Stories of Resilience

Lessons from Local Adaptation Practice

2023

GLOBAL CENTER ON ADAPTATION

CDKN Climate & Development Knowledge Network

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IN MEMORY OF

SALEEMUL HUQ

Forever a Champion of Locally Led Adaptation

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Preface

Dr. Patrick Verkooijen

Welcome to the second edition of our *Stories of Resilience: Lessons from Local Adaptation Practice*, where we are partnering again with community leaders to showcase their brilliant work in building local adaptation solutions across many challenging contexts.

This year's edition focuses on the many ways in which local communities innovate to use the materials closest to hand and their own sweat and toil to adapt: from regenerating hillsides, coasts, degraded farmlands, and urban green spaces, to recycling waste into wealth. All of these contribute to creating greater resilience for people and nature.

A clarion call at the heart of these stories is the championing of people's rights. Recognition and enforcement of basic rights are seldom put in the same basket as climate change adaptation. But, as these stories show, local communities regard progress on rights (particularly of marginalized groups such as women and Indigenous Peoples) and locally led adaptation as two sides of the same coin.

Where these fundamental rights are eroded, people's adaptive capacities are also weakened.

But the motivation and mobilization of communities can only go so far. They need governments, corporate, and multilateral actors to do their part. They need the patient, predictable and responsive funding that is one of the core principles of locally led adaptation to enable them to consolidate and upscale their hard work and talent.

I hope that development agencies are taking a long hard look at this new funding paradigm: local communities cannot be left to bear all the risks by confronting climate change without adequate support. The global community has a lot of catching up to do.

We at the Global Center on Adaptation are doing our part, supporting communities to develop People's Adaptation Plans and linking them to investments by bigger funders under our flagship Adaptation Acceleration Programs in Africa and Asia. We have also launched a **Global Hub on Locally Led Adaptation**, a platform for collaboration and a rich resource of stories from the frontline, with analysis and tools to inspire and support locally led adaptation.

For me, one of the thrills of this year's *Stories of Resilience* is that different age groups are collaborating enthusiastically to pilot adaptation innovations, learning from their peers' successes and failures, and nurturing new adaptation cycles. Believe me, social learning is alive and well in communities, even if you are not reading about this quiet revolution.

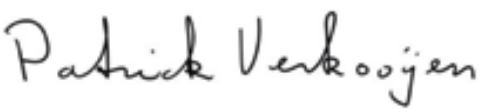
These concepts of openness to learning and intergenerational collaboration bring me to the bittersweet dedication of this report. Gathering the *Stories of Resilience* began under the wing of Professor Saleemul Huq, who was my Special Advisor on Locally Led Adaptation. He was a key part of the planning for this report as part of its Advisory Committee, lending his enthusiastic support to the amplification of vulnerable voices. With the most profound sadness, the editorial team and I learned of Saleem's untimely death as we were finalizing the chapters.

Saleem was a lifelong champion and advocate of locally led adaptation. He was solidly committed to building capacity across generations for justice-centered climate action, grounded in community capabilities and needs. His passion was manifest in his mentorship and guidance for projects such as this report, and in the legions of students and staff who blossomed under his tutelage at the International Centre for Climate Change and Development (ICCCAD) in Bangladesh, the Independent University of Bangladesh, the International Institute for Environment and Development, the Least Developed Countries University Consortium on Climate Change, and countless other networks.

Saleem introduced many of us to local communities who are taking their own steps to protect themselves from rising temperatures, constructing cyclone shelters and building alert systems.

Through Saleem's eyes we were able to see for ourselves how innately resilient people are – no matter how humble or constrained their circumstances. And from those experiences, I think we all took away the greatest lesson of all: that moving communities from vulnerability to resilience is a goal that is urgent, vital, and achievable.

It is with sorrow and pride that we dedicate this report to his memory. The best tribute I can think of is to continue to follow in Saleem's giant steps on the road to a brighter future for all the vulnerable and marginalized people that he championed.



Prof. Dr. Patrick Verkooijen
Chief Executive Officer
Global Center on Adaptation

Introduction

At COP28 in 2023, governments will conclude the first Global Stocktake (GST) of the Paris Agreement: a five-yearly assessment of how well countries (together) have done in addressing the causes and impacts of climate change.

The technical assessment for this Stocktake has concluded, and the results are predictable. For adaptation, the **synthesis report** finds that while there has been some progress, efforts remain fragmented, incremental, sector-specific, and uneven across regions.[1]

A key finding highlighted by the technical dialogue for the GST is that **when adaptation is informed and driven by local contexts, populations, and priorities, both the adequacy and the effectiveness of adaptation action and support are enhanced, and this can also promote transformational adaptation.** The findings of the Intergovernmental Panel on Climate Change (IPCC) are quoted, that success in making adaptation more transformational depends on the availability of appropriate enabling environments, including social learning, alignment of transformational change objectives with strategic priorities of governments and non-Party stakeholders, strong bottom-up governance grounded in local contexts, phased long-term program support, and appropriate financing.[2]

We conducted a stocktake of sorts of our own in 2023, with local actors. The Global Center on Adaptation and the Climate and Development Knowledge Network issued a call for stories from champions of "locally led adaptation" (LLA). We received a resounding response – and this report is the result. It presents key issues and trends, achievements, and needs articulated by local adaptation leaders.

Although a small sample size, the stories we received are an indicator of progress and gaps in adaptation at the local level. They show that communities are racing to adapt to climate change with as much speed as they can muster in the face of limited resources because they have no choice – their survival depends on it. Their efforts are in many cases transforming lives and livelihoods for the better. However, their gains are precarious where they lack the enabling environment (legislative, fiduciary, institutional, technical, and capacity-related) to lock in local transformations – global and national systems are not changing fast enough in response to their needs. Local adaptation leaders are struggling to find the resources to enable their work to scale and extend it to other communities. Despite the incredible initiative demonstrated by local actors, they specify needs for funds and technical assistance.

The stories also show that in comparison to sectoral top-down adaptation efforts, local champions are implementing more holistic approaches that are not only multi-sectoral, but also understand the multiple linkages between climate change as a driver of exclusion and marginalization, and its impacts on the agency and psychosocial health of communities. This kind of holistic understanding to inform solutions may only be possible at the local level – they are often stymied by multiple sectoral interests at higher levels of governance.

Mangrove planting in Gazi Bay Kenya.

The diversity of stories of resilience presented here cautions against aggregation when it comes to assessing progress on adaptation. No measures of progress towards a Global Goal on Adaptation can be effective without local-level assessments of progress by individuals and communities in managing the impacts of climate change. There is much to be done on measuring the impact of locally led initiatives, and to develop the social learning called for by the IPCC and technical dialogue of the GST for transformational adaptation. Learning by communities and by different social groups facing specific adaptation and social-political challenges, such as women, younger and older people, and Indigenous Peoples, must be a priority. Such efforts should accommodate a diversity of approaches that are better suited than results frameworks for financiers, or aggregations of results to a point of meaninglessness.

Among the golden threads that weave throughout this publication are the spirit of self-help, the desire for economic diversification to further adaptive capacity, and the motivation to build solidarity among local groups to enhance resilience. These ideas inform the publication's organization into thematic chapters.

We received more than 200 stories in response to our call. We selected 19 LLA initiatives for deeper exploration and collaborated with storytellers from each of those localities to capture the detail of their achievements and challenges. We wove together the implications of those stories – together with broader insights – into "Key Takeaways" for each chapter. In this Introduction, we synthesize the trends in the stories and the recommendations for action: the recommendations for global and national policymakers and providers of finance are highlighted in **blue**, while the recommendations for local and community actors are highlighted in **green**.

We hope that together with the findings of the Global Stocktake, they will inform the goals and approaches that governments identify in their 2025 Nationally Determined Contributions and in subsequent work, to make adaptation truly transformational by institutionalizing strong bottom-up governance, grounding adaptation in local contexts, and providing long-term program support and appropriate financing.

