultural and livestock yield, in order to provide farmers with additional ways of managing their

finances. This removes the rigidity of payment schedules and mitigates risks for farmers who are being increasingly subject to pests, market fluctuations and unpredictable weather conditions leading to volatile incomes for farmers.

Flexible repayment schedules are also designed to align with farmers' harvest cycles, which allow them to repay the loans when they have an income stream from selling their yield. This helps farmers better manage their cash flow as they are able to synchronize their repayments with harvest cycles, and thus reduce financial stress. Additionally, aligning loan repayments with the availability of funds optimizes cash management, and also encourages farmers to invest in agricultural practices that enhance productivity and yield. Traditional microloans are repaid on a monthly or bimonthly basis, which can put financial strain on farmers who are dependent on agricultural yield to make repayments. In order to mitigate this issue, Sawiris and the MFIs they partner with offer extended periods of time for the repayment of loans, where installments can be made on a quarterly or annual basis, in comparison to the bimonthly loans the farmers are generally subject to.

High interest rates charged by microfinance organizations increase the financial burden for farmers as it increases their cost of borrowing and makes it more difficult for them to repay their loans. To address this challenge, Sawiris and their partner MFIs aim to provide interest rates to farmers lower than traditional market rates, which makes credit more accessible to smallholder farmers, and allows them to invest in their farms, purchase inputs and improve productivity without incurring excessive financial burdens. Interviews with MFIs and loan officers revealed that while some of their branches offer between 18-30 per cent interest on loans, they aim to provide between 8-12 per cent. As a result of lower interest rates, farmers are able to better plan towards environmentally sustainable practices and climate resilient technologies, which supports the livelihood and economic growth of smallholder farmers and rural communities.

2. Partnerships with government agencies like Ministry of Agriculture to develop agricultural training programs to be distributed to farmers:

Sawiris Foundation works in partnership with the Ministry of Agriculture to develop training programs that are tailored specifically to the needs and challenges faced by

farmers. These resources include crop cultivation techniques, water management practices, soil conservation methods, pest and disease management among others. These training programs are also a means of helping farmers move away from traditional farming techniques to adopt more innovative and profitable agricultural practices, like crop rotation. Due to a partnership with government agencies, Sawiris Foundation is able to access the expertise and resources of government agricultural services, which they can then distribute across target audiences through government offices, agricultural cooperatives, farmer schools, and other local institutions which allows them to maximize their reach and benefit.

This initiative helps build the capacity of farmers in Qena by equipping them with the relevant knowledge, skills and resources needed to optimize their agricultural practices and productivity. These training programs make the farmers self-reliant wherein they are empowered to take control of their own livelihoods as they are able to make informed decisions, adopt sustainable farming practices, and adapt to changing environmental conditions, which enhances their resilience and gives them the tools needed to overcome imminent challenges. Through the creation and distribution of knowledge to farmers in Qena, Sawiris Foundation along with government agencies contribute to the capacity building and sustainable development of rural communities.

3. Partnership with government agencies like the Ministry of Agriculture to train agricultural guides for the purpose of educating farmers:

Sawiris Foundation partners with the Ministry of Agriculture to provide training to guides who visit farmers directly on their farms or communities to deliver training sessions. These sessions are conducted in the farmer's local language and focus on practical, hands-on learning experiences that are directly related to their agricultural activities. These guides often demonstrate the different practices farmers should adopt by establishing demonstration farms where they teach new techniques, crop varieties and advanced technological processes. Since these sessions are conducted within rural communities, they encourage peer to peer learning among farmers who are able to exchange knowledge and share experiences, which helps foster a collaborative community and a mutual sense of support among farmers.

The agricultural guides remain accessible to farmers for questions, training sessions and troubleshooting and provide continuous support and follow up to ensure that farmers receive ongoing support to optimize their agricultural practices and maximize their yield. Through these guides and consistent training, farmers are able to adopt more efficient and sustainable farming methods, which lead to increased crop yields, improved quality of produce and enhanced resilience to climate change and environmental challenges. Overall, the assistance from these guides allows farmers to generate higher yields, access new markets and ultimately improve their standard of living.

GAPS

From our research, we identified certain gaps in the ecosystem that Sawiris can address in order to strengthen the resilience of farmers in the face of climate change:

Microfinance and Economic Empowerment

The gaps in our research were mostly regarding limitations concerning the capacity of MFIs like FEDA and REDEC to address farmers' urgent needs beyond immediate financial products, resulting in a gap in service provision related to improving access to high-quality water. Additionally, MFIs charge interest rates that are higher than preferred, which amplifies the financial burden for farmers and thus makes it difficult for them to repay their loans.

Policy and Partnerships

Despite efforts to address water scarcity and rising temperatures, there is a misalignment of the Egyptian government's policies with the needs and realities on the ground for farmers. Challenges in accessing government subsidies and incentives for sustainable agriculture and water management practices persist.

Water Management and Conservation Efforts

The inefficiency of traditional canal irrigation systems is exacerbated by poor maintenance and adequate infrastructure such as proper lining, leading to significant water loss and contamination. There is a need for the segregation of functions in water management between the Ministry of Irrigation and the Ministry of Agriculture to streamline operations. There are also training and

literacy gaps in understanding water scarcity, water conservation, and management among farmers and livestock holders.

Agricultural Practices and Crop Management

A lack of awareness among farmers about climate change impacts has led to ill-preparedness in mitigating and coping with its effects, exacerbated by a lack of outreach.

We also found there is insufficient training in modern and sustainable agricultural practices such as crop rotation, which leads to reduced soil health and water efficiency. Gaps persist in implementing intercropping systems and other sustainable practices that save irrigation water and improve crop nutrient use

RECOMMENDATIONS

Systemic Design Approach

Our research suggests that SFSD's partners' clients currently face and will continue to face a negative impact on their income due to water scarcity and rising temperatures. It also shows that many policies aimed at addressing these challenges are often misaligned with the needs and realities on the ground, despite the United Nations Development Programme's statement that government is a "necessary precondition for building and maintaining momentum" across development projects.⁵² Additionally, the research indicates that there is a lot of innovative work already being done, both inside Egypt and in peer countries, that directly and effectively fills these gaps and supports clients building climate adaptation and mitigation. However, without the necessary policies that enable SFSD's target population to access these products, technologies, and strategies, they remain out of reach.

⁵² System Change: A Guidebook for Adopting Portfolio Approaches. (n.d.). UNDP. Retrieved April 17, 2024, from <https://www.undp.org/publications/system-change-guidebook-adopting-portfolio-approaches>.

Iterative Systems Transformation Through Partnership Led Evidence-Based Pilot Interventions

SFSD CAN LEVERAGE ITS NETWORK TO MOVE POLICY TOWARD ADDRESSING THE BARRIERS THAT CLIENTS FACE

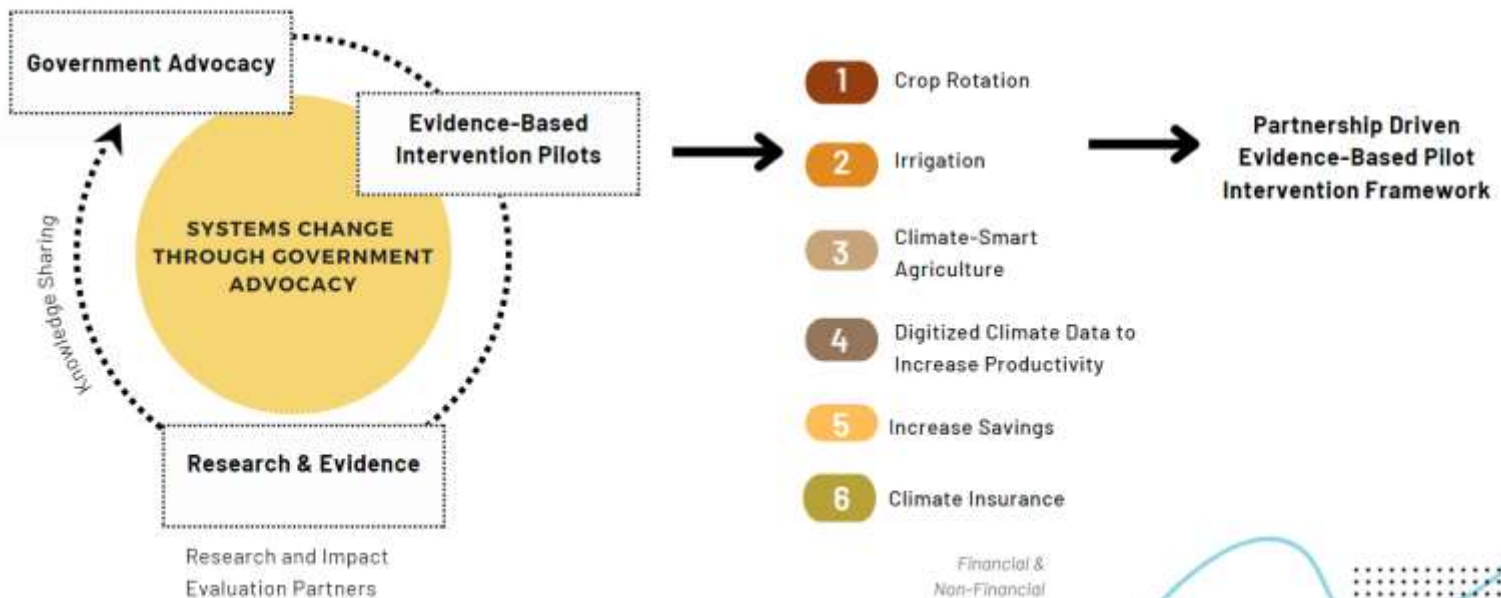


Figure 7: Systems Transformation Through Advocacy

SFSD can help to address these barriers by leveraging its strength in partnerships.

Particularly, SFSD can utilize its network to advance evidence-based interventions and move policy to enable an environment for clients to access relevant tools and build resilience. Figure 7 outlines this relationship. We believe that if clients gain awareness of climate-related challenges and the mitigation/adaptation tools available in response, and can access and properly use them, then their incomes will increase and communities will build resilience to climate change. This theory of change is depicted in Figure 8. For this to be most effective, there must be an enabling policy environment that responds to real needs. We advise engaging relevant actors as early as possible, as government actors need time to process what is being proposed, contemplate the issues that may surface based on their involvement, and determine how they wish to be involved.

Theory of Change

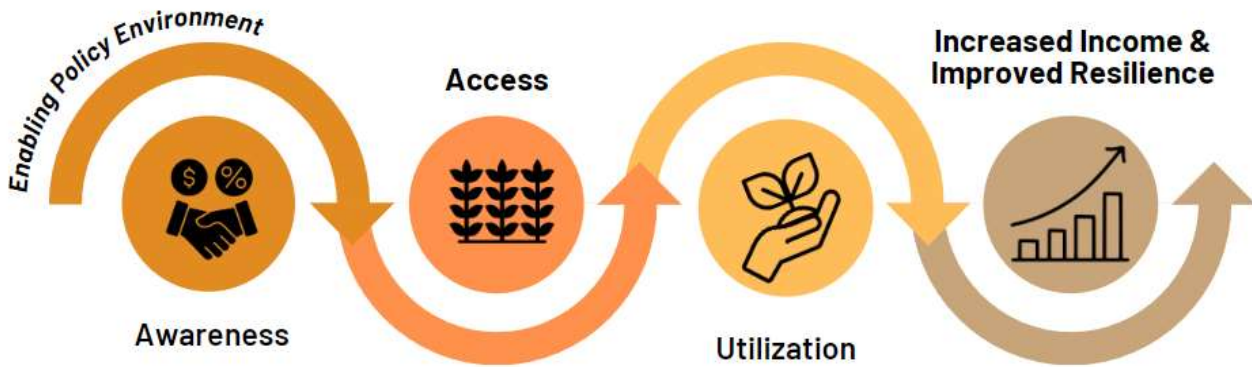


Figure 8: Theory of Change

We identified six main evidence-based interventions, both financial and non-financial, that, if accessible, can significantly increase climate resilience: (1) Crop Rotation; (2) Irrigation; (3) Climate-Smart Agriculture; (4) Digitized Climate Literacy; (5) Climate Insurance; (6) Comprehensive Savings Mechanism. We believe that with SFSD's strong capability for partnerships, they can continue to connect with innovators, donors, and MFIs to help fund evidence-based pilots. SFSD can link those innovators with impact evaluators and researchers to produce research-based evidence supporting these interventions, and then share that knowledge with government agencies to encourage them to establish relevant policy. This iterative system change through government advocacy will not only be effective because SFSD can connect and share knowledge among partners, but will also encourage learning from research and adjusting pilot programs based on impact evaluations. This helps to de-risk investment, a major incentive to the government, by offering proven evidence for the necessary types of interventions, and conversely, those that do not hold promise.

Partnership-Led Evidence Based Intervention Model

One of the biggest strengths of Sawiris Foundation is its partnerships with local, international and government organizations. It works with more than 50 partners to maximize the material return with the aim of designing and implementing more effective and integrated programs. To leverage these partnerships to best address the identified issues of looming water scarcity and climate change, including fluctuating and severe temperatures, decreased crop yields and increased pest attacks on crops, we have developed a partnership-led evidence-based intervention model to connect clients with the existing tools, technologies, and strategies that can help farmers adapt to and mitigate climate change (See Figure 9).

