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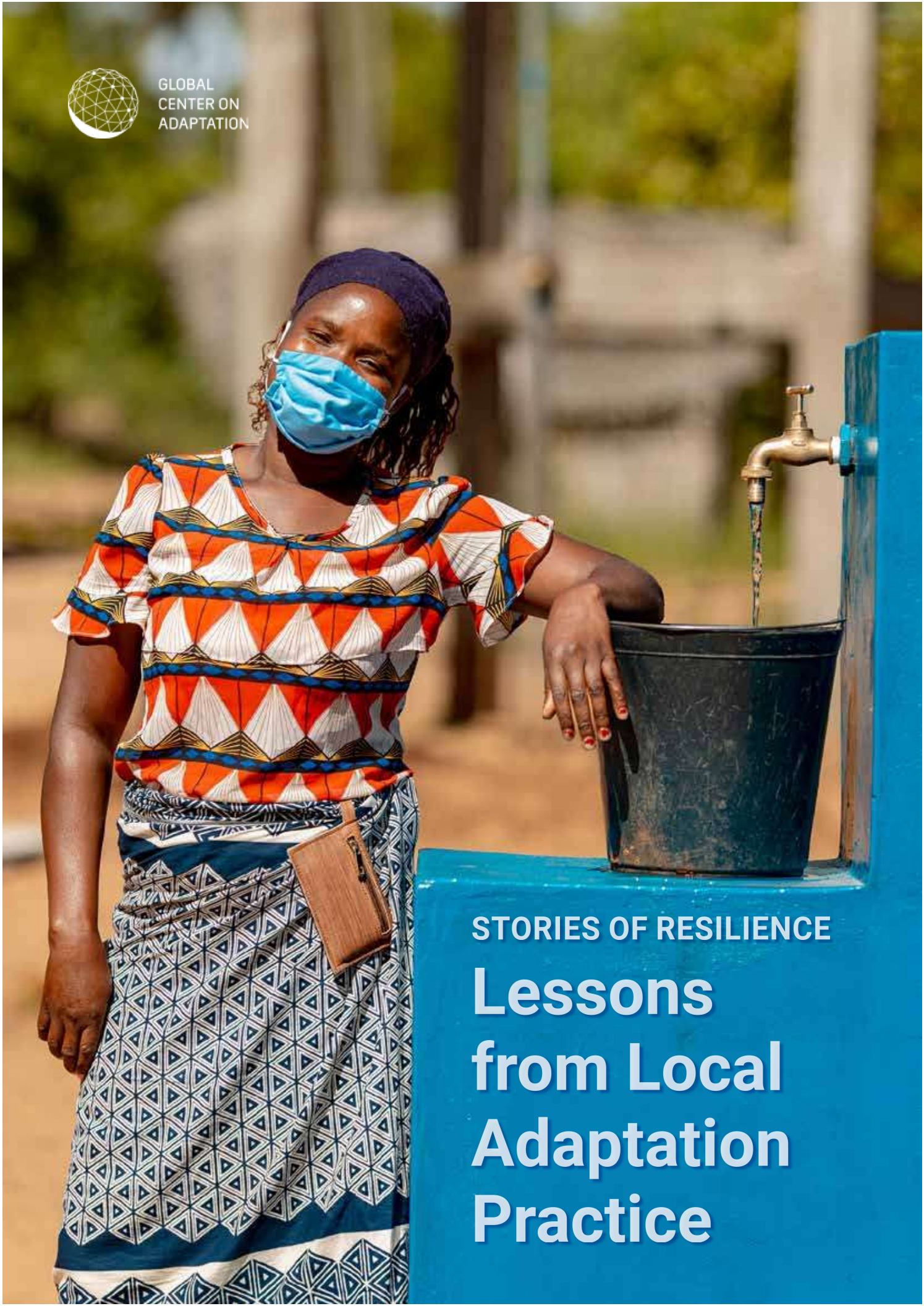

STORIES OF RESILIENCE

Lessons from Local Adaptation Practice


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PRACTICE


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Contents

were conducted for exposed populations including traffic police, hawkers, street vendors, construction workers, and school children. Workshops and evidence-sharing sessions were organized for policy makers and influencers, to leverage their power to connect and motivate citizens to take collective actions on heat stress adaptation.