Communities are Restoring Degraded Ecosystems

Communities are redoubling their efforts to conserve and restore threatened ecosystems. Their livelihoods and local economies, food, water, and energy sources, as well as their health and mental well-being, are directly and heavily reliant on these ecosystems, and they strongly recognize that ecosystem resilience is community resilience. They are planting trees and other vegetation, enriching the land through regenerative and agroecological methods, and shoring up nature-based infrastructure. They are imaginative in creating pockets of thriving ecological systems in urban and peri-urban areas, while in rural areas, they are forging partnerships for ecosystem restoration on a broader canvas. Healthier ecosystems directly strengthen the adaptive capacity of people and nature to the impacts of climate change – the changing weather patterns, water scarcity, reduced soil productivity, and increased incidence of crop and livestock diseases. **Chapter 1** documents both ecosystem conservation and restoration, including through regenerative agriculture.

Secure livelihoods and access to healthy, nutritious food that people can buy or grow themselves are key motivations behind most of the stories in this publication. These are the basics of life that are increasingly threatened by climate change. People are also diversifying their economic activities, with the hope of improving their incomes. The stories describe the many ways in which they are doing this in the land-based sectors, and through more efficient use of natural resources, Indigenous and local knowledge, innovation, and new technology. Improved, reliable income streams and assets tend to inherently strengthen people's resilience to climate shocks. People's choices of diversified economic activities are also adapted to the specific hazards, vulnerabilities, and opportunities that intersect in their local contexts. Economic diversification is a cross-cutting theme throughout all the chapters.

Examining evidence of illegal logging, Assin District, Ghana.

Communities are also rediscovering ways of living with nature that are less aggressive and extractive, opting for more organic and circular solutions that sustain rather than destroy ecosystems and their services. They are leading the way in promoting circular economies by recognizing the productive potential of waste streams and finding ways to capitalize on solid waste to turn 'waste into wealth'. As **Chapter 2** illustrates, by removing solid waste from the local environment, they are reducing the negative impacts of intense rainfall, flood risk, and dying aquifers.

Supporting community efforts to regenerate their environments and prioritizing their rights and needs over those of external actors, including through supportive legislation, finance, institutions, and technical and capacity support should be climate adaptation priorities of the highest order for governments, development financiers, private landowners, and private businesses – including transnational actors.

Community Rights Over Natural Resources is an Adaptation Issue

Communities are also becoming stronger defenders of the ecosystems on which they depend, halting environmentally destructive practices as a route to resilience. Often, this involves taking on powerful external commercial and political interests to defend local environmental rights, as illustrated in **Chapter 1**.

As the case studies in this publication also demonstrate, climate risks to local communities are heightened by transnational actors with transboundary value chains in our globalized economic system. **The critical role of ecosystems in building community resilience and local people's primary rights over natural resources, including Indigenous Peoples' land rights, must be recognized by transnational actors, who must take increased responsibility for minimizing the climate risks to host communities for the source raw materials (natural resources) and labor that feed into value chains.**

The Task Force on Climate-related Financial Disclosures (TCFD) has been at work for six years, developing and working with its members to apply the voluntary guidelines on corporate disclosure of climate-related risk. However, interpretations of these guidelines may steer corporations towards dwelling on the potential climate risks to their profits and value chains, with shareholder or owner accountability foremost – without prioritizing the risks of communities that host raw materials or provide labor in business value chains.

Equally, national and subnational governments (including customary authorities, where relevant) must become better educated and aware of the climate risks to communities of natural resource degradation. Activities that harm ecosystems should not be awarded priority and profit over those that seek to protect.

At All Levels, Climate Change Needs System Change

Decentralized government planning and fiduciary systems hold the promise of allowing LLA approaches to flourish. This publication contains compelling stories from Kenya in **Chapter 1**, where development planning is devolved to county government, and organic farmers are now deeply involved in representing their priorities in budget allocation; and from northeast Brazil in **Chapter 7**, where decentralized authority to the municipal level permitted a visionary Mayor to extend climate-resilient water provision to all households.

The evidence in this publication suggests that devolution of decision-making authority to local levels and meaningful partnerships between communities and local governments create an enabling environment that allows LLA efforts to flourish – especially when accompanied by meaningful fiscal devolution.

Global policymakers, national and local governments, and all providers of finance have a role to play in supporting this enabling environment for devolved decision-making to support transformative local adaptation action.

Promoting Human Rights is Core to Adaptation

Marginalized social groups, including marginalized women, know that climate change impacts set off a cascade of further responses in society that can be deeply discriminatory to certain groups of people (like early forced marriages of girls). Groups working to represent and advance the rights of women, younger people, older people, people living with disabilities, and marginalized ethnic and Indigenous groups are confronting not only the unequal impacts of climate change – depending on people's different capabilities and vulnerabilities. They are also confronting unjust responses to climate hazards because of discrimination in society; adaptation responses may also be discriminatory.

Local adaptation leaders are courageously pushing for recognition and realization of their human rights as part of rounded LLA approaches. They are building their self-confidence and skills as adaptation leaders. Confronting discrimination is essential for many people to be able to thrive, and doing so widens the leadership pool for local adaptation. While this is a cross-cutting theme in the publication, it is highlighted particularly in **Chapter 3** on women's leadership.

Changing Mindsets, Proving by Doing

The idea of "proof of concept" is widespread in the worlds of science and business. In the context of LLA, we see local leaders proving the efficacy of their adaptation interventions. However, it is not as simple as demonstrating that a technique for climate-resilient agriculture yields good results, or that a social enterprise for integrated waste management is viable. Proving by doing is also shifting social norms in critical ways, reducing people's vulnerabilities while creating a virtuous circle.

We see this phenomenon strongly in the domain of gender (in)equality. Several LLA champions described how men in their communities resisted the idea of women organizing for adaptation (including in the *2022 Stories of Resilience*). However, once the women had proven the collective benefits of their kitchen gardens, their environmental clean-ups, their adaptation-focused businesses, and their savings associations (especially demonstrating their financial viability!), the men were persuaded. They granted their moral support, and sometimes even joined in. "Proving by doing" is a **cross-cutting theme** throughout all the chapters.

Collaboration Across Generations is Sparking Innovation

Many of the stories of resilience are led by young or older people in communities. All these stories emphasize the power of intergenerational collaboration, especially in combining modern tools, technologies, and scientific discovery with Indigenous and local knowledge of the environment to adapt better, faster. Sometimes these collaborations are around testing and piloting innovative adaptation techniques in a locale. Sometimes they are about young people's eagerness to tap into Indigenous forms of knowledge held by elders in communities – for example, about interpreting the weather and utilizing wild species and agrobiodiversity to adapt effectively. We also learn that modern technologies and materials are sometimes maladaptive to weather and climate extremes – leading communities to rediscover, validate, and build confidence in Indigenous and local knowledge, as in the "hurricane houses" designed and made with sustainable local fibers in Vanuatu. **Chapters 4 and 6** in this publication describe the effective strategies and remaining barriers for intergenerational collaboration, and the use of Indigenous knowledge in LLA.

Solidarity is a Source of Strength

Solidarity building among local groups with a common purpose is among the most potent forces for positive and sustained change. Adaptation leaders are forging links of solidarity within and across national borders, to learn and to counter more powerful interests. Solidarity networks help them exchange strategic and tactical knowledge so that each one can develop more effectively to pursue their local goals; and consolidate and amplify their voices as a larger collective to advocate for change at regional and international levels.

The publication documents many instances of peer-to-peer organizing and support through networks and federations, including in **Chapter 7** on solidarity building. We see this in the stories of solidarity movements of local actors mobilizing at subnational level, national level, or internationally – in Pintadas Municipality, Bahia State in Brazil, and Osukuru District in Uganda. These groups are effective in localized behavior and policy change, and in amplifying their concerns more widely, via their connections to international feminist climate movements, such as the Huairou Commission.

Local actors can obtain greater voice and influence by working effectively in solidarity with other local actors in horizontal people-to-people networks, as well as leveraging this voice for policy changes that support their priorities.

A community meeting on climate resilience in Zaña, Peru.