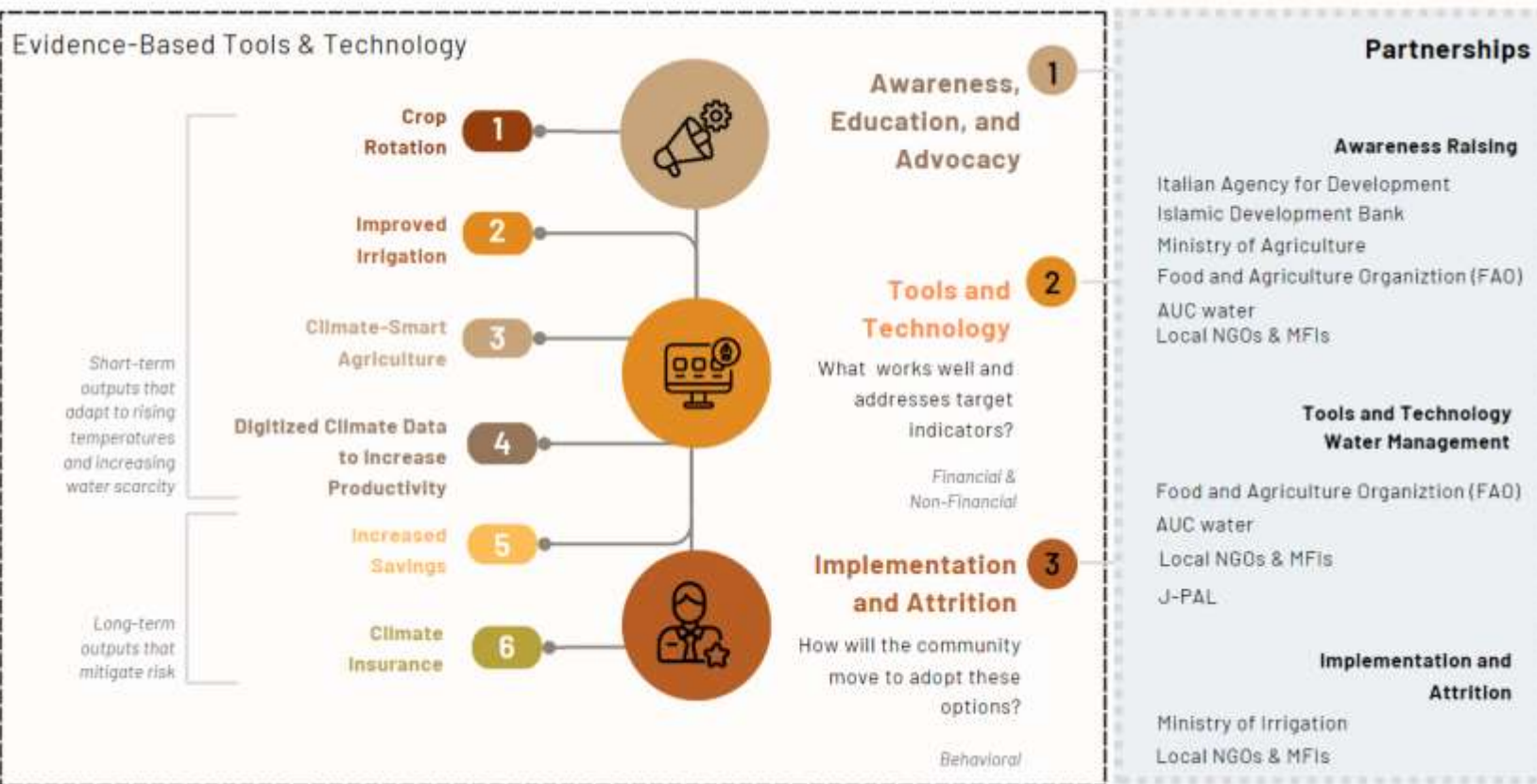


Figure 9: Partnership-Led Evidence-Based Pilot Intervention Framework

This framework includes 6 top recommended evidence-based pilots that require 3 main functions to which SFSD will support partners: (1) Awareness; (2) Tools and Technology, and (3) Implementation and Attrition. These interventions will only be effective if clients are aware of the challenges that create their need, are able to access them, and actually use them. This framework will aid farmers in diversifying crops, access more subsidies for fertilizers and pesticides, and focus on resource mobilization through a combination of financial and nonfinancial interventions and behavior change:

1. Implementing Crop Rotation to Combat Water Scarcity, Increase Fertility and Yields

Crop rotation is the practice of planting different crops sequentially on the same plot of land to improve soil health, optimize nutrients in the soil, and combat pest and weed pressure. A simple rotation might involve two or three crops, and complex rotations might incorporate a dozen or more. Crop rotation helps return nutrients to the soil without synthetic inputs. The practice works to interrupt pest and disease cycles, fosters biodiversity, supports beneficial soil organisms, and attracts beneficial insects and pollinators.

By not planting the exact same crops in the same land every year, farmers can prevent a build-up of pests and diseases in the soil. Planting a variety of crops from different families is a good way to lessen pest and disease damage. Another aspect of crop rotation is alternating “heavy” feeders (plants that use a lot of nutrients) with “light” feeders (plants that use less nutrients) to reduce nutrient demands on your soil.

Implementing crop rotations could attain the sustainable use of natural resources in upper Egypt. Considerable amounts of irrigation water could be saved under crop rotations in each agro-climatic zone as a result of implementing intercropping systems on raised beds. Crop rotation increases water use efficiency and improves crop nutrient use efficiency. It reduces risk of weather damage and thus reduces yield losses and that will increase net profit of farmers. It could also improve grain quality and reduce grain yield variability. Furthermore, crop rotation could save the applied irrigation water to crops. Thus, using crop rotations potentially promotes the sustainable use of natural agricultural resources as well as increases the agricultural productivity of unit land and the unit of irrigation water under the prevailing conditions of water

scarcity. As a result, the probability of attaining food security for strategic crops will increase and that will help in improving living standards and alleviating poverty in the rural population.

Thus, crop rotation and intercropping can help in solving food insecurity problems through increased land productivity. Furthermore, it can save a sum of irrigation water and increase water productivity. These saved irrigation water amounts can be used to cultivate new areas and reduce food gaps.

Recommendations for potential partnerships to implement a program of crop rotations:

Awareness/ Education

We are proposing programs to train agricultural experts on crop rotation as well as train farms on fertilizer use in order to properly adopt crop rotation practices.

a. Partner with the Ministry of Agriculture to train agricultural experts on crop rotation:

The Sawiris Foundation should partner with the Ministry of Agriculture to provide technical knowledge and capacity building sessions on crop rotation techniques to agricultural experts who can then share the necessary guidance to local farmers. The technical knowledge will include but not be limited to rotational planning, crop sequencing, soil management and pest control. The farmers will be able to implement crop rotation practices under the guidance of these agricultural experts.

b. Partnership with Food and Agriculture Organization to educate and train farmers on proper use of fertilizers:

There is a common misconception among farmers that increasing fertilizer use linearly increases crop yield, spurred by lobbying efforts by the fertilizer companies and a lack of literacy on optimal usage. This needs to change. There is already an effort underway by the Food and Agriculture Organization (FAO) to educate farmers on the proper amount and methods of fertilizer use. Sawiris, with the help of its on-ground MFIs should

connect the training specialists with the farmers who can train farmers on proper use of fertilizers based on the crops, seasons, and methods of irrigation. For instance, drip irrigation requires less fertilizers as compared to traditional methods of irrigation (Gazula et al., 2018).

Tool/ Technology

The tool we are proposing in this recommendation is crop rotation but for adequate development of the practice, we need comprehensive R&D.

c. Partner with Food and Agriculture Organization, AUC, BRAC and/or JPAL to conduct research and development:

Collaborate with the agricultural research institutions to conduct research on crop rotation techniques tailored specifically to the agro-climate of Upper Egypt. Research findings can inform best practices and help optimize for crop rotation strategies for maximum yield and sustainability. In addition to the Food and Agriculture Organization, Sawiris Foundation can also collaborate with universities like the American University in Cairo, and research centers or organizations like BRAC and JPAL to assess the impact of crop rotation on soil fertility, water use efficiency, pest management and crop productivity.

Implementation

To adequately implement crop rotation practices and make the impact sustainable, we propose both behavioral and financial mechanisms to encourage the Qena community.

d. Partner with local MFIs like REDEC/FEDA to establish demonstration farms:

Establish demonstration farms with local farmers who are considered to be the community's "role models" to showcase the practical implementation and long-term benefits of crop rotation. Sawiris Foundation should identify partners that have prior experience in working with agricultural development projects in the region. These partners should be well versed in the climate trends and challenges faced by the farmers

which will make them valuable when designing crop rotation initiatives. The demonstration farms can also serve as learning centers where local farmers, government officials and relevant stakeholders can visit to observe the crop rotation practices.

e. Partner with the Ministry of Agriculture to provide incentives to farmers for crop rotation:

Collaborate with the Ministry of Agriculture to design, identify and provide appropriate incentives to the farmers for undertaking crop rotation practices. These incentives can be financial, including subsidies on seeds, pesticides and fertilizers, access to credit and insurance, lower interest rates and a longer payment period to optimize for revenue generation through crop rotation. Our on-ground research shows that small farmers have a limited capacity in getting subsidies on fertilizers from the government, which is dependent on the size of land and category of land, i.e. reclaimed land. Sawiris could work with the Ministry of Agriculture in removing the cap of land size and category to provide subsidies on fertilizers, pesticides and smart seeds to farmers by incentivizing crop rotation.

Additionally, farmers can be given preferential access to markets and value-added opportunities, and a guaranteed minimum price on their crops from the government. This could include establishing market linkages, supporting certification programs for sustainably produced crops, and creating premium pricing incentives for produce grown through crop rotation. Incentive bundling packages, which can include financial subsidies for inputs, credit access, agricultural and climate related guidance can help farmers move to sustainable methods of farming like crop rotation.

2. Improvement of Irrigation System through its Maintenance, Water Management and Water Conservation

Although most of the farmers in our sample population, who receive their services from Sawiris's partner MFIs in Qena use groundwater to irrigate their lands, there is a vast majority of farmers and livestock holders in Qena whose production is dependent on water from the Nile River.

Water scarcity is not only a climate change issue, but it is also an important result of inefficient traditional canal irrigation systems, exacerbated by poor maintenance and a lack of coverage, leading to water loss and contamination. A proper lining of canal water with cement is necessary to limit water loss.

These maintenance systems are enacted across the world to reduce water loss and maintain water quality for irrigation. According to Carmelo Armetta, who has worked in Egypt in sustainable development initiatives focusing on agricultural practices, water management, cooperative laws, and the impact of climate change, there needs to be a segregation of functions in water management between the Ministry of Irrigation and the Ministry of Agriculture to streamline operations.

The role of Sawiris here is to advocate and lobby for lining of canals in areas where beneficiaries of Sawiris are located (to begin with), so that their water woes are reduced for the next five to seven years. This includes extending partnerships with ministries such as the Ministry of Water Resources and Irrigation and the Ministry of Agriculture. The Ministry of Water Resources and Irrigation already has the mandate of ‘rehabilitation of water facilities’ and ‘rational management of groundwater’. By strengthening these collaborations with experts and relevant stakeholders, water conservation activities and improved irrigation systems can help improve farmer productivity.

Awareness/ Education

Before the Qena community can adopt improved irrigation methods into their agricultural practices, they must understand the role of water scarcity in their decreased agricultural production as well as the need for water conservation.

a. Partner with the AUC Center for Excellence of Water and Local MFIs for Training and Literacy in Water Scarcity, Water Conservation and Management:

One of the major threats to agriculture and livestock due to climate change is that of water scarcity, and with that, a decrease in the quality of water. Farmers have indicated

the lower levels of groundwater table by the need to use motors and solar panels to access groundwater.

Qena is currently facing water resource challenges in terms of limited quantity and quality of water resources, low water use efficiency, the continuous population growth, the agricultural and urban expansion in desert lands, and extreme climate change projections (Omar & Aly, 2021). A multifaceted approach is needed to conserve and manage water with a priority towards literacy and awareness of farmers and livestock holders towards the knowledge of water scarcity—that their water resources are limited and thus they need to adapt to techniques that conserve water. This also includes crop rotation and diversification as explained earlier and switching to more robust methods of irrigation (described further below). This also includes keeping a close check on the water table usage.

Water conservation and management cannot be carried out in silos and therefore there needs to be a collaboration of Sawiris with local MFIs who would train farmers and women—irrespective of them being non-farmers—in different ways water can be conserved, such as for domestic purposes. Women are an important stakeholder in this framework because they can teach water management practices to their kids, and other women in the neighborhood, leading to a multiplier effect.

In the recent past, AUC Center for Excellence of Water has worked in establishing linkages and creating collaboration and accountability between different partners on water management. It has a network of water experts including students which Sawiris could collaborate with and connect to local MFIs. The expertise of these scientists and practitioners can also be used to help farmers in planting crops which not only use less water, but are also customized to their soil and temperature needs (more details in sections on crop diversification and climate-smart agriculture).

Tool/ Technology

The main tool we are proposing through this intervention is the adoption of an improved irrigation system, either through drip irrigation or sprinkler irrigation, installation of solar panels and developing water pipelines.

b. Partner with Islamic Development Bank and local MFIs (REDEC/ FEDA) for Drip Irrigation and Sprinkler Irrigation for Water Conservation:

There is a noticeable decrease in the quantity of water. In certain areas of Qena, for instance, farmers only get water for a few hours in a day. Farmers who have smaller land areas get only one to two hours of water access in a day, so it is essential to help them sustain and increase their access to water.

Our interviews and discussions with various experts on water conservation and increase in crop yield reveal that technology adoption, particularly in water saving and climate adaptation, is crucial for future resilience efforts. Two main modern ways of irrigation which conserve water are sprinkler and drip irrigation. Undoubtedly, these irrigation systems are relatively costly. However, farmers must conduct a cost-benefit analysis in determining whether they want to increase their yields and decrease water usage, while also considering the size of their lands.