A communication strategy was developed, followed by campaigns and outreach programs to communicate the risks of heat stress and its impact on health, livelihoods, and productivity; and ways to mitigate them. Heat advisories were released in the local language (Gujarati) through press releases, radio, TV and online campaigns, LED displays, hoardings, posters, and pamphlets displayed in key locations. For instance, prescription slips of hospitals run by RMC displayed measures to prevent heat stress-related illnesses. Door-to-door campaigns took place to train families to cope with heat waves and encourage them to adopt prevention strategies.

City authorities institutionalized heatwave risk reduction and heat stress adaptive capacities by developing a framework for reporting heat related morbidity and mortality by primary health centers and hospitals. A training manual for medical professionals was developed in Gujarati, and extensive trainings were organized for health professionals.

Conclusions

Rajkot's Climate Adaptive Heat Action Plan has helped to highlight the specific socioeconomic vulnerabilities of the urban poor, while identifying immediate, medium- and long-term measures to manage heat waves. By producing evidence of rising temperatures in the city and of its differentiated impacts, the process prompted and enabled policy makers to design, develop, and implement further devolved ward-level heat action plans, that identify context-specific interventions for vulnerable wards within the city.

The process, conducted during the COVID-19 pandemic, faced its share of challenges. Data and information were difficult to obtain – either because of the pandemic, or because it did not exist. For instance, lack of data on mortality and morbidity due to heat stress made it difficult to calculate heat stress thresholds (the thresholds at which mortality rises significantly). It was also clear that low-income groups were becoming even more vulnerable to heat stress because of the socioeconomic impacts of the pandemic, including unemployment, reduced income, and lack of access to health facilities.

The need for cities to develop green-blue infrastructure to reduce the impact of hear stress was also clear; as was the need to build the capacity of city governments, medical staff, and health workers, to support heat stress plans. Continued awareness campaigns, particularly for women in the informal sectors, casual workers exposed to heat, and outdoor workers are necessary. Finally, similar planning, which targets the vulnerability of the poor, is urgently needed in other cities around the world where temperatures are already high, and are rising higher.

Chapter 5
Organizing for climate change

KEY MESSAGES

- Local cooperatives and alliances can strengthen local leadership in climate adaptation and the resilience of livelihoods based on farming and forests.
- Cooperatives increase negotiating power and access to markets, information, finances, and technical assistance. Members can collaborate among themselves, and with regional associations, sub-national governments, non-government organizations, academic institutions, and global networks, to build resilience to climate change.
- Cooperatives can promote climate resilience by fostering equitable benefit sharing, sustainable management of ecosystems and biodiversity, and food security.
- Collaborative partnerships, access to technologies, knowledge sharing, finance, and effective monitoring and evaluation – activities supported by cooperatives and alliances – are necessary to scale local climate action, along with political will at all levels.

Devolved decision making

Addressing structural inequalities

Providing flexible finance

Investing in local capacities

Building understanding

Monitoring, evaluation, and learning

Transparency and accountability

Collaborative action

Smallholder farmers in developing countries are particularly vulnerable to both extreme and slow onset climate change impacts, because of their high exposure and low adaptive capacity. Research has also shown that smallholder farmers who are effectively organized can benefit from aggregated links to markets and services, and from speaking with a collective voice to advocate for their needs.[54]

The role of agricultural cooperatives in supporting smallholder farmers is widely recognized since their large-scale introduction in the 1970s and 1980s.[55] Agricultural cooperatives are member organizations owned and run by members, to facilitate access to, among other things, natural resources such as land and water; information, knowledge and extension services; markets, food, and productive assets like seeds and tools; and policy and decision-making.