Filling Institutional Gaps

LLA is embraced and championed by local institutions which are "unusual suspects" for the job. We hear from museums, schools, colleges, public health providers, churches, and other faith institutions in these pages, about their extensive climate leadership. These institutions did not necessarily have climate action as part of their original mandates, but they already form the loci for social capital and collective reflection and action. From this position, they have launched into LLA, sometimes filling critical institutional gaps at the local level.

This potential can be further strengthened through deliberate efforts and targeted to engage these institutions and leverage their social capital for stronger local responses to climate change.

Other Ways of Doing

There is still a significant chasm between top-down approaches – such as ways of measuring progress on adaptation – and local needs. Bridging this chasm requires investments in sound, locally sensitive science, and in developing measurement approaches that are ultimately accountable to local people in their diversity, recognizing them as decision-makers, users, and producers of evidence, and integrating local and Indigenous knowledge. Choosing and using metrics to measure the effectiveness of LLA cannot stop at community consultations or community representation in project cycles from proposal writing to M&E. It requires a shift in the mindset of experts who are in relational power positions, whether as fund managers in financier agencies, intermediaries, country governments, or implementation organizations.

Measurement of resilience and adaptation actions in scientific, academic, and policy circles is often limited to rigorous quantitative methods, such as impact assessments, geographic information systems (GIS), and remote sensing. These methods are often twinned with expert-driven approaches for planning and future-casting, such as downscaling of global climate models to predict climate risks for a geographic area. The use of large-scale data sets, which often have gaps, and the absence of (or lack of possibility to conduct) ground-truthing of satellite data and model assumptions are some of the reasons why these methods have not always been effective in many countries.

In the stories in this publication, we find other ways of understanding, planning, and "measuring" evidence of resilience – explored in **Chapter 6**. These include, for instance, the *tok stori* method of the Solomon Islands for group decision-making and consensus building, co-construction of knowledge, co-design of plans, and evaluative and accountability functions. Emerging evidence demands a balance between the rigor of impact evaluations and embracing the plurality of knowledge, values, and lived experiences of LLA. Efforts towards attaining this balance between rigor and plurality also demand a shift in the weightage given to methods used in capturing or "measuring" evidence – qualitative approaches such as story-telling, and emerging forms such as arts-based approaches, games, and citizen science, should be treated as equally important ways in which evidence can be "measured".

The role of co-production processes is essential in empowering communities for risk-informed, transformational decision making for LLA. Communities' willingness to innovate, implement, and emerge either more resilient or better informed on how to improve resilience, is a pragmatic approach that is explored as a **cross-cutting theme** throughout all the chapters.

It is worthwhile for communities to define and implement their own adaptation priorities, as well as to monitor, measure, and articulate progress on their own terms. Evaluation of adaptation progress, as well as objective-setting, should be people-centered.

Communities can and should co-lead such evaluation processes of how LLA is proceeding, whether it is achieving their goals, and whether it is creating maladaptation – this process should be rooted in their Indigenous and local knowledge. However, this does require local actors finding adequate space and resources to do so without undue burdens.

At the same time, local actors can collaborate with governments and scientific networks to share data in ways that fairly compensate local efforts, to inform larger endeavors that will shape the public policy response to climate change, such as national climate planning and budgeting, the pursuit of international sustainable development objectives such as the Sustainable Development Goals, and international stocktaking (under the UNFCCC and other global processes).

Local Leaders are Entrepreneurial in Mobilizing Diverse Resources for Adaptation

The stories demonstrate how much of locally led adaptation is achieved through in-kind contributions of community members to collective goals: including voluntary labor toward articulating and achieving local resilience priorities. This is not included in costs, and its economic value is vastly under-recognized – yet this voluntary effort is foundational to all the stories of resilience in this publication. Local leaders are being highly entrepreneurial in mobilizing these local resources for positive change, and also in reaching out to forge partnerships with external actors to remunerate community members for their efforts and leverage supplemental resources to scale action on community resilience priorities.

Effective local leaders are creative in mobilizing community contributions that are just and fair, as well as reaching out to external organizations to access information, technology, capacity, and finance for local efforts. They recognize that a "mix and match" approach may be necessary for mobilizing external resources – seldom can a single organization provide everything that is needed. Notwithstanding the entrepreneurial flair of the most successful local adaptation leaders, the requirements for accessing external support are still far too complex. The onus should be on external financiers – public and private – to make support for local adaptation both more accessible and more comprehensive in scope.

Effective local adaptation leaders are also persistent in engaging community members to craft and deliver a vision for climate resilience. They recognize that the process of community engagement is an iterative process, where climate awareness-raising and education play a role, alongside listening to people's experiences of climate impacts and proposed solutions. They recognize that there are different individual, household, and social group interests – and that in any local context, some friction in debate can be healthy, as long as people's rights are recognized and respected.

Although the local champions who wrote to us are highly motivated, they identify the need for external support, especially finance, as critical. The LLA champions who are most effective in advancing community objectives are entrepreneurial in accessing, mixing, and matching diverse sources of financial and in-kind assistance but the onus – one might say the burden – is firmly on them. To target climate finance better and get it to where it is urgently needed, innovation is necessary, with the flexibility to make mistakes and "learning by doing". Both providers and recipients of climate finance must take risks. This risk should be carefully distributed, so that those that have greater capacity take the larger risks.

Communities already facing disproportionate impacts of climate change, at the receiving end of systemic inequities, cannot be expected to solely take on the burden of designing, implementing, fundraising, and reporting for adaptation interventions. Experts can continue to play a range of roles, sensitively, while facilitating processes that build local, collective agency.

Gazi Bay coastal fishers.

Change Adaptation Finance, Not How the Poor Have to Frame Their Climate Challenges

One of the towering themes is how local adaptation champions are working holistically to create resilience and adaptive capacity across multiple facets of people's economic, social, and psychological well-being, as well as incorporating further values and freedoms that are paramount to them, such as cultural heritage and freedom from gender-based violence. Addressing these concerns is poorly – if ever – recognized and supported by funders of "adaptation" projects.

Evidence from the stories of resilience in this publication demonstrates anecdotally and convincingly, through personal testimonies, that the "whole-of-person" approach of community-based organizations is increasing people's economic livelihood opportunities, their psychosocial well-being, and their political voice. Community-based organizations have developed these approaches organically in response to their members' needs and broader community imperatives.

Local adaptation champions often have a more holistic view of what it will take to build climate resilience and adaptive capacity at the local level, compared to the rigid requirements of climate financiers to formulate "climate rationales". Climate rationales certainly hold importance in many contexts (such as quantifying reductions in greenhouse gases for mitigation projects); this publication strongly suggests that a broadening of rationales for locally led adaptation is urgently needed. As **Chapter 8** highlights, this will require learning-by-doing and an increased appetite for risk.

Discriminatory norms and structural biases magnify the climate-related losses and damages that fall on marginalized groups, including marginalized women. Climate resilience is also about countering these norms and biases, along with the corrosive mental health effects of climate change and giving people in climate-affected communities more mental, as well as physical, coping strategies – especially in the face of repeated and massive losses. Increasing people's greater agency or control over their lives plays a key role in coming to terms with these losses, as illustrated in **Chapter 5** and across the stories.

Community members prepare to plant bamboo.

Funders and governments must be smarter about recognizing the cascading impacts of climate change on marginalized groups in society and supporting communities to explore multiple pathways to climate-resilient development. They must be willing to provide patient, predictable resources for LLA that directly address the social norms and structural power relations which currently perpetuate disproportionate burdens, and which widen the gender development gap.

They should also acknowledge that community priorities such as tackling gender-based violence and convening mutual support activities for psychosocial resilience are as integral to locally led adaptation as more "technical" adaptation activities, such as building physical infrastructure or supporting the adoption of climate-smart technologies. It does not require complex training to provide this kind of community-based support: community members have significant capacity. Often, all they need is relatively light training, but they do need to be paid adequately for their work.

Local adaptation leaders should continue to respond to people's intersecting vulnerabilities and capabilities, including the specific needs, concerns, and strengths of particular sub-groups in their communities, such as older and young people, ethnic minorities, people living with disabilities, and others.