Drip Irrigation

Drip irrigation can improve the efficiency of both water and fertilizers. Precise application of nutrients is possible using drip irrigation. Weed and disease problems may be reduced because of drip irrigation because it does not wet the middle rows of the crops as does overhead irrigation. Further, it has low pumping needs. Drip systems require low operating pressure (10–12 psi at the drip tape) compared to overhead systems (50–80 psi) (Gazula et al., 2018). This pumping may be used to irrigate smaller lands using drip systems.

On the other hand, it requires maintenance and high-quality water. Proper management of drip irrigation requires a learning period. In addition, the water-application pattern must

match the planting pattern. For instance, if emitter spacing does not match the planting pattern, root development may be restricted resulting in crops to die. Moreover, not only is its installation costly, major costs also include its maintenance cost.

Another thing to consider is the small land holding of farmers, whereas in order for drip irrigation to be economically viable farmers need to have a larger land that is at least 2 to 5 acres in size. Thus, it would be beneficial to set up collaborations between 7 to 15 farmers whose land sizes combined will make drip irrigation more viable.

As per our discussion with Mohannad Hesham Abouelrouse, Founder & CEO of Life From Water Foundation, a lot of farmers have water reservoirs near their land which they use to store water. The government helps them pump the water in and out of the reservoir and they use drip irrigation. However, there is a large initial cost associated with drip irrigation. This is where the microfinance loans can come in, and help farmers install drip irrigation systems, which can conserve water and increase yields.

In addition, **solar panels** are also not extremely costly. If only used to pump water out of the ground, it is not as expensive. Providing solar panels is another way through which MFIs and NGOs can help farmers who live close to the Nile access water for both household and agricultural purposes.

According to Abouelrouse, Life From Water Foundation, there are infrastructural challenges in accessing water in Qena. These can be resolved through providing **water pipelines to the farmers' lands from their reservoirs**. Creating these water pipelines is extremely cost effective since they (4-inch and 6-inch) only cost around 300 Egyptian pounds. Some of the NGOs are already helping provide those pipelines. Life From Water Foundation has the experience, and network linkages to connect Sawiris with the NGOs who can help farmers in provisioning that access.

Sprinkler Irrigation

In sprinkler irrigation, irrigation water is applied to the crops like natural rainfall. Water is distributed through a system of pipes usually by pumping. It is then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground

through a uniform application of water. This irrigation system can be a suitable method for Qena farmers as it is suited for most row, field, and tree crops, as well as for sandy soils. This is less costly than drip irrigation and covers larger surface area, and can easily be funded through microfinance loan options.

Coverage of installation costs is where the loans and other financial services of MFIs may come into use. Further, the Islamic Development Bank in Egypt has expertise in the knowledge needed for drip irrigation, and pumping water in greener ways. Thus, they can work with MFIs to train farmers in switching to alternate ways of irrigation. The bank has already worked successfully in Eastern Egypt—which covers 40 percent of the size of the country—in helping install drip irrigation, and green water pumping methods. Furthermore, Sawiris has a relationship with the Islamic Development bank, thus, they can leverage on their existing partnership.

Implementation

In order to successfully implement an irrigation system, we recommend working with relevant government actors for fiscal support in management and maintenance.

c. Partner with the Ministry of Water for implementation, maintenance and management of irrigation systems:

We propose partnering with the Ministry of Water to acquire any additional funding and technical support for the implementation as well as connect the Qena community with local government actors to provide adequate fiscal support for maintaining and managing the irrigation systems.

3. Digitized Climate Data to increase crop and livestock productivity

There is a need to digitize climate data to fulfill the needs of farmers and livestock holders to increase crop yields and livestock productivity. This is a long-term strategy for which we have already identified certain needs of farmers through our research. One of the biggest concerns of farmers is the lack of information in terms of seasonal and temperature change (owing to climate

change). To counter this, there is a need to update and notify farmers regularly in terms of daily temperatures, weather predictions and seasonal changes along with warnings and farming advice. Farmers can have more control regarding what they can ask by introducing mobile phone-based information service. Kenya's example can be used as a case study to replicate a similar system for farmers based in Egypt.

CASE STUDY: Kenya

The Kenya National Farmers' Federation (KENAFF) introduced a mobile-based information service, known as USSD (Unstructured Supplementary Service Data), to keep farmers better informed. This service allowed the operator to send text-based messages to users' phones based on an input code. These messages covered a wide range of topics, including COVID-19 mitigation measures, technical advice, adaptation and resilience-building suggestions, and updates on market conditions and weather patterns. All information provided is localized to the sub-county level. Once subscribed to the platform, users receive four push messages per week and can respond to these messages with specific codes to request further information. Alternatively, users can formulate their own questions and submit them via text message. If multiple users within a county pose the same question, the service disseminates the answer to all subscribers in that county, ensuring widespread access to valuable information. Furthermore, the service is adept at conveying complex technical information to its subscribers in plain language, enhancing comprehension and usability.

Awareness/ Education

In order to properly utilize a digitized climate dissemination service, the Qena community would have to learn how to utilize the service itself, from asking questions to acquiring information.

- a. Partner with local MFIs and community members to educate farmers on mobile literacy services:**

Local MFIs such as REDEC and FEDA can help educate farmers about utilizing mobile services through 'Train the Trainer' programs. This can incorporate volunteers from the Qena community so that farmers feel trust and ease when learning from their own community members. While this phone service develops, the same volunteers could also be used as channels to disseminate all the information to farmers. Thus, they would work as intermediaries between the expert partners and the farmers deployed by the MFIs.

Tool/ Technology

The development of the technology for this service requires a multilateral partnership with relevant stakeholders in the region with inspiration from the KENAFF USSD model.

b. Partner with Kenya National Farmers' Federation (KENAFF), Agricultural Bank of Egypt, Islamic Development Bank and local MFIs to develop mobile service:

SFSD could partner with different organizations including Agricultural Bank of Egypt, Islamic Development Bank and local MFIs to utilize agricultural specialists who provide technical advice and collect up-to-date market information from the MFI branch offices across Qena. Then Islamic Development Bank could potentially help produce the technology, ie. the mobile service itself by collaborating with KENAFF to understand their USSD program model. This partnership could benefit thousands of farmers in Qena and beyond. Over time, this collaboration could be extended with more partners to enhance its content, allowing farmers to also use other services such as audio and video calling with experts to get farming and animal husbandry advice. This would be a win-win situation for both farmers and research experts who can collect more data and further advance their research on changing farming patterns in lieu of climate change.

Implementation

c. Partner with community leaders to serve as village role models:

We recommend local MFIs work with community leaders to serve as village role models to encourage use of the service itself. This can include working with small businesses in

the area and appointing liaisons in the marketplace to advertise and promote the use of this digitized service.

d. Partner with Ministry of Agriculture to build credibility and scalability:

We recommend the Ministry of Agriculture also supports this program by streamlining this technology in governorates outside of Qena. Governmental support is crucial to overcoming the barriers that often hinder the widespread adoption of transformative technologies. By actively endorsing and facilitating the integration of this innovation into various governorates, the Ministry not only helps to empower local farmers but also fosters economic resilience and food security on a national scale. Moreover, governmental support for a digital program provides credibility and legitimacy, instilling confidence among stakeholders and investors alike. This can help navigate regulatory hurdles and unlock more funding avenues.

4. Climate-Smart Agriculture

When it comes to climate change adaptation, climate-smart agriculture (CSA) is a popular solution among countries that heavily rely on agriculture, and Egypt is not an exception. CSA constitutes a strategic approach aimed at directing agricultural systems towards effectively supporting development initiatives and ensuring food security amidst the changing climate conditions. CSA contains a variety of tools and practices including but not limited to: drought-resistant crops, water harvesting techniques, pest control, carbon sequestration, among others. CSA has emerged as a holistic solution to end food insecurity and promote sustainable development while addressing climate change issues.

The primary goals of CSA encompass sustainable enhancement of agricultural productivity and incomes, fostering resilience to climate change impacts, and mitigating greenhouse gas emissions where feasible.⁵³ Through the adoption of CSA technologies and practices, there emerges a dual opportunity to confront the challenges posed by climate change while simultaneously fostering economic growth and development within the agriculture sector.

⁵³ M. Yusuf Ali and Md Emdad Hossain, "Profiling Climate Smart Agriculture for Southern Coastal Region of Bangladesh and its Impact on Productivity, Adaptation and Mitigation," *EC Agriculture* 5, no. 9 (2019): 530-544.

While Egypt is still very premature on CSA, the experiences of countries facing similar challenges can offer valuable lessons. The case study below on Bangladesh is one such example. Implementing similar smart seed mechanisms in Egypt holds promise for enhancing climate resilience and securing agricultural livelihoods in the face of changing climate conditions.

Additionally, an integrated and wise approach to nutrient management that combines organic and inorganic inputs is critical to fulfilling the increased nutrient demands of sugarcane plants.⁵⁴ Optimizing the application of vital nutrients such as nitrogen, phosphorus, and potassium, along with the use of biofertilizers and proper composting, can significantly improve yields. Integrated pest and disease management, coupled with efficient irrigation strategies like skip furrow or alternate furrow techniques, are also vital components in maximizing sugarcane production. The Furrow Irrigated Raised Bed (FIRB) system is another practice that promises to enhance sugarcane yield while simultaneously improving the efficiency of water and fertilizer usage. This is particularly advantageous when sugarcane is grown in rotation with wheat, which is common in Egypt. Such advancements not only have the potential to bolster sugarcane yields but also to improve the livelihoods of farmers by optimizing resource use and enhancing crop resilience against environmental stresses.

Moreover, there are also targeted CSA practices towards wheat and mung beans, which are both relevant in the context of Egypt. For wheat, the CSA practices include the use of saline and heat-tolerant varieties, conservation agriculture, pest-resistant varieties, and dwarf and early-maturing varieties. For mung beans, the practices include the use of shorter duration high-yield varieties, conservation agriculture, and the use of mung bean biomass as brown manuring.⁵⁵ Similar benefits are noted with these practices, including increased yield and income, empowerment of women, and mitigation of soil erosion and greenhouse gas emissions.

⁵⁴ Bhatt, R., Majumder, D., Tiwari, A.K. et al. Climate-Smart Technologies for Improving Sugarcane Sustainability in India—A Review. *Sugar Tech* 25, 1–14 (2023). <https://doi.org/10.1007/s12355-022-01198-0>.

⁵⁵ M. Yusuf Ali and Md Emdad Hossain, "Profiling Climate Smart Agriculture for Southern Coastal Region of Bangladesh and its Impact on Productivity, Adaptation and Mitigation," *EC Agriculture* 5, no. 9 (2019): 530-544.

CASE STUDY: *Bangladesh*

In Bangladesh, the vulnerability of rice production to fluctuations in monsoon patterns stresses the pressing need for climate-resilient agricultural practices. The dependence on consistent and predictable rainfall renders the sector particularly susceptible to disruptions caused by changes in monsoon behavior. For instance, the early arrival of the monsoon can lead to flood damage as rice seedlings are submerged during crucial growth stages, while delayed monsoon onset can result in water stress, potentially causing significant yield losses of up to 70 per cent.⁵⁶ The challenges outlined are reminiscent of those faced in Egypt, where agricultural productivity is also threatened by climate variability and extreme weather events. Drawing parallels between the challenges encountered in Bangladesh and those in Egypt highlights the relevance of implementing CSA practices to enhance resilience and sustain food security. One such CSA practice observed in Bangladesh is the cultivation of Aus rice, which is an indica type rice but constitutes a distinct genetic group, and can be used as a comparable case study. Aus rice occupies approximately 14 per cent of the agricultural area during the March to July period.⁵⁷ Aus rice cultivation faces various climatic hazards, including drought, storms, and extreme weather conditions. However, the adoption of CSA practices, such as direct dry seeding, has proven effective in mitigating risks and ensuring yield stability. Direct seeding, which refers to the process of “establishing the crop from seeds sown in the non-puddled and unsaturated soil,” not only establishes the crop in a timely manner but also minimizes soil degradation and reduces greenhouse gas emissions by reducing the need for tillage.⁵⁸ Additionally, the use of drought-tolerant short-duration high-yielding Aus rice varieties further enhances resilience to climate-induced stresses, thereby ensuring grain production and increasing carbon sequestration. Moreover, the cultivation of lodging-tolerant taller Aus rice varieties, particularly in tidally flooded regions of southern Bangladesh, exemplifies a CSA practice tailored to local conditions. These varieties help mitigate the risks associated with excessive tidal water or tidal surges, safeguarding crop integrity and promoting carbon sequestration.

⁵⁶ Mahmood R., et al. “The role of soil water availability in potential rainfed rice productivity in Bangladesh: applications of the CERES Rice model”. *Applied Geography* 24 (2004): 139-159.

⁵⁷ M. Yusuf Ali and Md Emdad Hossain, "Profiling Climate Smart Agriculture for the Southern Coastal Region of Bangladesh and its Impact on Productivity, Adaptation and Mitigation," *EC Agriculture* 5, no. 9 (2019): 530-544.

⁵⁸ Liang C, Li Y, Zhang K, Wu Z, Liu J, Liu J, Zhou C, Wang S, Li F, Sui G. Selection and Yield Formation Characteristics of Dry Direct Seeding Rice in Northeast China. *Plants (Basel)*. 2023 Oct 7;12(19):3496. doi: 10.3390/plants12193496. PMID: 37836236; PMCID: PMC10575160.