Cooperatives help farmers solve collective problems. For instance, access to markets is a common challenges. To address it, cooperatives can help producers exercise economies of scale. More members together have more negotiating power, and can attract more traders and institutional buyers by pooling their produce.[56]

Beyond this, there is broad consensus that cooperatives support all dimensions of reducing poverty because of the way they operate – they identify economic opportunities for their members; empower the disadvantaged to defend their interests; provide security to the poor by converting individual risks into collective risks; and mediate access to assets that members need to earn a living.[57]

Agricultural cooperatives have an important role in protecting smallholder farmers from the threats of climate change, including changes in weather patterns, floods, droughts, and weather extreme events. They can support efforts to identify and adopt adaptation strategies and disaster and risk management actions, by informing their decisions on crop type or location, the adoption of new technologies and modernization, water management, migration, insurance, reform of pricing schemes, extension services, and livelihood diversification, among others.[58] They can also support the adoption of good practices for long-term climate resilience, such as nature-based solutions (NbS) and agroforestry.

This chapter highlights four stories that illustrate how agricultural cooperatives and producer associations help farmers deal with the impacts of climate change, through strategies such as improving their organizational skills, diversifying livelihoods, and implementing agroforestry, and NbS. From growing shade-grown coffee in Mexico, to seaweed farming in Tanzania, to shea kernel value chains in Ghana, each story describes the range of adaptation measures that have been adopted, and highlights the advantages of working through local cooperatives for future climate resilience. These insights can particularly useful when considering how to apply and design LLA responses.

Stories of Resilience: Lessons from Local Adaptation Practice

Coffee Cooperatives

One of the world's last remaining cloud forests are found in the Chiapas mountains in south-eastern Mexico, near the border with Guatemala. Nurtured by the heaviest rainfalls reported in the country, these unique forests are home to endemic species such as the horned guan *and* quetzal, and have been declared a UNESCO Biosphere Reserve. Within and around the steep mountain slopes of the Biosphere Reserves of the Chiapas Sierra Madre, shade-grown coffee is the main livelihood.

Mexico is among the world's top coffee producers, with the Chiapas region serving as the country's most important coffee producing area. There are large coffee estates in the lowlands, and smallholder farms owned by indigenous communities in the mountains. The areas surrounding the Biosphere Reserve also have coffee farms managed by smallholder families with collective tenure (*ejidos*), and private small scale ranches practicing subsistence agriculture. Many of the smallholders cultivate shade-grown coffee, planting a canopy of assorted types of shade trees in their coffee plantations. This agroforestry practice has proven to have multiple mitigation, adaptation and resilience benefits: it provides vital ecosystem services ranging from biodiversity habitats to water catchment, carbon sequestration and soil conservation, while also generating livelihoods.

Caption ????????

In previous years, however, erratic climate conditions have cut coffee production by half in the Chiapas. Production fell from 138,000 tons to 69,000 tons over two decades.[59] This is attributed mainly to changes in precipitation and temperature patterns, along with extreme weather events, that impacted soil fertility and resulted in disease and pest outbreaks.[60] Outbreaks of coffee rust in 2011 and 2012 in Central America and Mexico, for instance, were attributed to climate change, which enabled coffee rust, caused by the fungus *Hemileia vastatrix*, to affect new ecosystems and increase virulence.[61]

A coffee rust epidemic broke out in the Chiapas in 2013, devastating coffee production, severely damaging livelihoods, and increasing debt and social inequality. Some farmers adapted by shifting to other (non-shade grown) varieties of coffee, intensifying production methods, and increasing dependency on external agrochemical inputs. These coping mechanisms are potentially maladaptive in the long term, with negative impacts such as increased rural debt and damage to ecosystems.