This does not mean that one local leader or group has to do everything – holistic approaches can arise from effective partnerships, as illustrated across the chapters. **Community-based organizations, networked with others, also have a role to play in educating financiers about the constraints of current funding models, as well as the more flexible support they need across multiple interventions to build communities' adaptive capacities.**

Innovation Is Emerging, To Make Larger Streams of Finance Work for Communities

A diverse range of stakeholders, including the private sector, non-government organizations, and local government units, are forging meaningful partnerships and approaches for financing LLA, as illustrated in **Chapter 8**. Furthermore, the stories highlight that financial solutions need to be deeply embedded in local traditional, cultural, socio-economic, and governance contexts; and particular attention should be paid to the complementary capabilities and resources required for LLA (such as financial literacy training, and learning how to access and manage financial services).

The role of the private sector in supporting LLA goes beyond responding in times of crises by donating financial support. As important local actors, they should actively and appropriately become more strategically engaged in investing in resilience, not just for "business continuity", but also through more meaningful approaches to target their contributions, including Corporate Social Responsibility contributions, to locally determined needs. In **Chapter 8**, forming "Public-Private-People" Partnerships is one way this is demonstrated, which capitalizes on the role of the private sector as a good source of knowledge, data, frameworks, tools, and capacities. Care must be taken to foster equitable partnerships and alignment of understanding and goals – especially where there are existing inequities and power imbalances at play, such as those between large corporations and local governments and communities, and between government and local communities.

Financial exclusion also needs to be addressed across the wide ecosystem of development finance institutions that could be serving local adaptation champions but currently are not doing so. The streams of finance from these institutions need to better target community needs, including through locally led planning processes to inform large investments; and deploying small, strategic, versatile funding modes with straightforward paperwork and accountability mechanisms that are commensurate with the modest grant funds. Efforts in this direction include the People's Adaptation Plans supported by the Global Center on Adaptation to inform investments by development finance institutions, described briefly in **Chapter 5**.

The stories highlight that those receiving funding and support should not be viewed simply as beneficiaries, but as agents of change in their own lives and communities. This required paradigm shift should reposition local actors and communities as critical partners that are respected for the valuable knowledge, resources, and innovations they bring to the table.

Principles for Locally Led Adaptation

The eight LLA Principles were developed by the Global Commission on Adaptation and launched at the 2021 Climate Adaptation Summit, to guide efforts to promote LLA.

1 **Devolving decision making to the lowest appropriate level:** Giving local institutions and communities more direct access to finance and decision-making power over how adaptation actions are defined, prioritized, designed, implemented; how progress is monitored; and how success is evaluated.

2 **Addressing structural inequalities faced by women, youth, children, disabled, displaced, Indigenous Peoples and marginalized ethnic groups:** Integrating gender-based, economic, and political inequalities that are root causes of vulnerability into the core of adaptation action and encouraging vulnerable and marginalized individuals to meaningfully participate in and lead adaptation decisions.

3 **Providing patient and predictable funding that can be accessed more easily:** Supporting long-term development of local governance processes, capacity, and institutions through simpler access modalities and longer term and more predictable funding horizons, to ensure that communities can effectively implement adaptation actions.

4 **Investing in local capabilities to leave an institutional legacy:** Improving the capabilities of local institutions to ensure they can understand climate risks and uncertainties, generate solutions, and facilitate and manage adaptation initiatives over the long term without being dependent on project-based financier funding.

5 **Building a robust understanding of climate risk and uncertainty:** Informing adaptation decisions through a combination of local, traditional, Indigenous, generational, and scientific knowledge that can enable resilience under a range of future climate scenarios.

6 **Flexible programming and learning:** Enabling adaptive management to address the inherent uncertainty in adaptation, especially through robust monitoring and learning systems, flexible finance, and flexible programming.

7 **Ensuring transparency and accountability:** Making processes of financing, designing, and delivering programs more transparent and accountable downward to local stakeholders.

8 **Collaborative action and investment:** Collaboration across sectors, initiatives and levels to ensure that different initiatives and different sources of funding (humanitarian assistance, development, disaster risk reduction, green recovery funds, etc.) support each other, and their activities avoid duplication, to enhance efficiencies and good practice.

CHAPTER 1

COMMUNITIES AS ECOSYSTEM STEWARDS

HIGHLIGHTS

- Ecosystem-based adaptation is of great interest to local adaptation leaders because ecosystems are the basis for water and food security and livelihoods; tied to people's cultural and spiritual beliefs, to personal and group identities, and to psychosocial resilience.
- The root causes of environmental degradation are context-specific, but not always local. Environmental degradation is also caused by external actors, including powerful commercial interests.
- Defining "locally led adaptation" as the "lowest appropriate level" of action is a complex question in the context of ecosystem-based adaptation. In cases where external actors are impacting local environments, or where landscape approaches are necessary, decisions may need to be taken at the catchment scale and with inter-jurisdictional or transboundary cooperation.
- Long-term monitoring across the ecological, social, and economic impacts of locally led, ecosystem-based adaptation is missing for many initiatives, certainly in a form that is documented and readily accessible to other communities and actors. While impacts are often positive, they may be inadvertently negative or maladaptive.
- The strongest examples of long-term monitoring and evaluation identified in the chapter came from individual practitioners who had some research training and then transitioned into local practice, or from local natural resource management institutions that forged partnerships with research institutes.
- A greater role for local actors to collaborate to create joined-up monitoring across localities is essential – and to create local learning loops.