Awareness/ Education

a. Partner with local MFIs and Islamic Development Bank for CSA education to farmers:

We propose a partnership between the Islamic Development Bank and local MFIs to utilize agricultural expertise from the bank and provide training to volunteers/ officers within MFIs to then teach farmers about the importance of climate smart agriculture. This form of education and awareness can include the case studies we provided as well as other forms of foundational knowledge to relay the benefits of CSA. This is crucial so that farmers can understand why they are adopting these new practices. Emphasizing the role of drought and climate change in the community's agricultural practices will be essential in these awareness and education programs so that farmers can see the link between changing climate and these new innovative practices.

Tool/ Technology

b. Partner with the Ministry of Agriculture and JPAL to identify best CSA practices:

Forging strategic partnerships with the Ministry of Agriculture in Egypt and relevant non-governmental organizations like J-PAL will be the cornerstone for actualizing CSA and CST in the region. Collaboration with NGOs like J-PAL offers the added advantage of empirical research insights, innovative pilot projects, and capacity-building initiatives that are evidence-based. Partnerships with these entities will help leverage their resources and expertise to implement evidence-based initiatives on the ground. These organizations can work on the ground to implement CSA strategies, tailor interventions to local contexts, and their impact. Together, this alliance can leverage scientific research, practical expertise, and policy support to drive the implementation of CSA and CST practices, creating more capacity within the community and a more resilient agricultural sector within the country.

Implementation

c. Partner with the Ministry of Agriculture for policy support, farmers' incentives and outreach:

The Ministry, with its resources and regulatory powers, can facilitate the adoption of CSA practices through policy reforms, financial incentives for farmers, and national outreach programs. First and foremost, the Ministry can establish policy reforms aimed at integrating CSA principles into mainstream agricultural practices. By incorporating CSA standards and guidelines into existing agricultural policies and frameworks, the Ministry will be key to the success of sustainable farming practices in the Qena community and beyond. By allocating funding for research projects, pilot studies and technological innovations, the Ministry can contribute to the generation of new knowledge and the adaptation of new technology to local contexts. In terms of financial incentives, the Ministry can provide farmers with subsidies on drought resilient seeds, work with MFIs to offer low-interest loans for investments in climate-smart technologies, and grant tax incentives for the adoption of sustainable agricultural practices. Lastly, the Ministry can launch national outreach programs aimed at raising awareness and building capacity around CSA practices among farmers. These programs can include farmer training workshops, extension services to disseminate knowledge on sustainable farming techniques, and demonstration farms to illustrate the benefits of CSA in practice. Thus, through these strategies, the Ministry becomes a key player in the adoption and success of CSA practices.

Long-Term Financial Interventions:

5. Climate Insurance

Climate insurance is a financial tool that aims to take on the risks associated with climate change and provide protection against the severity of disasters and mitigate the impact.⁵⁹ Insurance solutions can help accelerate recovery processes and help rebuild infrastructure and livelihoods.

⁵⁹ Insure Resilience Group, Understanding Climate Risk, https://www.insuresilience.org/wp-content/uploads/2022/10/factsheet_understanding-climate-risk-1-1.pdf.

Organizations including the World Bank and the Global Facility for Disaster Reduction and Recovery have worked on efforts to develop insurance solutions and other forms of financial assistance to vulnerable countries for disaster risk management.⁶⁰

There are many benefits to climate insurance. First and foremost, climate insurance helps diversify and smooth risks from climate-related extreme weather events across various regions and timeframes. This tool provides timely and reliable financial support and is able to cover economic losses more effectively than post-disaster aid or loan options. Furthermore, insurance schemes provide an incentive to lower risk through lower premiums for preventative measures, reducing the overall climate vulnerability.

However, there are some challenges in the emerging field of climate insurance. For example, comprehensive insurance schemes require updated weather data, and inadequate access to such data is extremely prevalent in various climate risk countries. One potential solution to this is expanding the availability of remote sensing data through satellite technology. Additionally, there is a gap in reaching vulnerable and more impoverished communities with such tools due to lack of financial literacy. These challenges must be addressed to ensure equitable and effective climate risk management through insurance mechanisms.⁶¹

Climate Insurance Case Study:

Over 80% of rural Bangladeshis experience frequent and intense climate-related disasters. According to a 2022 study by the International Institute for Environment and Development, Bangladesh spends an estimated \$1.7 billion annually on adoption and building post-disaster. Bangladesh has an existing national-level early warning system for disasters such as cyclones and floods. Practical Action, a UK-based developmental organization, has created a system to disseminate climate information locally by installing electronic boards at local government offices to display weather-related information and sending out phone voice messages in anticipation of extreme weather events such as floods. Practical Action has also trained volunteers to raise awareness about climate change, disasters and protection measures among community members, especially among women. Practical Action has designed its small-scale

⁶⁰ World Bank, Climate Insurance, <https://www.worldbank.org/en/results/2017/12/01/climate-insurance>.

⁶¹ Insure Resilience Group, Understanding Climate Risk.

climate insurance scheme to be affordable, fixing premiums based on farmers' ability to pay according to the pilot phase. Additionally, making insurance attractive for farmers requires quick and transparent payouts.⁶²

Bangladesh has various companies offering insurance products, but are hesitant about climate or agricultural insurance due to feasibility concerns. Globally, insurance costs are rising as the impacts of climate disasters become more frequent and severe, and disproportionately affecting poorer households. Poor farmers often receive cash for selling their crops but are still excluded from the benefits of technology, access to banks, and aid after a disaster, and as such assistance primarily benefits landowners rather than farmers. Exports in the country have suggested that loans, along with micro-insurance, should be subsidized by governments, aid agencies, and others to offer low-to-zero interest rates.⁶³

Egyptian Case

In Egypt, climate insurance is an extremely new tool. More recently, a unified insurance law passed by the Egyptian parliament included an insurance policy targeted towards covering the risks of agricultural crops from climate change as a pathway toward financial inclusion. There is a need to increase investments in agricultural insurance as Egypt sees fluctuations in temperature, drought, flash floods, sea-level rise and crop diseases, which all impact agricultural production and food security. Farmers in Upper Egypt especially suffer from the impacts of climate change on their agricultural products. In Ismailia, known as the government for the best mangoes in Egypt, has seen a 50 per cent decrease in production from 2019 to 2020. In Qena, the farmers who serve as clients for FEDA and REDEC have spoken about their main issues being crop-related diseases due to temperature fluctuations, which thus impacts food security and income resilience. Although loans are important for farmers to buy basic inputs for production, insurance offers a way to mitigate shock, not simply adapt. Various agricultural insurance policies cover the death of livestock, fire in poultry farms, and the transport of cotton and flax.

⁶² Contexts News, Bangladesh Tests Climate Finance For Disaster Hit Communities, <https://www.context.news/climate-justice/bangladesh-tests-climate-finance-for-disaster-hit-communities>.

⁶³ Ibid.

However, most of these insurance policies primarily support large agribusiness so smallholder farmers are excluded.⁶⁴

The 2022 unified insurance law provides a step towards financial inclusion. This crop insurance policy covers natural hazards such as floods, droughts, temperature fluctuations, humidity, and pests and diseases. This policy requires continuous collaboration between all stakeholders in the insurance scheme and development of root technological products such as remote sensing and drones, banks and financial institutions to utilize wallets to support agricultural productivity and reducing premiums.

Since comprehensive information on insurance is lacking in the Egyptian context, experts look to countries undergoing similar disasters and financial mechanisms such as in Kenya. One of the biggest challenges regarding the low uptake of climate insurance in Kenya is the lack of literacy round insurance products, the inability to pay insurance premiums because insurers find crop insurance too risky to do unpredictable weather patterns which impacts price settling, and insurers who charge low premiums to attract clients but are unable to make payouts.

With these benefits and challenges in mind, climate insurance in the Qena context will be a useful long-term mitigation process to respond to drought and climate related crop failure. We propose a partnership model to develop an insurance scheme to tackle this issue.

Awareness/ Education

a. Partner with the Islamic Development Bank and Acre Africa to provide insurance literacy programs:

Since one of the biggest challenges towards insurance take up, we recommend an insurance literacy program implemented with the insurance product in the Qena community. This would be similar to a financial literacy program that REDEC or FEDA have already implemented into the community. This can also replicate the financial literacy programs that the Islamic Development bank has created, that are not necessarily

⁶⁴ Dalia Gouda, Small Farmers, Climate Change and Agricultural Insurance in Egypt, LinkedIn - Pulse (2022, <https://www.linkedin.com/pulse/small-farmers-climate-change-agricultural-insurance-egypt-dalia-gouda/>).

insurance specific, but provide a good curriculum for financial training as a whole and utilize Acre Africa's expertise on climate insurance.

Tool/ Technology

The basic insurance scheme we propose will have six primary partners: the insurer, the reinsurance company, the distributions channel, the broker/ intermediary, the government and the price setter.

- b. Partner with Axa-Egypt, Africa Re, local MFIs, Acre Africa/ Apollo Agriculture/ Islamic Development Bank and Pula to develop and disseminate the climate insurance product:**

Insurer

Insurers develop innovative insurance products that incentivize climate-related risk prevention, often through lowering premiums to policyholders implementing climate-related adaptation measures. Insurance companies then manage high risk, such as a covariate risk, through reinsurance. This entails selling the risk to reinsurance companies.

One potential partner is Axa. Axa is one of the largest global insurers working in 51 countries with 93 million clients. Axa is focused on promoting human development, with a pillar emphasizing the fight against climate change. Their strategy to tackle climate change includes investments in green assets as well as investments from carbon intensive industries, and most important designing paramedic insurance solutions in developing countries.⁶⁵ Axa has an Egyptian affiliate, known as Axa Egypt, present in the country since 2015, offering a variety of micro-insurance plans. Axa Egypt provides protection to 1 million customers nationwide.⁶⁶

⁶⁵ Axa, <https://www.axa.com/>.

⁶⁶ Axa-Egypt, About Us, <https://www.axa-egypt.com/about-us>.

Reinsurance Company

Reinsurance companies assess risk, calculate models, take on risk, and pool with different products around the world. In this case, pooling the risk can look at the region the product is targeted for, either the entirety of Egypt or East Africa undergoing drought, for example.

A potential reinsurance company is Africa Reinsurance Corporation (Africa Re), which is the leading pan-African reinsurance company and the largest one in the African continent. Africa Re has a Financial Strength and Credit Rating of A (Stable) by A.M. Best Company (since 2016) and A – (Stable) Standard & Poor’s (since 2009).⁶⁷ Africa’s Re’s strength is its commitment to capacity building and technical assistance to African insurers and its collaborations with 42 member states regional partners, with the recent collaboration under new the Alliance of African Multilateral Financial Institutions (AAMFI) with Africa Finance Corporation, African Export-Import Bank, and others working towards sustainable economic development across the continent. Africa Re has a Cairo office that covers Egypt, Sudan and South Sudan.

Distribution Channel

The distribution channel then takes the product information produced by the insurance company, and then assessed by the reinsurer, and communicates it to end clients, providing some sort of economy of scale. They often measure the acres of the farm, assess the risk, help calculate the price, and sell the product. The distribution channel leverages existing processes/ staff on the ground. Oftentimes, this step proves to not be very cost-effective in microinsurance for poorer people; although the premium cost of each policy is relatively small, the cost of distributing insurance as a percentage of the premium becomes overwhelming.

In the Sawiris context, MFIs such as REDEC and FEDA would serve as the distribution channel, disseminating the product to their clients in Qena, and using their in-house expertise to measure the farms, and assess the risks.

⁶⁷ African Reinsurance Corporation, African Re, https://www.africa-re.com/about_us/africa_re.

The Broker/ Intermediary

Some countries by law require brokers to provide basic services and some do not. In the Egyptian context, insurance companies do not require brokers; according to Law No. 10 of 1981, the Law on Insurance Supervision and Control in Egypt, makes no distinction between agents and brokers, referring instead to intermediaries. The Egyptian Financial Regulatory Authority (FRA) also has issued a ruling prohibiting insurance brokers from collecting fees, insurance premiums, or other payments from policyholders. MFIs might require a personalized agent such as a broker or intermediary to help facilitate the process.

We propose Acre Africa as an intermediary. ACRE Africa holds the status of a registered insurance surveyor in Kenya, serving as an insurance agent in Rwanda and Tanzania, with active projects across Uganda, Ghana, Malawi, Senegal, and Mozambique. Their primary objective is to alleviate the stress and potential damage caused by climate variables for farmers across Africa. In the agricultural insurance value chain, ACRE Africa plays an incredibly instrumental role in combining technical product design, stakeholder coordination, and business development. They help local insurance companies incorporate index products into their portfolios through product development expertise. They also work with local agricultural organizations to customize and implement insurance products. Acre Africa notably functions as a service provider, working alongside local insurers and other stakeholders, and thus does not fulfill the same role as the insurance company itself. Acre Africa doesn't take on the risk, but utilizes its tech platform and connects with distribution channels, like MFIs, to collect data such as the names of clients and geolocations, and maps that information against their index; Acre Africa has a dashboard for weather events and how it affects clients when trigger sets off, and will connect with MFIs then mobilize payment.⁶⁸

A second potential intermediary could be Apollo Agriculture. Apollo, a technology company headquartered in Nairobi, operates to serve farmers in both Kenya and Zambia. Apollo aims to equip farmers with all necessary resources—from seed to sale—to transition into successful commercial farming ventures. Operational procedures at Apollo entail farmers using cash transactions or credit facilities to acquire units. Farmers opting for credit apply for financing,

⁶⁸ Acre Africa, Products, <https://acreafrica.com/products/>.

receiving instant credit decisions facilitated by Apollo's machine-learning credit models. Farmers also select their desired products from Apollo's digital store and collect them from the nearest village agro dealer, as Apollo sustains partnerships with over 1000 agro dealers to ensure maximum accessibility for farmers. Comprehensive agricultural training is provided to all farmers, while those purchasing on credit are additionally safeguarded by insurance against unforeseen circumstances.⁶⁹

Another potential (either additional or alternative intermediary) would be the Islamic Development Bank. The Islamic Development Bank (IsDB), a multilateral development bank working to promote social and economic development in Member countries and Muslim communities worldwide. IsDB addresses climate change through adaptation-driven and resilience-focused investments and interventions. In 2020, the Bank published its [Climate Change Action Plan \(2020 – 2025\)](#) sets out how the IsDB strategy regarding climate change will be implemented with its clients in line with the Paris Agreement.⁷⁰ The Bank also mainstreams climate consciousness across various sectors including agriculture and rural development, energy, transport, health, urban development and water policies. Since Sawiris has an existing relationship with the Islamic Development Bank, and utilizes their climate tech expertise, this can be an interesting partnership for the Islamic Development Bank to venture into climate insurance in the MENA region.