Other farmers shielded themselves from the worst impacts of the epidemic through their affiliation to cooperatives, which provided emergency support and credit when the disease first hit, while strengthening the resilience of smallholders by diversifying livelihood sources. Cooperatives were also quick to build connections with national and international initiatives that allowed them to invest in soil preservation and sustainability, by adopting agroecological and integrated pest and disease management solutions.

Better Together

Over the years, smallholder coffee producers in the Chiapas (with an average of two hectares of land per family) have formed associations, each with 100-500 members. These associations have then come together to create a second level of cooperatives, with up to 1,000 producers.

In response to the coffee rust epidemic, these cooperatives were able to swim against the tide by resorting to alternative forms of pest and disease management such as pruning, opting for disease tolerant local varieties, and using microorganisms to enhance soil quality and plant nutrition so that coffee plants had better defenses against diseases.

They also benefited from the support provided by the cooperatives to access affordable loans and credit, including through community savings. The community savings usually help members tide over lean periods outside the harvest season, given that coffee producers rely on the profits earned during the annual harvest season for the entire year.

In addition, farmers benefited from the efforts of cooperatives to promote livelihood diversification, by developing new value chains related to ecotourism and honey production. Honey production builds on the indigenous practice of managing *Melipona* "stingless" bees, which are endemic to the region, and produce a nutrient-rich honey with a diversity of uses.

The cooperatives innovated to address the challenges of more vulnerable sections of society – working with youth groups on ecotourism; creating women's organizations for women coffee producers, including for roasting and selling roasted coffee directly on the national market; and setting up a women's financial institute that provides loans at low interest rates for business incubation. Working groups within cooperatives on these new value chains are now legally established cooperatives in their own right, allied with the original cooperatives.

"The coffee rust could have caused more damage, or we would have been less capable to respond, if the cooperative focused only on coffee for survival," says a member of the *Comon Yaj Noptic Cooperative*, based in the Nuevo Paraiso, La Concordia region of the Chiapas (*Comon Yaj Noptic* means "we think together"). "We need to keep analyzing potential climate impacts and adapting, to have the capacity to react."

The cooperatives also offer technical extension services to producers to improve coffee yields and quality; and provide support to access basic services related to health, education, sanitation, electricity, and communication. Youth from the community are trained by experts in agroecological practices, to become trainers themselves. They build community nurseries and share strategies to improve prices. "It's not just about producing and selling coffee, it's ensuring through our work the satisfaction of our collective needs such as health, education, and environment that is what has always inspired our work," says a *Comon Yaj Noptic* member.

Signing up to sustainability certification (including organic, Fair Trade, and bird-friendly certification) not only helped enhance coffee sales and profits while conserving flora and fauna, but also provided access to social premiums offered by some Fair Trade networks. These social premiums are funds kept aside for the community to use each year, at the discretion of the cooperative's general assembly. They can be assigned to housing credits (for instance, after the 2017 earthquakes and tropical storms in 2020), or to provide loans to members.

In addition to the implementation of good practices that support long-term climate resilience, advantages of the cooperatives therefore include:

- Capacity development for, and commitment to, best practices related to climate risk and impact management, quality control, project management, and administrative and financial management.
- Collaborative networks between local smallholders, regional associations, subnational governments, NGOs, and academia, that support resilience building strategies.
- Collaborations with responsible buyers, leading to new markets (for instance, for specialty coffee).
- Better access to government programs, new value chains and markets, and grants from foundations.
- Cross-sectoral collaboration, leading to innovations and new social organizations, demonstrating how collaborations build social resilience.
- Livelihood diversification, income stabilization, and access to low-cost credits.
- Better access to markets, information, and technical assistance, with improved negotiating power.
- Adherence to social equity and human

rights considerations, including the prohibition of child labor, and just working conditions for seasonal migrant workers (often from neighboring Guatemala), to comply with Fair Trade and other international standards.