Devolving decision making

Addressing structural inequalities

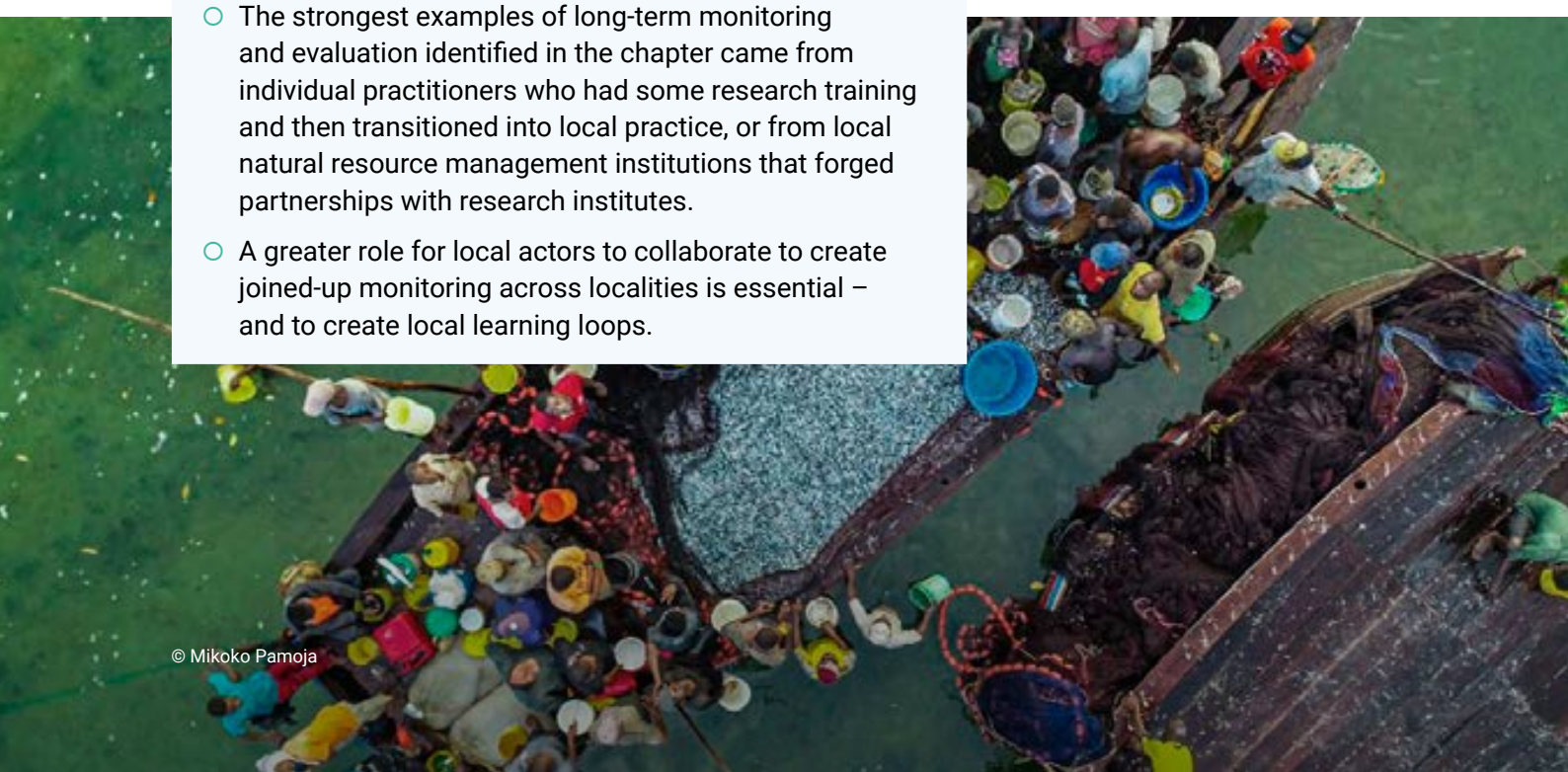
Investing in local capacities

Building understanding

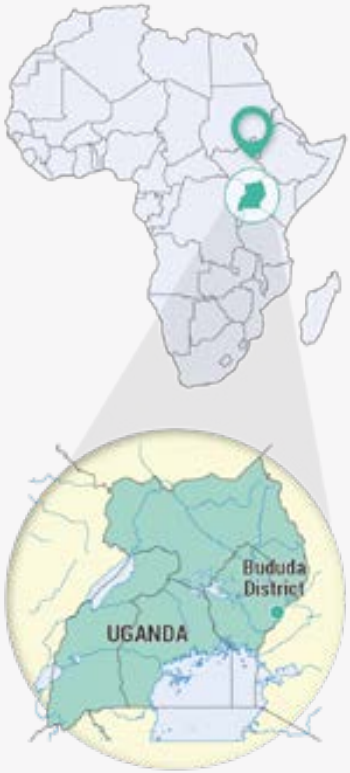
Flexible programming and learning

Collaborative action

IN THIS CHAPTER



Irene Walimbwa.



> **It is my sole drive and passion to see such change take place in my community in the Mount Elgon region. Our core value, which drives us as an organization, is to work with the women and youth who often are left out, as we look to empower them and improve their livelihoods through environmental conservation.**
>
> Irene Walimbwa, Founder and CEO, AW Bamboo Enterprises

THE STORY OF MOUNT ELGON'S COMMUNITY

As narrated by Irene Wabule Walimbwa, Founder and CEO, AW Bamboo Enterprises Ltd[3]

Mount Elgon, on the border of eastern Uganda and western Kenya, is the oldest extinct volcano in East Africa. Its slopes were once covered with dense montane forest, with belts of lush highland bamboo (*Yushania alpina*). Over time, overuse by local people who struggle to feed their families and meet livelihood needs has depleted the forest cover. This makes the mountain slopes highly vulnerable to weather-related hazards. In 2010, a landslide following heavy rains killed more than 300 people in Bududa District on the Ugandan slopes of Mount Elgon, sweeping away several villages, schools, and health centers – a disaster that shook the world. Another landslide in the region in 2018 killed 40 people.[4]

Deforestation has also caused tensions between the Uganda Wildlife Authority (UWA), which runs the Mount Elgon National Park for nature conservation and tourism, and the local communities, who want continued access to timber and non-timber forest products.

Irene Walimbwa was a local advocate and champion of women and youth empowerment when, in 2002, she mobilized a group of vulnerable women and young farmers to start a savings association for small business support. Early successes focused on livestock husbandry, but this work soon led to the idea of starting a company to process bamboo products to ease these local tensions and advance sustainable development in the Mount Elgon region.

AW Bamboo Enterprises Ltd welcome sign.

Chinese delegation visiting AW Bamboo Enterprises to exchange knowledge on bamboo cultivation, 2022.

Irene knew that bamboo had the potential to provide multidimensional benefits to local people and the ecosystem, stabilizing the mountain slopes to prevent landslides while contributing to local economic empowerment and disaster risk reduction:

- The tree planting would help to stabilize soils on the mountain slopes and reduce the risk of erosion and landslides that have plagued the region in the past.
- The shoots – both fresh and dried, whole and powdered – are a highly prized delicacy of the region with great market potential. The enterprise could provide decent jobs, especially for women and young people in the community, along the entire value chain – tree planting, cultivation, sustainable harvesting of bamboo shoots, processing, packaging, and marketing a range of consumer products.
- It would help to reduce conflicts around natural resource use between community members and the UWA by delineating and permitting economic activities in a specific area of parkland.
- Generating carbon credits would create a further revenue stream for the community by enhancing a natural carbon sink.

Irene registered **AW Bamboo Enterprises Limited** in 2012 to enable local communities to grow bamboo on a large scale and to conserve, add value, and distribute bamboo products to low-income and environmentally vulnerable communities in the Mount Elgon region. Although her goals were clear, there was little or no dedicated land available for the enterprise to access for cultivation, so the bamboo had to be sourced from traders.

Irene was highly resourceful in networking and raising funds and in-kind support from diverse sources for the venture. She joined the **Uganda Small Scale Industries Association** where she networked with other local businesses. At a 2018 trade show, she met with representatives of the **Uganda Development Corporation**. The corporation invited her to apply for funds, on condition that the business produces its own bamboo. Irene had the idea of applying to the UWA to use land within the Mount Elgon National Park for bamboo cultivation.

By 2021, Irene had signed a Memorandum of Understanding with the UWA and the Bududa District government, giving AW Bamboo Enterprises the right to use land within the national park for sustainable cultivation and livelihood activities. AW Bamboo Enterprises launched a pilot project to work with communities in the district.[5] More than 500 women and young people from the local communities are now involved, growing Highland bamboo and other species such as Arabica coffee*, Olea welwitschia* (Elgon teak)*, Podocarpus* spp.*, Prunus africana,* mahogany spp., *Aningeria altissima*, *Cordia africana* (Sudan teak), *Cordia millenii, Strombozia schefulleri, Syzygium* spp., and *Newtonia buchananii.*

The bamboo saplings planted in 2021 are bearing shoots, which can now be harvested and packaged. Local people are creating economic value by processing the harvest into diverse products. Bamboo shoots are harvested and either sold fresh locally or dry-smoked, packaged, and sold. The dry-smoked shoots are also ground into powder, used in local cooking, for sale.

In partnership with the **International Network of Bamboo and Rattan**, training is provided to community members in various activities related to bamboo value addition, post-harvest handling, and financial skills. They are also made more aware of climate change, and the best ways to prepare for its impacts on their society and livelihoods.

As for other tree species, Irene says: "The Mount Elgon National Park has restrictions on logging, so we will distribute the other tree species to farmers," says Irene. "We will encourage them to address deforestation by growing these other species on the degraded land and use the tree products for their livelihoods."

The community members already obtain immediate benefits from AW Bamboo Enterprise's MOU with the UWA, because the project allows them to intercrop maize, onions, beans and other vegetables among the bamboo trees, for seasonal harvesting. Without the project, they would have been excluded from this land in the Mount Elgon National Park; now they can farm it in an ecologically sustainable way, while contributing to soil stabilization on the mountain slopes.

Irene demonstrates the bamboo production process to Hon. Flavia Munaaba, Secretary General of the Uganda Bamboo Association.

Mount Elgon National Park, Uganda.

AW Bamboo Enterprises shows how community-led ecosystem restoration, linked to indigenous species propagation and growth, can drive business models that are environmentally, socially, and economically sustainable. Local entrepreneurs can create a virtuous circle of added value, while cashing in on local cultural tastes for sustainably produced goods.