Scholar/ Price Setter

The last part of this model is the expert who sets the price, often also serving as one of the intermediaries. We need an intermediary that has the in-house expertise to calculate it, such as ACRE Africa, IRI, or other specialized people.

The data provider will utilize data systems like “thrips”, data satellites, weather servers, NASA systems, etc, and will recode this data into a more logical and transparent form to judge frequency. The second piece of data that is harder to attain is yield data. For example, if it rains 25 per cent less than the prior 5 years, how will this affect the yield of corn? This is hard to measure; some countries track it through their government or other extension services. Some do

⁶⁹ Apollo Insurance, <https://www.apolloagriculture.com/>.

⁷⁰ Islamic Development Bank, Climate Change, <https://www.isdb.org/climate-change>.

so by interviewing farmers about their yield data over the past few years; but this practice can be quite imprecise, making payout calculations even more improvised.

We recommend Pula, a Kenyan agricultural insurance and technology company that designs innovative agricultural insurance and digital products to help smallholder farmers.⁷¹ They can work to utilize an existing pricing model to figure out how much farmers will lose during climate shocks, but they will go beyond satellites and send people to measure loss in yields to get more specific prices (ie. area yield) - which is more helpful for cash crops - but in general, keeps the price low. Pula specializes in offering digital insurance solutions to shield smallholder farmers from the adverse effects of climate change and crop failure. Through strategic alliances with companies like Apollo, Pula bundles insurance with essential farming inputs such as premium seeds and fertilizer, which are made available to farmers on credit. This collaborative effort not only mitigates financial risks associated with input purchases but also empowers farmers to adopt progressive farming techniques, thereby bolstering food and financial security. In Kenya, agriculture plays a foundational role in the economy, employing over 40 per cent of the population and contributing significantly to the GDP; therefore, climate change threatens a decline in farming productivity. The adverse impacts of climate-related events have been felt by millions of Kenyan farmers, with approximately 5.4 million individuals currently experiencing acute food shortages. Although the need for formal financial products to shield farmers from climate-related risks is extremely timely, the utilization of these tools remains significantly low. Pula's innovative index-based insurance models, particularly the Area Yield Index Insurance (AYII), tailored for smallholder farmers, offer a practical solution. By making insurance accessible to previously uninsured farmers through various distribution channels, Pula is making significant strides in safeguarding the livelihoods of vulnerable agricultural communities. Across 22 countries, Pula has already reached 9.6 million farmers, with over two million Kenyan farmers benefiting from its offerings. In terms of this partnership, Pula has the inhouse expertise to work as an additional/ alternative intermediary, as well as use their skills to evaluate the optimal prices for premiums.

JPAL would be another scholarly partnership as they are an existing partner for Sawiris and currently do research around price setting for interest rates for microloans in Egypt, and could

⁷¹ UNSGSA, Empowering Kenyan Smallholder Farmers Pula's Game Changing Digital Insurance, <https://www.unsgsa.org/stories/empowering-kenyan-smallholder-farmers-pulas-game-changing-digital-insurance>.

apply that expertise towards setting optimal premium prices and designing potential insurance-loan bundle models.

c. Partner with the Ministry of Agriculture and Acre Africa to get comprehensive climate data:

Climate insurance schemes require a comprehensive database for weather-related events. Although Egypt does not currently have a model like this, ACRE Africa has the technology and existing products that allow the digital dissemination of weather events and predictions that could be harnessed to create an Egypt-specific model. Another example, KENAFF USSD, as mentioned earlier, responds to climate change and allows farmers to engage with and adapt to timely weather events. KENAFF has varying levels of expertise including in-house agricultural specialists which provide technical advice and its field offices throughout the country provide up-to-date market information. KENAFF also partners with national ministries and organizations for additional data. For example, the Kenya Agricultural Observatory Platform, provides weather data, and the Kenya Agricultural & Livestock Research Organization provides the latest research.⁷² Sawiris can work with the national ministries to extract weather related data as well as the aforementioned organizations to create a digital database for insurance schemes to utilize.

Implementation

d. Partner with the Ministry of Agriculture for subsidies on insurance premiums:

Insurance products tend to be expensive because they need to cover events that are not too infrequent (otherwise less variable) or too predictable, i.e.. happening every 5-10 years. Moreover, reinsurers are often not comfortable with their pricing models and thus might have a larger premium to add an extra cushion to the premium pricing. Then clients would also have to pay for the associated distribution costs.

⁷² KENAFF, <https://www.kenaff.org/>.

InsuResilience Solutions Fund (ISF) promotes the development of innovative and sustainable climate risk insurance products to improve the resilience of poor and vulnerable households against the impacts of climate change; ISF has done significant work around premium subsidies.⁷³ They showcase that affordability is the main barrier to insurance uptake. The idea is if a donor begins with covering the initial subsidies, another player in the local economy will soon take over this role. Furthermore, donor subsidies help to offer more reliable, more cost effective and faster support to disaster affected communities.⁷⁴ Thus, an option is to have Sawiris pay for part of the premium, either for the short-term or long-term phase, and make it more attractive to MFIs to buy the insurance product on behalf of their clients in this case.

However, the more long-term sustainable option is to have government actors pay part or all of the premiums. Also, there is potential for nonprofits and multilaterals to cover premiums for temporary periods, such as JPAL for research purposes; however, this model is not sustainable. We would thus have to engage the Ministry of Agriculture in Egypt for premium subsidies.

An example of a government subsidized insurance scheme is the Rashtriya Swasthya Bima Yojana (RSBY) in India. This is a government-backed healthcare insurance scheme that provides financial protection to unorganized sector workers, poor families, and households below the poverty line. This insurance scheme provided ₹30,000 per family annually for hospitalization expenses. The premium for the scheme is subsidized by the government, making it more affordable for the target population.⁷⁵ Although this is regarding healthcare, the impact of government subsidies on important insurance mechanisms is applicable to the agricultural sector as well.

⁷³ InsuResilience Solutions Fund. (2022). Premium subsidies for climate risk insurance: Insights for sovereign climate and disaster risk finance and insurance, <https://insuresilience-solutions-fund.org/>

⁷⁴ Zoe Scott, Vikrant Panwar, Lena Weingärtner and Emily Wilkinson, Insights for Sovereign Climate and Disaster Risk Finance and Insurance, InsuResilience Global Partnership (2022), https://www.insuresilience.org/wp-content/uploads/2022/12/PEA_PremiumSubsidies_TP2-2022-12-22-14_06_52.pdf.

⁷⁵ Nivabupa, The Rashtriya Swasthya Bima Yojana: Benefits, Features and Eligibility, <https://www.nivabupa.com/rashtriya-swasthya-bima-yojana.html>

Through this intervention, therefore, we hope to fortify the 2022 unified insurance law and materialize goals of financial inclusion by reaching smallholder farmers in Qena and other parts of Egypt and incorporate real mitigation strategies into policy. Government partnership and potential subsidy programs will be a crucial part of this strategy.

e. Partner with local MFIs to promote the insurance product to the Qena community through outreach programs:

There is a need for awareness campaigns, potentially through village role models who promote insurance products. Within rural communities, role models serve as vehicles for disseminating crucial information, bridging the gap between conceptual understanding and practical implementation. Through nuanced engagement strategies deployed in local marketplaces and innovative outreach initiatives, they foster an environment for informed decision-making among farmers. Their efforts not only bolster resilience against environmental uncertainties but also cultivate a culture of proactive risk management essential for the long-term sustainability of these agricultural practices.

6. Comprehensive Savings Mechanism

Our recommendation for the climate-resilient savings mechanism consists of three main savings strategies: micro-savings programs, financial literacy and climate education programs, and Village Savings and Loans Associations (VSLAs). Sawiris can implement these strategies together or individually.

Awareness/ Education

The dual challenges of economic management and climate adaptation are particularly pronounced in agricultural regions like Qena, where environmental conditions directly influence economic stability. Financial literacy and climate education programs are crucial in equipping farmers with the knowledge to navigate these challenges effectively.

Collaborative efforts with established entities like BRAC, which has a proven track record in implementing financial education programs in similarly challenged settings, could facilitate the

development of tailored educational content, with an emphasis on saving.⁷⁶ These programs should cover essential financial principles, the use of financial products, and strategic responses to climate variability. Local success stories and practical examples should be integrated into the curriculum to illustrate the tangible benefits of such knowledge, enhancing participant engagement and learning outcomes.

By prioritizing financial literacy and climate education, Qena can empower its farmers to make informed decisions that bolster economic and environmental resilience as well as learn the importance of saving for long-term poverty alleviation and economic wellbeing. Educated farmers are more likely to adopt sustainable agricultural techniques, effectively utilize financial tools, and improve their overall livelihoods. Such programs not only contribute to individual prosperity but also foster community-wide advancements in sustainability and economic independence.

a. Partner with AUC, Islamic Development Bank, BRAC for a financial literacy program:

The potential partners we propose for a financial literacy program are the American University of Cairo (AUC), IDB, and BRAC. Since the Islamic Development Bank already has a financial literacy program, we can utilize their curriculum and expertise. BRAC would be a good implementer because they have an existing relationship with Sawiris and are already implementing interventions. AUC could also provide its expertise as an education institution to further support a financial literacy curriculum. We also propose to emphasize the role of savings in the financial literacy program in poverty alleviation. It is incredibly important for farmers in Qena to understand why they need to save. Otherwise, farmers will not do so and only have enough to purchase necessities and sustain themselves but not enough for long-term savings.

⁷⁶ BRAC. (2023). Financial inclusion programs.

CASE STUDY: World Food Programme, Zambia

Starting this year, the World Food Programme is creating an initiative to promote climate resilience and financial inclusion for over 17,000 smallholder farmers in Zambia over the span of the next two years.⁷⁷ Farmers will receive training on sustainable agricultural practices, and financial literacy, and have more access to affordable credit and risk insurance as well as weather forecasting services. This program also includes a digital component by scaling up the use of Maano, the Virtual Farmers Market application. This is an e-commerce platform that advertises farmers' supply and buyers' demands for crops. The combination of this digital tool as well as an agricultural and financial literacy program aims to empower farmers to take what they learn from their training to a more accessible market.⁷⁸

CASE STUDY: ICD Financial Literacy Training Program

In 2022, The Islamic Corporation for the Development of the Private Sector (ICD) and the Executive Education of the University of Business and Technology launched a joint education program to promote financial literacy and financial inclusion for the Islamic Development Bank's 55 member countries.⁷⁹ This program includes financial education workshops, boot camps, in-class, and online programs as well as other opportunities. The goal of the program is to easily access and accelerate the integration of affordable digital financial products and services for underserved populations, as well as small business owners. The FinLit Program also provides access to affordable financial products and services including savings, financial planning, emergency funds, crowdfunding, financing, investments, and wealth growth. Although this initiative is not particularly targeted towards farmers, the curriculum, tools and expertise this sector of the Islamic Development Bank has to offer through this program can be strategically utilized for a more farmer targeted approach.

⁷⁷ World Food Programme. (2024). Climate resilience and financial inclusion initiatives for Zambia.

⁷⁸ World Food Programme, WFP Expands Resilience Activities to Support Smallholder Farmers in Zambia, <https://www.wfp.org/news/wfp-expands-resilience-activities-support-smallholder-farmers-zambia>.

⁷⁹ ICD & UBT. (2022). Financial literacy and inclusion programs.

b. Partner with local MFIs to develop a digital micro-saving program:

Micro-savings is a branch of microfinance financial inclusion services adapted to where financial entities encourage individuals to save in smaller quantities of money due to a more stringent and limited income.⁸⁰ Similar to traditional savings, micro-savings became particularly popular and important in unbanked and underbanked populations where entry to the formal financial sector is much more difficult to access due to impediments like high interest rates, fees or the need to maintain a minimum balance.⁸¹ Micro-savings accounts typically require minimal initial deposits without requiring minimum balances, and need small deposits and fees to be waived. These minimum requirements afford farmers with a low barrier to entry as well as the flexibility to save incrementally according to the seasonal nature of their income and overall circumstances. Ultimately, micro-savings is intended to provide financial stability in a sustainable manner, especially for those of low-income communities.

In rural areas like Upper Egypt Qena, where agriculture is the predominant source of the community's livelihood, income is typically irregular and seasonal, financial instability is prevalent and a significant concern.⁸² Due to limited access to resources such as water and modern farming systems, challenges ranging from economic to environmental are exacerbated. Farmers crop yields have decreased over time, unfortunately, leaving them in an increasingly more precarious situation. Sawiris's partnerships with MFIs such as REDEC and FEDA have granted them access to serve the Qena community by providing microfinance loans and forms of income diversification.⁸³ The services have resulted in expanding farmers' purchasing power concerning farming and livestock activities. However, despite the benefits, the fees and interest rates charged by the microfinance institutions, farmers often fall behind in repayment. The effects of cyclical poverty make

⁸⁰ Ledgerwood, J., Earne, J., & Nelson, C. (Eds.). (2013). *The New Microfinance Handbook: A Financial Market System Perspective*. World Bank Publications.