Zanzibar Seaweed Cluster Initiative

Seaweed is perhaps the single most important aquaculture sub-sector in Tanzania, particularly in Zanzibar where it employs nearly 26,000 people (of which almost 80% are women).[62] The seaweed industry is an important livelihood source at the micro level. At the macro level, it is the third biggest contributor to foreign earnings in Zanzibar, after tourism and cloves, bringing in about €2 million annually.[63]

Tanzania started commercial seaweed farming in 1989, with two species of seaweed: *Kappaphycus alvarezii* (commercially recognized as *cottonii*); and *Eucheuma denticulatum*, (commercially recognized as spinosum).[64] However, earnings from the seaweed industry have fluctuated significantly due to the monopsonic nature of the seaweed market, which is controlled by multinational companies, and because of climate change.[65]

The increase in sea surface temperature and disease outbreaks due to climate change affect seaweed production. Disease include the "ice-ice disease" and epiphyte infestations. (Ice-ice is caused when changes in salinity, ocean temperature, and light intensity cause stress to seaweeds, making them produce a "moist organic substance" that attracts bacteria in the water and induces the characteristic "whitening" and hardening of the seaweed's tissues.)

The commonly farmed *cottonii* variety, for instance, began to die off in some parts of Zanzibar due to increased water temperatures, and the higher magnitude of ocean waves that wash away the seaweed.[66] Many farmers lost their livelihoods, or were forced to produce *spinosum* despite its low market value.

In 2006, a network of academics, government officials, and farmers came together to form the Zanzibar Seaweed Cluster Initiative (ZaSci). The main objective of ZaSci was two-fold: to develop innovative farming techniques to increase production; and to add value to farmed seaweed by promoting the production of quality seaweed products for national and international markets.[67] A leadership team brought together representatives from government, market and industry, academia, and local growers and their groups.

ZaSci introduced a new farming technique of using deep-water floating rafts to reduce the problem of *cottonii* die-off. Farmers were trained to construct floating rafts with thick nylon ropes to grow the seaweed, and provided essential gear, including boats. A higher value *kikarafuu* variety of seaweed was introduced in addition to *cottonii*. Efforts were also made to standardize the design of seaweed farms, to reduce the space between farms and face them in the same direction to increase production areas, and to reduce the breakage of seaweed due to high winds. These new farming techniques led to higher production rates and sparked the interest of new growers to adopt these practices.

Farmers were trained in the production of seaweed soap, made from local ingredients including caustic soda, coconut oil, water, and seaweed; and of dessert-like treats made from seaweed, coconut milk, sugar, and peanuts. As these new products helped to improve incomes, growers increased their value-added products to include body creams, massage oils, seaweed powder, cakes, cookies, puddings, jam, and salads.

Training was also provided in keeping accurate records on the health of the seaweed, the impact on the environment, contribution to local economies, and the impact of improved production on developing the community.[68] The training helped ZaSci members to monitor and evaluate production on their seaweed farms, and equipped them with the skills to understand and adapt to their environment.

ZaSci continues to look for opportunities to improve productivity by introducing new seaweed species and improving farming methods. Discussions have taken place with government departments to explore the possibility of providing additional funding, and support with respect to prices, revenues, and land lease. New points of collaboration with other projects and institutions have been identified. Efforts to build skills and capacity also continue.

Advantages of working through the cluster include:

- Cross-sectoral collaboration between producers, academia, and government, leading to an improved understanding of, and support for, the seaweed market.
- Improved production, due to improved production techniques and the introduction of new varieties that are more adapted to the changing climate.
- Livelihood diversification, particularly through value-addition.
- Identification of new markets, including for value-added products.
- Increased interest and appreciation for seaweed production from local growers.
- Capacity development for improved production and product development, as well as record keeping and production monitoring.
- Improved adaptation and resilience to changing climatic conditions.

Global Shea Alliance

From Senegal to Uganda, right across Africa, nearly two billion shea trees grow naturally and in managed "shea parklands" that cover 300-350 million hectares. They contribute 10-25% of household income in some villages,[69] and are an important source of dietary fat, especially since the fruits ripen at a time when there are few alternative food sources available. About ten kilograms of shea butter is consumed per person every year in the region.[70] The trees also act as carbon sinks, sucking in 1.5 million tons of carbon dioxide each year.