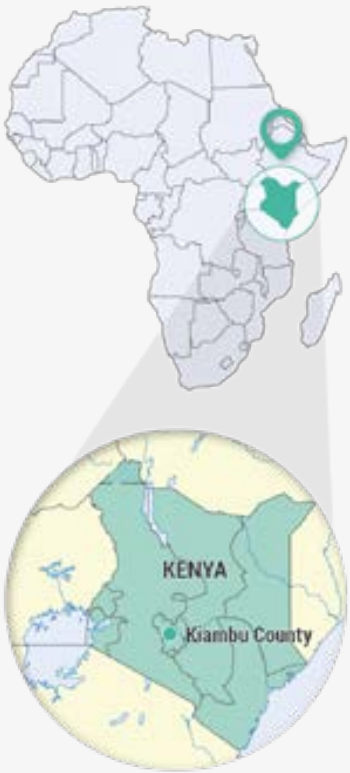
How Challenges are Addressed

The key challenges faced by AW Bamboo Enterprises are limited financial resources and access to technology – for instance for packaging. The process of packaging by hand is slow. More capital is needed for the mechanization of parts of the process, which would save workers' time and enable the business to scale up. The process of training local farmers is also necessarily time-consuming but is being patiently addressed.

With sufficient finance, equipment, and training, the possibility of scaling up production to create further, secure livelihoods and access wider markets would be possible. From this pilot project, the hope is that the ecosystem restoration, sustainable use, and value chain model can be replicated in other districts of the Mount Elgon region. Irene believes that communities may go from strength to strength in fulfilling their livelihood needs and enjoying local produce if they restore key ancient and indigenous tree species in the Mount Elgon region over the next 10–30 years.

Sylvia Kuria.

> **It has been so difficult; we prepare the land, and the rain doesn't come even though the seed is there.**
>
> Sylvia Kuria, organic farmer



THE ORGANIC FARMERS OF KIAMBU COUNTY

As narrated by Sylvia Kuria, organic farmer, Kiambu County, Kenya[6]

Kenya's Kiambu County has historically been dry. Now, climate change is making the rains scarce and erratic, further testing the abilities of farmers to produce crops.

Since 2020, five harvests have failed due to the lack of rain. Farmers are challenged because they cannot predict the onset of the rains any more. Historically, the long rains began in mid-March and lasted for ten weeks. Now, the long rains arrive only in May and last for just two to three weeks. The short rains expected in October appear only in November and last for a few days. Water conservation is urgently needed, but at a scale that requires collective action. A single smallholder farmer cannot do enough.

Meanwhile, the use of chemical inputs to agriculture, including pesticides marketed aggressively in East Africa, is polluting and depleting the natural environment.

This complex of challenges motivated Sylvia Kuria, a farmer in Kiambu County, to embrace agroecological methods on her farm. Sylvia saw the potential to run an organic, climate-resilient farm business. She also saw the opportunity to demonstrate the art of the possible to other local farmers. Her vision is catalyzing a local movement to embrace agroecological methods, with minimal chemicals and more efficient water management.

> **We have done a lot of advocacy to emphasize harmful pesticides. We are saying we should have quality organic inputs. The farmers have been using synthetic inputs, which are not very good for them.**
>
> Sylvia Kuria, organic farmer

Members of the organic farmers group meet in Kiambu County.

Making the Leap from Farm Plot to Policy

Sylvia's approach to building local resilience involves direct skills training and field implementation work, as outlined below:

- **Training of farmers in agroecological methods**, including demonstrations on Sylvia's working farm. This includes agroforestry methods, which utilize specific tree species such as *Sesbania sesban* and *Calliandra* spp. to fix nitrogen, stabilize soils, and provide nutritious food for people and animal fodder.
- **Creation of kitchen gardens to provide nutritious food for families year-round.** In the kitchen gardens, the women cultivate cereals and vegetables that do well in long and short rains. Sylvia and her group are promoting local indigenous foods, such as kumquats, indigenous avocadoes, and plums. These fruits are nutrient-dense and bolster local food security.

Sylvia's approach also involves advocacy to secure a supportive public policy and investment environment for organic farming. Sylvia and other farmers have banded together as an informal advocacy group. They are not registered with a specific name but are drawn from three non-governmental organizations with a local presence: Trees for the Future, Biovision Africa Trust, and the Community Sustainable Agriculture Healthy Environmental Program.[7] Together they have pursued the following:

- **Advocacy as a group of 100+ farmers for national policies** to support climate-resilient, agroecological methods. This includes successful advocacy to phase out harmful chemical pesticides such as pymetrozine, chlorothalonil, diuron, and thiacloprid, which have been banned in Europe and elsewhere but were still in use in Kenya. (They were subsequently banned in Kenya in July 2023.)[8]

> **Agroecology is an integrated approach that applies ecological and social concepts and principles to the design and management of food and agricultural systems. It is not only a set of principles and practices that enhance the resilience and sustainability of food and farming systems – it also involves a holistic understanding of agri-food systems. Moreover, it seeks to create a socio-political movement that empowers small-scale farmers to achieve food sovereignty.**
>
> Martin Oulu, ***Transitioning Ndeiya Sub-county to a Sustainable Food System from Local Farmers' Perspective***[9]

Freshly grown peas.

- **Engagement with county government to pivot the county's development plan towards support for organic, climate-resilient farming.** As a result of the Kenya Climate Smart Agriculture Strategy, 2017–2026,[10] each county now has climate-smart agriculture committees. These have become an important engagement arena for Sylvia and fellow organic farmers. They are seeking to get agroecological principles and activities prioritized in each county committee. The informal group of farmers organized in 2022 to define their top five advocacy asks for integration into the County Integrated Development Plan of Kiambu County. The farmers' initiative was successful – their priority asks were adopted word for word as commitments in the County Plan, addressing:
  - provision of extension services and support, particularly in agroecology;
  - support for local markets, especially organic markets;
  - support for agroforestry (trees on farms to diversify production and economic risk, and enhance productivity);
  - support for rainwater harvesting and conservation; and
  - enhancement of quality, quantity, and access to organic inputs for local farmers.[11]

Now the farmers' group is engaged in seeking meaningful budgetary allocations from the county government to support this work.

- **Partnership with the county government on public infrastructure for more climate-resilient water management and farming.** The county has budgeted for funding and constructing small dams to help manage scarce water resources. Sylvia's group has initiated dialogues with county officials to explore how small dams could be installed in their area. These small dams will provide women in the villages with a sustained source of freshwater for their kitchen gardens, all year round.

> **For me, I'd like to be an example to other counties in Kenya and other areas of Africa as a whole, for local farmers to think they have a powerful voice.**
>
> Sylvia Kuria, organic farmer

How Challenges are Addressed

Mainstreaming agroecological principles and practices always requires an ongoing effort. With the turnover of administrative personnel, there is work to be done to retain institutional memory, maintain previous commitments to agroecology, and prevent backsliding. This is happening in two principal ways:

- **Representation on county and ward development committees.** Sylvia and her colleagues endeavor to get agroecology champions appointed to the committees so that these committees remain well informed about, and committed to, agroecology. The Kiambu County Climate Change Act 2021 details the different committees that are mandated to "support climate resilience through development planning, management, implementation, regulation, and monitoring of adaptation and mitigation measures and actions." These extend to ward level, the smallest unit of local government. On one of these smaller committees, the Ndeiya Ward Planning and Development Committee, an organic farmer represents the agroecological goals and outlook of the organic farmers' group.
- **Calls for investment.** Farmers are following up their earlier policy advocacy with entreaties to county government to invest in agroecology. Their three calls for investment are directly correlated with the previous policy priorities:
  - **Extension services.** A call for the county government to invest in employing extension officers and support the officers and the farmers with relevant training in agroecology.
  - **Aggregation, value addition, and territorial markets.** A call for national government to invest in local markets and develop value chain activities that would enable farmers to create and sell a value-added product for the region.
  - **Agroforestry.** A call to set up tree nurseries and ensure farmers in the locality can access the tree seedlings at affordable prices during the rainy seasons.

Having secured a strong policy achievement in Kiambu County, the group is now looking at adopting a similar approach in neighboring Nakuru County.