⁸¹ Federal Reserve of St. Louis. (2012). *Microsavings: Opening the door for individuals to invest in themselves*, <https://www.stlouisfed.org/publications/bridges/summer-2012/microsavings-opening-the-door-for-individuals-to-invest-in-themselves>

⁸² Egyptian Center for Economic Studies. (2021). *The Socio-Economic Situation in Upper Egypt*.

⁸³ Mehra, R., & Rojas, M. H. (2008). *A significant impact: microfinance in the lives of women farmers in Egypt*. International Center for Research on Women.

it increasingly difficult for farmers to raise themselves out of poverty. The inheritance of challenges including limited access to water, efficient farming systems and financial services have hindered farmers from improving their quality of life. Lower agricultural productivity and consequently, income stability has made it increasingly difficult for generations of farmers to emerge from poverty.

Our team is proposing expanding the microfinance services FEDA and REDEC provide in the strategic implementation of micro-savings programs that would provide a more secure, scalable method for farmers to manage their earnings, gain access to credit lines, and create a linkage to broader financial services that would propel them to more sustainable financial growth.⁸⁴ This financial inclusion is essential for fostering economic stability and resilience, enabling farmers to invest in improvements and protect against unpredictable climatic or economic challenges.

We recommend a micro-savings program model in Qena as it relates to the impediments farmers face with saving their income due climate change effects such as crop loss and pest infestation.⁸⁵ A micro-savings program has the potential to be incrementally transformative in the long run as it would foster a culture of savings and investment in the community. Incorporating the micro-savings program would build upon its existing relationship with FEDA and REDEC but adapting it to micro-savings as opposed to solely loans, meeting more of the specific needs of Qena's farming communities. Providing farmers the opportunity to make smaller deposits without penalty or fees as well as there being no minimum balance requirement, this would give flexibility and an increased level of autonomy over their finances and lives.

Operationally, farmers would typically save by making regular, small daily, weekly, or monthly basis deposits. The amount of the deposit would depend on their streams of income and personal preferences. Deposits could be made directly to FEDA and REDEC, where these MFIs would offer specific accounts dedicated to micro-savings, consequently, making them more accessible to those that need it. MFIs would assure a

⁸⁴ Linkages between social and financial performance: Evidence from Sub-Saharan Africa microfinance institutions, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9090451/>

⁸⁵ IPCC. (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. IPCC Working Group II Report

minimum balance is not required as well as no fees or penalties charged in order to increase accessibility and usage within the community. Increasing flexibility would increasingly foster a culture of saving and level of autonomy over their finances and lives. A micro-savings approach leverages the existing trust and networks that farmers already have with MFIs like FEDA and REDEC. MFIs could also consider incentivizing these micro-savings accounts by offering benefits like earning interest or being linked to some of the insurance products mentioned designed specifically for the agricultural sector.

Mobile Wallets

As part of the micro-savings model, we are proposing a mobile wallet component. This builds upon the financial inclusion services FEDA and REDEC already provide to farmers in Qena, particularly access to Meeza cards. Meeza is Egypt's national payment scheme, established under the guidance of the Central Bank of Egypt, allowing financial institutions to cater to their customers who expect to make payments.⁸⁶ It functions only within the Egyptian network as a debit card/ prepaid card. Mobile wallets thus allow farmers to manage their finances more conveniently. It also offers a practical solution to the challenges posed by the limited physical banking infrastructure in remote areas like rural Qena. Ultimately, it aims to transition Egypt to a less-cash society.⁸⁷

Mobile Wallet Case Study:

M-Pesa was launched by Safaricom in 2007 and significantly transformed financial access in Kenya, becoming a pivotal tool in fostering financial inclusion, especially in remote, underserved and unbanked/ underbanked areas.⁸⁸ Originally a simple mobile money transfer service, M-Pesa quickly expanded its offerings to include micro-savings and microcredit features through integrations such as M-Shwari and KCB M-Pesa. These features allow users to save money, earn interest, and access loans directly from their mobile phones, removing the barriers posed by traditional banking infrastructure.⁸⁹

⁸⁶ Central Bank of Egypt. (2023). Meeza: Egypt's National Payment Scheme.

⁸⁷ Meeza, <https://meeza-eg.com/about-us/>

⁸⁸ Jack, W., & Suri, T. (2011). Mobile money: The economics of M-Pesa. NBER Working Paper, (16721).

⁸⁹ MDPI, <https://www.mdpi.com/2071-1050/11/3/568>

The significance of M-Pesa's evolution into micro-savings lies in its substantial socio-economic impact. By providing more accessible financial services, M-Pesa has helped bridge the gap for Kenya's unbanked population; this has contributed to an increase in economic empowerment and financial security. The platform has enabled individuals to manage their finances better, save for future needs, and start or grow small businesses, thereby stimulating local economies and promoting community development.⁹⁰ The success of M-Pesa in Kenya has also served as a model globally, illustrating the potential of mobile technology to innovate financial services in developing regions. The adoption of M-Pesa underscores the importance of the implementation of financial technologies and how sustainable development goals can be achieved, particularly in that of improving financial inclusivity and economic equality.⁹¹

Drawing on M-Pesa's success, integrating mobile banking technology into the micro-savings model proposed could further enhance accessibility and long-term stability for generations of Qena's farming community.⁹² Implementing a similar model in Qena would aim to support its largest income generating industry, the agricultural sector. Mobile wallets could be tailored to include features that support micro-savings and provide real-time financial services like payment for seeds, fertilizers, or veterinary services. Mobile wallets could also serve as a channel for government, non-governmental organizations and MFIs to distribute aid directly to farmers in times of crisis, ensuring that assistance is immediate and targeted to the populations that it is intended for.

Operationally, farmers in Qena would already have access to their Meeza cards. The mobile wallet would be offered conveniently within the financial services being offered from their phones. Farmers would be able to register for the mobile wallet by providing basic information such as their phone number and identification. The mobile wallet would allow for farmers to manage their finances, make payments, transfer funds and access loans. The mobile wallet could serve as a method for direct distribution of aid

⁹⁰ University of Oxford and Blavatnik School of Government, <https://www.bsg.ox.ac.uk/research/publications/m-pesa-success-story-digital-financial-inclusion>

⁹¹ Yunus, M. (2007). *Banker to the Poor: Micro-Lending and the Battle Against World Poverty*. Public Affairs.

⁹² University of Oxford and Blavatnik School of Government. (2020). M-pesa success story digital financial inclusion, <https://www.bsg.ox.ac.uk/research/publications/m-pesa-success-story-digital-financial-inclusion>

from MFIs, NGOs and government agencies. There would ideally be security features like pin protection. The adoption of mobile wallet technology in Qena would not only facilitate smoother financial transactions but could transform the economic landscape by enhancing financial security, increasing savings rates, and fostering a culture of financial planning and resilience among farmers. This technological shift is essential for aligning Qena’s agricultural practices with modern economic systems and providing farmers with the tools necessary for economic empowerment and increased climate resilience.

c. Partner with local MFIs to set up Group Savings through Village Savings and Loan Associations (VSLAs):

The last model we are recommending to the farmers of Qena is group saving through the Village Savings and Loan Association (VSLAs) which was piloted by the Cooperative for Assistance and Relief Everywhere (CARE) in 1991 in Niger where they utilized VSLAs as a vehicle for women particularly to save money and access loans.⁹³ Since the initiation of the pilot program, Niger has made substantial strides in reducing poverty by improving financial access, particularly for women and rural communities lacking services. These initiatives promote community unity and allow individuals to boost the local economy through investments in businesses and projects. Consequently, this enhances economic security and access to vital services, improving living conditions. According to CARE, the program has expanded to 200,000 VSLAs across 35 countries, generating over \$350 million in annual financial transactions and creating millions in savings, with a remarkable loan repayment rate of 99%.⁹⁴

By capitalizing on SFSD’s partnership with CARE, SFSD can bolster its relationship with CARE Egypt Foundation (CEF), which is dedicated to the needs of Lower and Upper Egypt.⁹⁵ Dedicating a VSLA model for the farmers of Qena would consist typically of 15-30 individuals from the community who come together to form a self-governed body. These members hold regular meetings—whether weekly, biweekly, or

⁹³ CARE, https://www.care.org/wp-content/uploads/2020/05/vsla_25years_final_20sept16.pdf

⁹⁴ CARE. (2020). 25 years of village savings and loan associations. Retrieved from https://www.care.org/wp-content/uploads/2020/05/vsla_25years_final_20sept16.pdf

⁹⁵ CARE Egypt Foundation, <https://care.org.eg/our-impact/>

monthly—to deposit their savings into a communal pot, which serves as a secure place to save their money, access small loans, and secure emergency insurance.

During these meetings, members contribute to a collective fund from which they can borrow money as necessary and repay it with interest. After completing a typical cycle, usually lasting about a year, the total amount accumulated—along with any interest generated—is proportionally distributed back to the members based on their individual contributions. After distribution, the group often restarts the cycle.

Village Savings and Loan Associations (VSLAs) offer a community-driven approach to savings and credit that is particularly well-suited to the communal and cooperative culture of Qena. By pooling resources and sharing risks, VSLAs can build a resilient financial community that supports individual and collective economic growth.

The structure of VSLAs encourages regular savings and controlled borrowing, with clear rules and mutual accountability. These groups can effectively address the lack of access to formal banking services, providing a transparent and manageable system for financial exchange. The success of VSLAs in East Africa, where they have enhanced the economic stability of communities by providing access to credit and building savings, serves as a model. In Qena, these associations could also focus on incorporating women, who often play crucial roles in both family finances and agricultural activities, thereby promoting gender inclusivity and empowerment.

Implementing VSLAs in Qena would leverage existing community bonds to enhance financial security and catalyze economic activities at the local level. Such initiatives not only foster financial independence but also strengthen social cohesion, creating a supportive network that can collectively respond to economic and climatic challenges. Continuous support, training, and adaptation to local needs are essential for the sustainability and success of VSLAs in the region.

Implementation

d. Partner with local MFIs to offer performance-based incentives to microfinance programs and VSLAs:

In order to promote savings for farmers, we propose working with the MFIs REDEC and FEDA to offer the following performance-based incentives that would ease farmers' access to financial services and products in order to make saving more appealing.

Specifically for digital micro-savings program:

Target High-Potential Entrepreneurs: Focus lending on experienced business owners who have demonstrated the ability to generate significant returns, optimizing economic benefits and employment.

Flexible Repayment Schedules: Adapt repayment terms to accommodate the fluctuating economic conditions that borrowers may face, which can enhance their ability to maintain payments and boost overall financial stability.

For both digital micro-savings program and VSLAs:

In-kind transfers: Could be another effective incentive for a repayment option if farmers reach a certain threshold of saving. In a project led by the SFSD's Economic Empowerment Team, participants were divided into three categories, with the first category receiving in-kind loans such as livestock, specifically sheep. These participants were provided with sheep for a period of six months, during which they engaged in activities like fattening the sheep and subsequently selling them for profit. The repayment of the loan occurred in installments, allowing borrowers to gradually repay their debt while also benefiting from the income generated through the sale of livestock. This approach not only provided access to capital but also facilitated income-generating activities, promoting financial inclusion and economic empowerment among participants.

Similarly, in a conversation with J-PAL regarding the Wadi El-Gedid green economy project, we learned that installment repayment was not limited to cash but could also be made in-kind. For example, participants in this project were given the option to repay their loans with agricultural produce, such as strawberries, instead of cash. This innovative approach allowed borrowers to repay their debts using the fruits of their labor, leveraging their agricultural activities to fulfill their financial obligations. However, a few challenges were identified, including the impact of inflation on loan repayment amounts and logistical issues associated with storing and managing in-kind repayments, particularly for larger items such as furniture. Additionally, verifying the value of in-kind repayments without proper documentation posed a challenge, highlighting the importance of transparent record-keeping and oversight in ensuring the integrity of the repayment process.

Overall, these case studies highlight the potential of exploring in-kind transfers as a viable repayment option in microfinance initiatives, particularly in agricultural contexts where borrowers may have limited access to cash but possess valuable assets or produce. By implementing in-kind transfers as performance-based incentives, this can be a useful way to mitigate some of the challenges that occur with in-kind transfers, but make saving more attractive to farmers as a way of receiving physical inputs, or enable them the option of repaying their loans in the form of agricultural produce. This can thus encourage long-term saving and debt alleviation.

Integrate Digital Solutions: Employ digital platforms to streamline the processes of loan disbursement and repayment, enhancing the convenience and accessibility of microcredit services for a broader range of borrowers.

Subsidized Loans/ Inputs: Farmers who reach a certain threshold of their micro-savings account or in their collective savings account in the VSLA each month, or at the end of the designated period, may be eligible for preferential loan subsidies to buy farm inputs and/ or subsidies on the farm inputs themselves, such as seeds, fertilizer, equipment,

etc.⁹⁶ The Grameen Bank, for example, bolstered its initial success on subsidies provided to farmers, providing an incentive to acquire credit.

Risk Sharing Mechanism - Insurance: Another incentive, this time promoting a risk sharing mechanism, is providing subsidies for insurance against weather-related crop failures. This shifts the adoption risk of agricultural methods away from farmers so that insurers can take on this risk. By providing a subsidy for insurance premiums once farmers reach a threshold of saving can be a useful mitigation tool and promote long term economic empowerment. This would of course only be utilized once an insurance scheme is set in place. Performance based incentives such as these motivate smallholder farms to practice micro-savings, whereas otherwise they may view it as an extraneous activity.