In recent decades, shea has become a booming globalized commodity. While shea butter has been a cooking staple in Africa for centuries, it is increasingly a major ingredient in lotions, moisturizers,

Burkiana Faso, Ouagadougou.October 4, 2010. African women producing shea butter handmade. Shea Butter is always used in Africa for food, such as cosmetics and as a drug.

caption from istock

and balms. The beauty industry is a large driver behind the growth of the shea value chains, set to exceed €3.5 billion by 2028.[71] In Ghana, for instance, shea nuts were the fourth best performing agricultural export in 2018, with a value of over €14 million.[72]

The local shea industry is an important source of employment, income, and economic diversification for more than 16 million rural women in Africa.[73] This income is typically the only income women have full control over, and because shea is grown during periods when other crops produce less, this income is even more essential to contributing to food security.

Every year, however, an estimated 7,929,417 shea trees are lost across West Africa due to climate change, lack of fallows, commercial agriculture, and tree removal. Rainfall distribution, increased severity and frequency of droughts, and soil degradation have threatened agricultural production and exports, provoking volatility in commodity prices. Climate change has become a "threat multiplier" to the shea value chain, interacting with non-climate factors that characterize the wider West African environment, economy, and society.[74] If this trend continues, a major disruption to the shea supply chain is anticipated by 2034.[75]

The Global Shea Alliance (GSA) was established in 2011. It is a non-profit industry association that, among other things, aims to improve the livelihoods of rural African women. It supports members to implement collaborative solutions to challenges, develop quality standards, share best practices, conduct research and advocacy, and open new markets for shea products. GSA has 706 members from 35 countries, including women's cooperative groups, brands and retailers, suppliers, and NGOs.

The GSA formalizes shea gatherers into collectives, educates women's groups about their rights and strategies to improve their income, and provides training in business development and health and safety. It also improves their capacities to manage disaster and climate risks and impacts. This capacity building helps to build the collectives' bargaining power and improve their recognition within the value chain.

The GSA launched the Action for Shea Parklands initiative in 2011 in response to declining tree populations across West and East Africa. The "promote, plant, protect" initiative addresses long-term and specific factors behind decreasing tree populations, while encouraging producers to plant new trees as an immediate response. Over the next ten years, the initiative aims to grow ten million trees, protect four million hectares of parkland, sequester 882,000 tons of carbon, train 250,000 people on sustainable parkland management, support research, and engage 500,000 women.[76]

Advantages of working through the GSA include:

- Formalization of women's groups into collectives, giving them stronger bargaining power and representation in the shea value chain, leading to improved incomes.
- Opening up new markets for shea products, including through new partners and international companies.
- Advancement on developing industry-recognized standards.
- Capacity and skills development for over 200,000 women, resulting in better quality control and aggregation techniques, and to improved incomes.
- Strengthened commitment to fair business practices.
- Promotion of laws and policies that focus on empowering the base of the value chain.
- Improvement in local infrastructure, including road networks and warehouse facilities.
- Increased tree-planting activities and protection of the carbon sink, contributing to climate resilience with adaptation and mitigation co-benefits.

Conclusion

Smallholder farmers are some of the most vulnerable to climate change and other shocks and stresses. Cooperatives, and alliances can play an important role in facilitating LLA by enhancing social capital, empowering smallholders, and creating risk-sharing mechanisms. They can help to create collaborations between national, regional and international stakeholders. Working through cooperatives and alliances can also help to increase and improve production, and diversify livelihoods.

Cooperatives and alliances can therefore support LLA Principles related to the devolution of decision making; addressing of structural inequalities, provision of flexible finance; investments in local capacities; building understanding of climate risks and uncertainties; and most of all, in collaborative action.