Kenyan vegetable farmer carrying a crate of spinach on her head.

THE STORY OF THE INGA TREE

As narrated by Mike Hands, Founder, Inga Foundation[12]

For generations, slash-and-burn agriculture has been a way of life for subsistence farmers in rural Honduras, as elsewhere in the tropics, because they know no alternative. Families clear-cut and burn patches of rainforest to create plots of fertile soil for growing their basic food crops. However, the soil fertility does not last. After a few cycles, crops fail and soils erode. This forces families who depend on slash-and-burn agriculture to keep clearing new patches of rainforest every few years just to survive. In some parts of the world, such as localities in mainland southeast Asia, traditional cyclical slash-and-burn practices have been found to be more ecologically sustainable.[13]

Mike Hands, a tropical ecologist from the UK, witnessed rainforest destruction from slash-and-burn and resolved to find out why farm plots in Honduras lost fertility so quickly.

He spent more than 15 years on trials, leading four projects as a Cambridge University researcher investigating which indigenous trees could best withstand climate shocks, anchor and enrich soils, and provide many other benefits to rural farm families living in poverty. Finally, he and his collaborators found what they were looking for: the Inga tree.

A farmer weeding his crops.

> **The Inga Foundation works with the communities living in the Cuero and the Cangrejal River Valleys. The valleys are of critical conservation importance, as they border Pico Bonito National Park, including a large area of primary tropical rainforest that is home to jaguars, pumas and howler monkeys and a diverse wealth of other species.**[14]
>
> Inga Foundation

Inga Alley Cropping method.

Land for Life

The Inga is a genus of tree with outstanding qualities for nourishing tropical soils and restoring soil fertility. While other tree species failed the test of resilience to climate shocks in the original Cambridge University trials, the nitrogen-fixing Inga tree was found to not only stabilize and replenish the soil but also to prevent erosion and protect watersheds and wildlife.

The **Inga Foundation**, named after the tree, was created to support the application and expanded use of the Inga Alley Cropping method in Honduras and beyond, as a proven effective alternative to slash-and-burn agriculture; and as a way of addressing rural poverty and creating rural wealth through a rejuvenated, agroforestry-based ecosystem.

Mike and the all-Honduran team of foresters, agronomists, field and nursery staff began the **Land for Life Project** in 2012 to promote the use of Inga Alley Cropping – a fully integrated ecosystem that naturally recreates conditions of the forest floor. The system effectively anchors a family to a single plot of land, allowing the entire family to work together close to home and eliminating their dependence on slash-and-burn agricuture, and helping them to achieve "land for life".

Inga Alley Cropping involves creating alleys lined with nutrient-fixing trees, within which farmers can produce food crops, such as beans and maize, for their families' survival, as well as cash crops for sale. The trees need to be densely planted (5,000 seeds per hectare) for resilience, to provide all the nutrients needed by the crops, and for soil protection. The method has been demonstrated to provide food and income security and eliminate the need for environmentally destructive slash-and-burn methods that destroy forests. Thanks to demonstration sites, its popularity is now spreading significantly among Honduran farmers, with the potential to spread much wider.

Initial pilots focused on eight local Inga species. A few more were added in the later plantings in Honduras and were outstanding performers, particularly *I. oerstediana* and *I. edulis*. Local provenances are always preferred.

The project started with 40 families and has added 40 more families each year; the graduate practitioners of the scheme now exceed 450 families.

The Inga Foundation provides the Inga seeds and cash crop plants (vanilla, turmeric, rambutan, allspice, black pepper, and hardwood trees) at no cost to each new family. The family provides the land, labor, and care on steep, degraded plots close to home, once called "sterile". Within two years, there is annual pruning for firewood and a protective layer of mulch from the leaves stripped from the branches that protect the soil and prevent erosion. The nitrogen-fixing trees, planted in hedgerows, stabilize and enrich the soil. It is truly a low-input system. The Land for Life Project in Honduras serves as a model for sustainable, organic, regenerative agroforestry in the tropics.

Once farmers hear about the system from friends or relatives, they are eager to visit the Foundation's demonstration farm and training center at Las Flores. The project has a 12-person full-time team of all Honduran foresters, agronomists, and field and nursery staff. The team all farm themselves, so they understand the challenges.

The farmer-to-farmer sharing of Inga seed takes place spontaneously as families plant several Inga seed trees. They have seen that Inga alleys produce food even during seven-month droughts and after eight inches of rain during deluges – and that all the Inga alleys survived the November 2020 back-to-back hurricanes with little to no damage. This farmer-to-farmer initiative ensures the natural expansion and lasting success of the system. The Foundation is in the twelfth year of the Land for Life Project. They have demonstrated, at landscape scale, and for the first time in the humid zones of Central America, a practical and sustainable alternative to slash-and-burn methods, which reverses environmental and soil degradation, as well as eliminating poverty and food insecurity. Families are empowered while protecting, enhancing, and restoring environments.

Over 5.5 million trees have been planted in Honduras under the Inga Alley Cropping scheme. The work of the Inga Foundation has created 100% sustainable food security for families whose Inga Alley Cropping plots are established for 18 months or more. Food security here means the stark difference between a good crop produced in a system that is resilient to climate violence and a poor crop from the previous unproductive slash-and-burn agriculture system. Families' nutrition is also enhanced: the Inga trees retrieve, retain, and recycle essential plant nutrients from the mineral mixture added at the outset.

Laboratory data showed much higher agricultural yields from plots with rock-phosphorus added, but also higher phosphorus content in the grain itself, better for nutrition. This principle applies to other nutrients and micro-nutrients.

Rural livelihoods are improved, as participants do not have to take on debt via loans. Women, young people, and older farmers are full participants, with some modifications as needed. The Inga Foundation works with family units or households on their land. About 6–8% are single-parent families, usually headed by widows. Extra manual labor is provided to help such families establish their Inga Alley Cropping system. The same is true for elderly people of either gender: provisions are made to lend them extra "muscle" to establish the system.

Farmers practicing the Inga Alley Cropping method.

> **There are no loans, debt or microloans – the program is by and for the families as they are trained at their plot and make all planting decisions. Slash-and-burn agriculture stops as soon as families plant their basic grain alley of hedgerow plantings of Inga tree species. All have 100% food security in 18–24 months and none have gone back to slash-and-burn agriculture. The Inga Tree Model is a grassroots program by and for the families.**
>
> Mike Hands, Founder, Inga Foundation

The system eliminates chemical fertilizers, herbicides, fungicides, pesticides, fossil fuel-intensive inputs, GMO seeds, and heavy equipment (with only a small supplement of mineral rock phosphate/lime required). Therefore, agrochemical run-off is stopped, promoting watershed integrity and biodiversity protection. The Foundation sees far more biodiversity in the Inga plots themselves, and in the secondary vegetation which has been spared burning; in comparison with the fire-climax grass-scrub vegetation of the original degraded sites. In the future, these observations will be strengthened by professional biodiversity surveys.

Stems and branches from annual pruning of the Inga trees are also a source of renewable firewood – which means that families do not have to harvest forest trees. Excess Inga wood may be traded or sold. An overall observation from the program sites is that the Inga Alley Cropping system has reduced migration to Honduran cities by creating more viable rural livelihoods. Its steady uptake by rural farming families can be explained by the fact that it provides what they need most: food security in basic grains.

> **Tree-based systems are resilient to climatic violence, whether as drought or hurricanes. Enhanced soil organic matter acts as a sponge, retaining water and releasing it slowly. Thick mulch reduces evaporation from the soil to almost zero.**
>
> Mike Hands, Founder, Inga Foundation

***Inga Edulis* – edible beans.**

How Challenges are Addressed

Farmers need to be convinced to change behaviors from the old slash-and-burn ways, it was all they ever knew. It takes demonstration to convince a family to change practices – the demonstration site and leadership of the local Honduran farmers (all using the method themselves) have been pivotal.

At the start of the program, demonstrations were indispensable; now, farmers' first encounter with the system is often with an Inga-farming neighbor. Nonetheless, the Foundation still uses the demonstration facilities.