OUTCOMES

The implementation of a partnership model engaging smallholders in Egypt could yield transformative outcomes in building resilience to the dual challenges of rising temperatures and increasing water scarcity. By adopting a systematic approach to crop rotation under this model, farmers can maintain soil fertility and reduce pest cycles, thus maximizing the productive use of their land. The collaboration between the Ministry of Agriculture, local MFI, and international entities like J-PAL could enhance the efficacy of these practices through shared knowledge and resources. Improved access to subsidies, coordinated through this partnership model, would incentivize farmers to invest in climate-adaptive measures. Subsidies could offset costs for climate-resilient seeds or new irrigation technologies, making them more accessible to smallholders. These financial supports would not only help mitigate upfront costs but also encourage the adoption of innovative agricultural practices.

Advanced irrigation strategies form another critical component of this model. As water becomes an even more precious commodity, efficient irrigation techniques, such as drip irrigation or solar-powered systems, would enable farmers to conserve water while maintaining crop yields.

⁹⁶ CCAFS, Climate Focus Report: Towards Policies for Climate Change Mitigation: Incentives and benefits for smallholder farmers (2012), https://climatefocus.com/wp-content/uploads/2022/06/ccafsreport7-smallholder_farmer_finance.pdf.

By integrating climate-smart agriculture practices into daily farming operations, smallholders can adapt to the increasingly arid conditions, ensuring their livelihoods remain viable even as the climate changes. Furthermore, insurance schemes that protect against crop failure due to extreme weather events would provide a safety net, reducing the vulnerability of smallholder farmers to the unpredictable nature of climate change. This risk mitigation tool could help stabilize income and investment in agriculture, thereby promoting sustained agricultural productivity.

Lastly, the development of savings programs tailored to the needs of farmers could ensure long-term financial resilience. Such programs could facilitate the accumulation of funds to invest in new technologies or recover from potential climate-induced losses. A secure savings scheme, possibly incentivized by matching funds or interest rate subsidies, could empower farmers to plan for future investments in climate resilience.

In summary, the collective impact of these interventions under a robust partnership model would be significant in helping the smallholders in Qena build resilience. It would not only secure their immediate agricultural productivity against the current climate challenges but also pave the way for sustainable farming practices that could withstand future environmental stresses. The success of such a model hinges on the coordinated efforts of all partners, each contributing their expertise and resources towards a unified goal of sustainable development and climate resilience in Egyptian agriculture.

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APPENDIX 1 - Arab MPI

In December 2020, the League of Arab States Social Ministerial Council endorsed the Economic and Social Commission of Western Asia to propose a revised Arab MPI framework—initially developed by UNDP and Oxford Poverty and Human Development Initiative (OPHI)—as a formal tool for monitoring and tracking multidimensional poverty in Arab countries.

The Arab MPI prioritizes the refinement of its methodology to support cross-country comparisons, ensure consistency over time, and accurately reflect the varied aspects of poverty in middle-income Arab nations. The selection of dimensions, indicators, and their corresponding deprivation thresholds in the Arab Multidimensional Poverty Index (MPI) are carefully determined to reflect their significance within the region, in alignment with human rights principles and the Sustainable Development Goals (SDGs), and to account for data availability across countries. This decision-making process involves collaboration among multiple agencies to ensure inclusivity and relevance (MPPN, 2021).

There are two main pillars in the Arab MPI, material living conditions and social wellbeing. The main difference in the revised Arab MPI is its assessment of poverty in both pillars and their equal allocation of weights. The revised Arab MPI thus relies on two pillars, five dimensions, and 14 indicators.

Following are the five dimensions of revised

Arab MPI:

1. Health: The dimension of health includes three indicators:
 - Child mortality
 - Child nutrition - The child nutrition indicator is also refined by considering underweight instead of wasting to mitigate seasonality biases.
 - Child pregnancy.

Compared to the original Arab MPI, most notably, adult malnutrition and female genital mutilation are omitted due to coverage issues across countries.

2. Education: The dimension of education includes three indicators:
 - School attendance
 - Age schooling gap (schooling repetition)
 - Adults' educational attainment
3. Housing: The dimension of housing includes two indicators:
 - Housing adequacy—overcrowding
 - Type of dwelling

Compared to the original Arab MPI, overcrowding is now evaluated among 10+ year olds, accounting for the importance of children's privacy. Deprivation in the type of dwelling is broadened to better capture regional housing conditions. This measure newly flags places other than stand-alone houses or apartments, as well as homes with a non-permanent floor or roof.

4. Access to Services: The dimension of access to services includes:

- Improved drinking water
 - Sanitation
 - Access to electricity
5. Assets: The dimension of assets covers three separate asset groups:
- Communication
 - Mobility
 - Livelihood assets

Compared to the original Arab MPI, these asset groups are selected not only based on their individual functions, but also their material values and data availability.

These assets may serve as indicators for enhanced individual capacities to deliver specific functions (such as mobility and communication), and thus enhanced achievement of particular capabilities. The refined definition improves cross-country comparability and mitigates biases. The revised index has been designed to capture multiple aspects of poverty more comprehensively for the Arab countries. It addresses data limitations more effectively, facilitates improved inter-country comparisons, and maintains consistency over time. This revision aligns with the enduring policy focus of Arab governments on addressing moderate levels of deprivation, particularly given the significant strides made in reducing extreme poverty during the early 2000s.

The emphasis on moderate poverty is in line with

how national poverty thresholds are determined, ensuring that the measures of multidimensional and monetary poverty remain policy-relevant and compatible. Furthermore, the revised index exhibits favorable characteristics in terms of the overall validity of the indicators, as shown by redundancy tests, and the stability of country rankings, as exhibited by robustness tests considering variations in weights and poverty thresholds.

The revised Arab MPI includes 11 countries:

1. Jordan
2. Palestine
3. Egypt
4. Tunisia
5. Algeria
6. Iraq
7. Morocco
8. Yemen
9. Comoros
10. Sudan
11. Mauritania

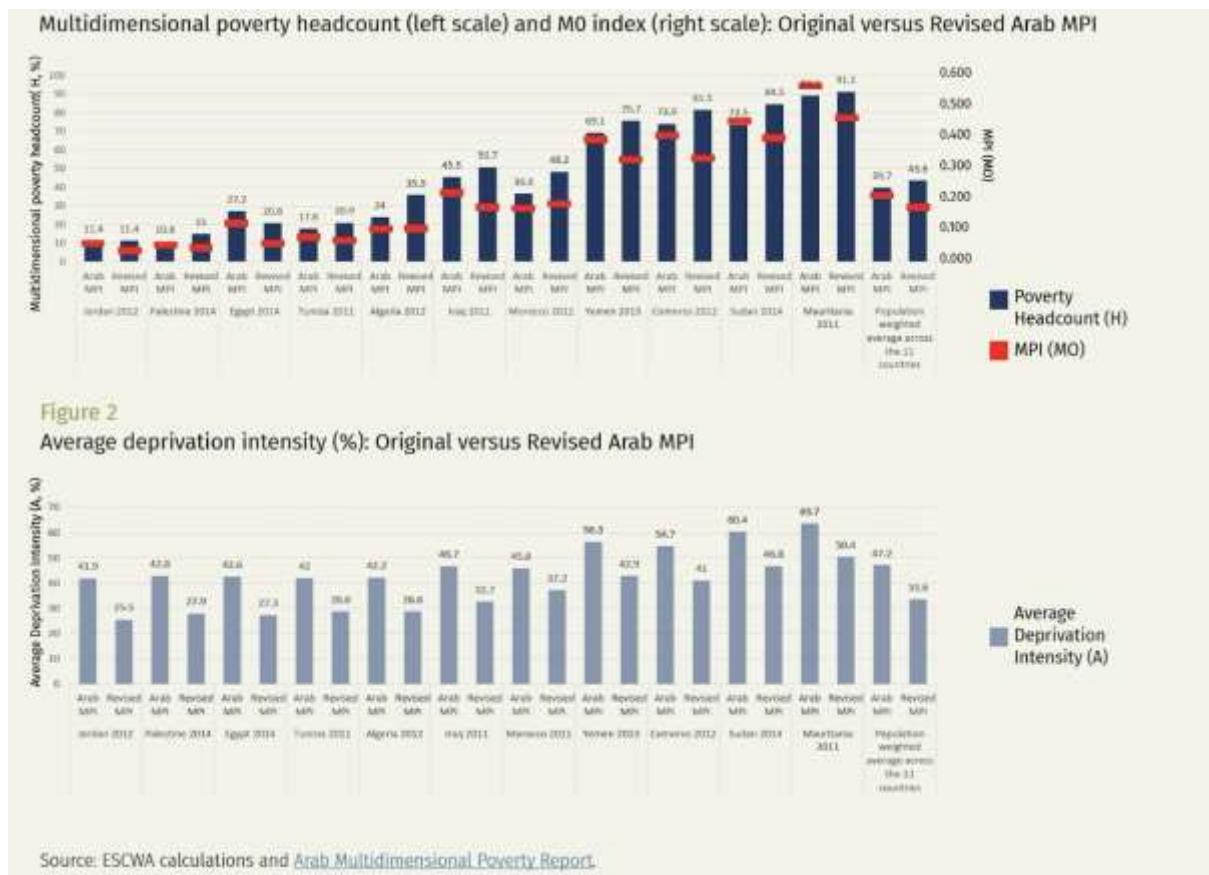


Figure 4: MPI - United Nations Economic and Social Commission for Western Asia and Arab Multidimensional Poverty Report

Figure 4 depicts the comparison between the countries in terms of poverty headcount and average deprivation intensity describing the differences in the original and the revised MPI. In both criteria, Egypt's MPI score improves in revised Arab MPI, which means that overall headcount poverty as well as deprivation intensity has decreased in Egypt as per the revised Arab MPI standards. However, we need to keep the limitation in mind that the last survey data available for Egypt is that of 2014.

Appendix 2: Survey Questions

1. How many clients/beneficiaries do you approximately serve?
 - A. 0-50
 - B. 50-100
 - C. 100-150
 - D. 150-200

2. In the questions below, please provide an approximate distribution of your clients'/beneficiaries' base:
 - A. What percentage are agricultural producers?
 - B. What percentage are livestock holders?
 - C. What percentage accounts for both: farmers and livestock holders?
 - D. What percentage are below the poverty line?
 - E. What percentage of small businesses do you cover?

3. What do your clients/beneficiaries produce for?
 - A. Household Consumption
 - B. Non-household Consumption
 - C. Both

4. Are your clients/beneficiaries in urban Egypt, rural Egypt, or both?
 - A. If both, what is the percentage of rural and urban clients respectively?

5. What interest rate is most used in loan (or any microfinance) plans/portfolios relating to water security?
 - A. Zero Interest Rate
 - B. Low Interest Rate (below market average)
 - C. Medium Interest Rate (equal to Market average)
 - D. High Interest Rate (higher than market average)

6. How closely located are your clients/beneficiaries to the Nile River?
 - A. 0-20 km
 - B. 40-60 km
 - C. 60-80 km

- D. 80-100 km
- E. 100 km and above

7. Do your clients/beneficiaries struggle with water scarcity with respect to per capita water intake (below 1000 m³ per person per year)?

- A. Yes
- B. No

8. What financial products are most used in loan applications relating to water security?

- A. Loans
- B. Grants
- C. In-kind Loans
- D. In-kind Grants

9. What financial products do you offer to clients/beneficiaries?

- A. Micro Enterprises
- B. Business Loans
- C. Remittances
- D. Money Transfer Services
- E. Islamic Microfinance products
- F. Financial Literacy and Training Program
- G. Consumer Business Loans
- H. Home Improvement Loans
- I. Employee Loans
- J. Special Needs Loans
- K. Collecting Savings
- L. Group and Individual Loans
- M. Micro Leasing Activities
- N. Non-financial Services
- O. Basic Social Protection Coverage
- P. Loan Guarantee Schemes
- Q. Mortgage
- R. All of the above

10. What is the average monthly household income of your clients/beneficiaries?

- A. 10,000 EGP and below
- B. 10,000-20,000 EGP
- C. 20,000-30,000 EGP
- D. 30,000-40,000 EGP
- E. 50,000-60,000 EGP
- F. 60,000-70,000 EGP
- G. 70,000-80,000 EGP
- H. 80,000-90,000 EGP
- I. 90,000-100,000 EGP
- J. 100,000 EGP and above

11. What are your clients/beneficiaries' main income-generating activities?

- A. Livestock
- B. Agriculture
- C. Small business
- D. Other (please specify)

12. Do you track the Multidimensional Poverty Index (MPI)?

- A. Yes
- B. No

If yes, what aspect of MPI or how is MPI applied in the field? (open ended question)

Appendix 3 - Expert Interviews

The following is information on each of the experts we interviewed:

- a. **Adam M Osman** – Associate Professor at the University of Illinois at Urbana Champaign. He is a development economist who has worked on RCTs in the Philippines, India, Nigeria and Georgia with a focus on the Middle East. His areas of research include access to finance, private sector development, labor markets, and international trade among others. He is also the Co-Scientific Director of the J-PAL office at the American University in Cairo.
- b. **Enock Sing’oei** – Agriculture and Climate Insurance Specialist in Africa and Bangladesh. He has worked as an Agriculture Insurance Specialist for UNDP, and as an Agriculture and Climate Insurance Consultant at ILO among other roles.
- c. **Carmelo Armetta** – Expert in food, security, and environment. He is currently working at the Italian Agency for Development Cooperation in Cairo, Egypt.
- d. **Daniel Osgood** – Head of the Financial Instruments Sector Team at the International Research Institute for Climate and Society (IRI). He focuses on marrying climate information with financial tools to enhance the livelihoods of smallholder farmers in developing regions. Osgood’s work, especially in the realm of index insurance, has demonstrated significant development impacts, offering hundreds of thousands of smallholder farmers the opportunity to purchase insurance through processes that are both farmer-driven and grounded in scientific research.
- e. **Dr. Ahmed Elsayed** – Executive Director of J-PAL MENA at the American University in Cairo. Dr. Elsayed oversees strategic and technical aspects of research, policy outreach, and capacity building activities aimed at reducing poverty in the MENA region. J-PAL MENA is pioneering evidence-based strategies to address poverty across various sectors in the MENA region.

Appendix 4 - Sample Interview Guide for Expert or Key Informants

* Disclaimer: the interview outline below is a rough and general outline to guide us, specific interview questions may vary depending on the context and interviewees' area of expertise

Introduction:

- Begin with a brief self-introduction, emphasizing that we are a Columbia SIPA student team working in collaboration with the Sawiris Foundation for Social Development.
- Clarify the purpose of the interview, explaining that it is part of a research initiative focused on identifying climate-resilient microfinance policy and product options for Upper Egypt.
- Ensure confidentiality and explain the use of any recording devices.
- Confirm the length of the interview and express gratitude for their time.

Opening Questions

Basic Information:

- Verify and confirm the informant's background, expertise, and role in the context of microfinance, climate change, or related fields.
- Establish rapport by inquiring about their experiences and perspectives in the field.
- Seek confirmation of their understanding of the project's objectives.

General Introduction:

- "To start, we are seeking your insights to better understand the intersection of microfinance and climate-related challenges in Upper Egypt. How would you describe the current landscape and potential opportunities?"
- * Specific question to be determined according to the context

Topics and Follow-up Questions

Microfinance and Multidimensional Poverty

Introductory Question:

- “From your perspective, how does microfinance currently intersect with the Multidimensional Poverty Index (MPI) in the context of Upper Egypt?”

Follow-up Questions:

- “Can you elaborate on specific initiatives or programs that have effectively addressed multidimensional poverty through microfinance in this region?”
- “Are there any challenges or gaps in the existing microfinance strategies that you have observed?”

Climate Change Impacts on Microfinance

Introductory Question:

- “Considering climate change projections, how do you perceive the potential impact on microfinance customers, especially smallholders and micro-entrepreneurs in Upper Egypt?”

Follow-up Questions:

- “In your experience, what adaptive measures have successfully mitigated climate-induced hardships for microfinance customers?”
- “Are there specific policy interventions or innovative products that you believe could enhance climate resilience in the microfinance sector?”

Transitions between Topics:

- Seamlessly transition between topics by summarizing key points from the previous discussion and introducing the next area of inquiry.
- *Specific transitions determined by the context

Closing:

- Express gratitude for their valuable insights.
- Discuss possible follow-up communications, such as additional questions that may arise.
- Inquire about other key informants they recommend for the team to contact.
- Mention the possibility of providing updates on the progress of the research.
- Thank the informant for their time and expertise, reiterating the importance of their contribution to the project.

Appendix 5 - Sample Guide for Focus Group Discussions with Farmers

* Disclaimer: the interview outline below is a rough and general outline to guide us, specific interview questions may vary depending on the responses that emerged during the discussion and questions from the interviewees

Introduction:

- Begin with a brief self-introduction, emphasizing that we are a Columbia SIPA student team working in collaboration with the Sawiris Foundation for Social Development.
- Clarify the purpose of the interview, explaining that it is part of a research initiative focused on identifying climate-resilient microfinance policy and product options for Upper Egypt.
- Ensure confidentiality and explain the use of any recording devices.
- Confirm the length of the interview and express gratitude for their time.

Questions:

1. Profiling Questions:

Name & Basic Introduction

- a. How long have you been a farmer/livestock holder/business holder?
- b. What did you do before?
- c. Do you live close to here?

Section 1 - business baseline

- a. What do you grow and sell in your business? How many and what kind of animals do you have?
- b. What are the main expenses you face during different stages of farming (e.g., planting, harvesting)?
- c. Have you noticed any changes related to climate?
 - How has it affected the crops?

- How has it affected the yield?
- Effect on prices/income?

Section 2 - Climate adaptation

- a. What happens when it does not rain
- b. How do you manage your farming activities during periods of drought or insufficient rainfall?
- c. What are the primary financial challenges you encounter during different phases of farming, such as planting, cultivation, and harvesting?
- d. What skills or knowledge do you believe are essential for farmers to effectively navigate climate-related challenges?
- e. Are there specific government policies or regulations you believe could better support farmers in adapting to climate change?
- f. Can you provide insights into the specific farming techniques or methods you employ to adapt to changing climate conditions?
- g. Have you diversified your crops or livestock in response to climate challenges, and if so, how has this impacted your overall business? What are any long-term plans or strategies you have in place to sustain your farming business amidst ongoing climate variability?

2. Climate Change

Current Situation

- a. How many liters of water does your household consume daily? (use any other way of measuring water consumption, it could be number of buckets in a day, etc.)
- b. Has your water consumption/access changed in the past 5 years?
- c. What activities do you participate in that use water (household consumption, agriculture, livestock)?
- d. How has your crop yield/ agricultural output changed in the past few years (due to the environment)?
- e. What food do you consume daily? Has your food consumption changed over the past 5 years?

- f. How do you currently manage risk related to weather, pests, and market fluctuations?
- g. Have you implemented any renewable energy solutions on your farm to reduce dependence on traditional energy sources and mitigate climate impact?
- h. What traditional or indigenous knowledge do you rely on to forecast weather patterns and make agricultural decisions?
- i. How do you collaborate with neighboring farmers or local agricultural organizations to share knowledge and resources for climate adaptation?
- j. Can you describe any innovative farming practices or technologies you have adopted to enhance resilience to climate change?

Impact

- a. Have the services provided to you by the NGOs/ MFIs affected your water consumption?
- b. Have the services provided to you by the NGOs/ MFIs affected your food consumption?
- c. Have the services provided to you by the NGOs/ MFIs affected your income?
- d. Have the services provided to you by the NGOs/ MFIs affected your savings?
- e. Have the services provided to you by the NGOs/ MFIs affected your agricultural output?
- f. In what ways have these services affected the quantity and quality of water available for irrigation on your farm?
- g. Can you describe any specific savings mechanisms or financial tools introduced by these organizations that have helped you manage financial uncertainties?

Climate Adaptation by Farmers

- a. What new farming methods have you implemented?
- b. What new income generating activities do you participate in?
- c. Are there any specific challenges you've encountered in implementing these new farming methods, and how have you addressed them?
- d. Have you received any support or training to develop skills related to these new farming methods or alternative income ventures?

e. How do you perceive the long-term sustainability of these new farming practices and income-generating activities in the context of ongoing climate change?

f. What are some lessons or insights you've gained from your experiences with these new approaches that you would like to share with other farmers facing similar challenges?

3. Services

Existing Services

a. What services are you currently receiving?

b. Have these services helped you increase your income? If so, which activities have helped the most?

New Services

a. What services would you like to receive?

Closing:

- Express gratitude for their valuable insights.
- Thank the group for their time and expertise, reiterating the importance of their contribution to the project.

Appendix 6 - Sample Guide for Focus Group Discussions with MFIs REDEC/ FEDA

* Disclaimer: the interview outline below is a rough and general outline to guide us, specific interview questions may vary depending on the responses that emerged during the discussion and questions from the interviewees

Introduction:

- Begin with a brief self-introduction, emphasizing that we are a Columbia SIPA student team working in collaboration with the Sawiris Foundation for Social Development.
- Clarify the purpose of the interview, explaining that it is part of a research initiative focused on identifying climate-resilient microfinance policy and product options for Upper Egypt.
- Ensure confidentiality and explain the use of any recording devices.
- Confirm the length of the interview and express gratitude for their time.

Questions:

1. Profiling Questions

- a. What percentage of your beneficiaries are farmers and livestock owners and how does this demographic fit into your overall beneficiary profile?
- b. What services do you provide to farmers and livestock owners? How do you assess the eligibility of farmers and livestock owners to qualify for loans or financial assistance from your institution? What criteria or factors do you consider when determining the loan amount and repayment terms for farmers and livestock holders?
- c. What percentage of farmers and livestock owners default on loans and/or are delinquent? What percentage of farmers and livestock owners in your clientele typically face challenges in meeting loan repayment obligations or experience delinquency?
- d. How do you support farmers and livestock owners who encounter difficulties in repaying loans, and what measures are in place to mitigate default risks?
- e. What are the main barriers or challenges faced by farmers and livestock owners in accessing financial

services, and how does your organization address these issues?

f. How do you tailor loan products and repayment terms to accommodate the seasonal nature of agricultural activities and the income fluctuations experienced by farmers and livestock holders?

g. How does your organization measure the impact and effectiveness of the loans provided to farmers and livestock holders in terms of their livelihood improvement and sustainable agricultural practices?

2. Climate Change

Current Situation

a. How does climate change affect your services?

b. What are some behavioral changes that your clients have utilized to combat climate change?

c. What needs have emerged from farmers and livestock owners due to climate change?

d. What measures does your institution take to support farmers and livestock owners in adapting to climate change and its associated risks?

e. How does your organization encourage and facilitate the adoption of climate-smart agricultural techniques and sustainable farming practices among your clients?

f. In what ways do you collaborate with other stakeholders, such as government agencies or environmental organizations, to address the climate-related needs of farmers and livestock owners?

g. What new demands or requirements have emerged from farmers and livestock owners as a result of climate change, and how has your institution responded to these evolving needs?

h. Are there any specific financial products or services tailored to assist farmers and livestock holders in managing climate-related risks, such as crop insurance or emergency funds?

i. Can you share any success stories or case studies of clients who have effectively utilized your services to enhance their resilience to climate change impacts?

Impact

a. How are the services you are providing impacted by climate change?

b. Post-Climate Change: What's the demand for the services you provide?

c. What are some of the short-term and long-term effects of climate change on farmers and livestock

owners?

Climate Adaptation by Farmers

a. How do the services and tools you provide help farmers and livestock owners adapt to climate change?

3. Services

Existing Services

- a. What type of services are you offering and how do you know they are useful to their particular circumstances?
- b. What new services do you think that should be offered in the near future to fill the perceivable gaps? Specifically, do you see any services in demand due to climate change impacts?
- c. How does your organization gather feedback or assess the effectiveness of the services provided to farmers and livestock holders, ensuring they are impactful in addressing their financial requirements?
- d. In your assessment, what are the existing gaps in the services currently offered to farmers and livestock holders, and what potential new services do you envision to address these gaps effectively?
- e. Are there any specific financial products or assistance programs you are considering developing to better support farmers and livestock holders in mitigating and adapting to climate change impacts?
- f. Can you provide examples of successful initiatives or pilot projects your organization has implemented to test new services or address emerging challenges faced by farmers and livestock holders?

New Services for Climate Change

- a. What new services do you think that should be offered in the near future to fill the perceivable gaps? Specifically, do you see any services in demand due to climate change impacts?
- b. How does your organization prioritize the development and implementation of new services or programs to address the most pressing challenges faced by farmers and livestock holders related to climate variability?
- c. How do you ensure that the new services proposed take into account the diverse circumstances and contexts of farmers and livestock holders across different regions of Egypt?
- d. Are there any partnerships or collaborations your organization is pursuing to enhance its capacity to deliver new services tailored to the needs of farmers and livestock holders affected by climate change?

e. How does your organization plan to monitor and evaluate the effectiveness of the new services introduced in response to climate change, and what metrics will be used to assess their impact?

4. Tools

MPI

a. How do you apply MPI in your services? What specific indicators or dimensions of poverty does your organization consider when using MPI to assess the eligibility of potential loan recipients?

b. How does the use of MPI help your organization better target and prioritize financial assistance to farmers and livestock holders who are most in need of support?

c. How do you ensure that the use of MPI is culturally sensitive and contextually relevant to the diverse backgrounds and circumstances of farmers and livestock holders in Egypt?

d. Can you share any success stories or case studies where the application of MPI has led to more effective targeting and impact of your financial services on poverty reduction among farmers and livestock holders?

e. Are there any challenges or limitations you have encountered in applying MPI to identify and support impoverished farmers and livestock holders, and how have you addressed these challenges?

f. How does your organization measure and track the outcomes and impact of using MPI in your services, particularly in terms of improving the socio-economic well-being of beneficiaries?

Monitoring and Evaluation Tools

a. Do you use any other measurement and evaluation tools for climate change related impacts?

b. How do these alternative measurement and evaluation tools complement or enhance your understanding of the climate change-related challenges faced by agricultural communities in Egypt?

c. Can you provide examples of the types of data or indicators collected through these tools to track and monitor climate change impacts on farmers and livestock holders over time?

d. How frequently does your organization conduct assessments using these measurement and evaluation tools to ensure timely and relevant insights into climate change adaptation needs?

e. How do you ensure that the data collected through these tools accurately reflects the experiences and perspectives of farmers and livestock holders, particularly in relation to climate variability and extreme weather events?

f. Can you share any instances where the findings from using these measurement and evaluation tools have informed the design or delivery of your financial services to better support farmers and livestock holders in adapting to climate change?

g. What challenges, if any, have you encountered in using these measurement and evaluation tools to assess climate change impacts on agricultural communities, and how have you addressed these challenges?

Closing:

- Express gratitude for their valuable insights.
- Thank the group for their time and expertise, reiterating the importance of their contribution to the project.





Columbia University

School of International and Public Affairs

420 W 118th Street

New York, NY, 10027

sipa.columbia.edu