With the benefit of these refinements over years of trials locally in Honduras, the Inga Foundation believes the Inga Alley Cropping system could be trialed more widely throughout the humid tropics.

THE DRIP POOL IRRIGATORS OF GUJARAT

As narrated by Naveen Patidar, Executive Director, Aga Khan Rural Support Program, India[15]

Residents of Surendranagar, Rajkot, and Morbi Districts in the state of Gujarat, India, have always been used to swings in temperature from season to season: from a low 7°C to a high of 45°C. Now this largely agricultural region is bearing the full brunt of climate change, putting farming livelihoods and food security under stress in the area.

The high temperatures are steadily creeping up because of climate change[16] and droughts have become more prevalent. At the same time, episodes of heavy rainfall and flooding now occur more frequently. The dual problem of floods during the monsoon season and droughts in summer has led the area to be classed as a climate change hotspot within India.

Climatic changes contribute to water scarcity, soil salinity and sodicity, desertification, and declining agricultural yields.[17] Farming households were initially not well prepared to adapt. Over one-third of residents in Surendranagar live in multidimensional poverty.

Gujarat farmers.

Gujarat farmers, using the drip irrigation method.

In this context, the Drip Pool Irrigation Program is a locally led initiative developed by and for farmers, to help them mitigate climate risks and enhance agricultural productivity. By combining technology, finance, and community collaboration, the program has enabled small and marginal cotton farmers in the Surendranagar, Rajkot, and Morbi districts to adopt drip irrigation and build resilient farmer institutions. Drip irrigation is a highly efficient way of delivering precious water resources straight to the roots of the crop, targeting water where it is most needed.

The Drip Pool Irrigation Program was initiated by the **Aga Khan Rural Support Programme – India** (AKRSP-I), a non-governmental organization, in 2010, with the support of the **C&A Foundation** and its partner, **Cotton Connect**. Recognizing the financial constraints faced by farmers in accessing drip irrigation technology, the Drip Pool Irrigation Program introduced a community financing mechanism. This mechanism offered interest-free loans to farmers, enabling them to purchase drip irrigation units and access a subsidy from the **Gujarat Green Revolution Company Limited** (GGRC), an implementing agency for micro-irrigation, of the state and federal governments. ("Pool" in the name of the program refers to this "pool fund" system for providing subsidised loans.)

> **Until 2015, I was solely dependent on rain-fed cotton crops as a source of income. I could not afford drip irrigation technology because of its high cost and the complications involved in applying it. Then Mansukhbhai, a worker from the Drip Pool Irrigation Program, guided me through the entire process of applying to the GGRC for an interest-free loan. Thanks to this, I began cultivating *jowar* (sorghum) along with cotton and increased my gross earnings by more than ₹ 22,000 (US$ 250) from only 1.4 acres of land.**
>
> Mathurbhai Jivrajbhai, Farmer, Goraiya village, Gujarat

> **I installed drip irrigation on my two-acre cotton farm after getting financial support from the Drip Pool Irrigation Program. I have seen clear differences in the drip-irrigated cotton farm, compared to rain-irrigated farming. I saved money on fertilizer, seed, and labor costs. Now, instead of using two and a half packets of cotton seed for sowing, I use two packets. I am so delighted that the technology has brought happiness to my family by reducing the drudgeries of fertilizer application and weeding.**
>
> Jenamben Farukbhai Badi, Arnitimba village, Gujarat

Drip Pool Irrigation Program Spreads Climate Resilience among Farmers

Addressing the region's climate challenges effectively and uplifting the livelihoods of affected rural communities called for robust and locally led adaptation strategies. This was especially true in the water resources sector. The scarcity of water in the area called for proactive water-saving measures, particularly in agriculture, on which communities depend for their livelihoods.

The success of the Drip Pool Irrigation Program relied on two core components: technology and finance. The technological aspect involved promoting the adoption of drip irrigation in cotton cultivation, emphasizing its potential to save water and increase profits. Simultaneously, the community financing mechanism provided farmers with loans that were repaid over two years through monthly installments. Repayments were reinvested into the community fund, allowing for the circulation of funds and extending the benefits of drip technology to more farmers.

Drip irrigation.

The Drip Pool Irrigation Program reached 1,352 farmers in its initial phase, focusing on cotton cultivation. Building upon these achievements, it was then scaled up to four districts in the region. A key addition to this phase was the emphasis on "farmers' institution development". Four Farmer Producer Companies (FPCs) were established, to engrain the technological and financial benefits of the program into the fabric of the communities. These FPCs took on the responsibility of managing agri-input purchases and output sales for the member farmers. By 2020, the program had reached an additional 9,750 farmers.

In the pursuit of a community-driven and locally led approach, the selection of villages and farmers for the Drip Pool Irrigation Program was based on factors such as the number of small landholders, available irrigation sources, existing penetration of drip irrigation, and overall livelihood opportunities. AKRSP-I organized village meetings and facilitated knowledge exchange visits to other villages to raise awareness about the benefits of the program. By employing the principles of "seeing is believing" and "learning by doing", the field team enabled farmers to witness the advantages first-hand and encouraged them to embrace the program.

The implementation of the Drip Pool Irrigation Program valued and included input from the farmers. A team of program staff and development officers at the village level worked closely with farming households to identify suitable loan recipients, determine loan amounts and repayment schedules, and ensure timely recovery from the farmers. Selected farmers received agronomic training and support to adopt improved agronomic practices in cotton cultivation and water management. Farmers reported that this form of engagement shaped the program to be farmer-friendly.

By promoting a farmer-driven model, the Drip Pool Irrigation Program has brought numerous benefits to the farmers, positively influencing cotton crop cultivation practices and the overall environment. By addressing the financial and extension challenges faced by smallholder cotton farmers, the program achieved operational success and significantly contributed to the well-being of the community.

> **I have a family of four, including two children, and own a total of three acres of land, all covered under drip irrigation. Before adopting drip irrigation, I cultivated cotton, groundnut, and vegetables using flood irrigation with fertilizers costing around ₹ 10,000 (US$ 120). However, since switching to drip, my fertilizer costs have been reduced to only ₹ 2,000 (US$ 24). Drip irrigation has significantly improved my water management. Previously, it took nine hours to irrigate the entire three-acre land using a submersible pump. Now, with a drip system … [it is] 1.5 hours.**
>
> **Inter-cropping has become feasible due to drip irrigation. I sow vegetables between cotton crops, gaining an additional income of ₹ 8,000 (US$ 96). Drip irrigation's efficiency allows me to manage my time better, enabling me to fulfill my social responsibilities and focus on my children's education. Overall, drip irrigation has revolutionized my farming practices and improved my life. It has not only reduced costs and saved time but also allowed me to make the most of scarce water resources. I am grateful for the support and benefits of drip irrigation in my farming journey.**
>
> Munnabhai Thakarashibhai Jenjariya, farmer, Amrapur village, Gujarat

Pumps and pipes pull water from the canal for farms.

Women working in the field.

> **My name is Rinaben, and I am a proud member of a Women's Farmer Interest Group in Wankaner block. Thanks to the Drip Pool Irrigation Program, our farming practices and lives have changed for the better. We received a zero-interest loan to install drip irrigation, reducing agricultural costs and increasing production. The formation of the Women's Farmer Interest Group was aimed at enhancing our farming knowledge and making us self-reliant through group savings. In our region, men and women are equally involved in farming, and the program recognized our potential. With 24 Women's Farmer Interest Groups now established across different villages, our 258 members are empowered to lead and make decisions in farming.**
>
> **Furthermore, we gain access to various benefits and receive government training, helping us become financially independent. Regular monthly meetings and savings are at the core of our success. Each month, we save ₹ 100 (US$ ≈1) per member, collectively amassing a substantial amount since our formation. In addition, [the state government] provided ₹ 10,000 (US$ 120) in revolving funds to each Women's Farmer Interest Group and three groups received loans of five times this amount. This financial support enabled us to explore new off-farm ventures, providing an additional source of income and fostering self-reliance. We are grateful for the opportunities … Together, we are nurturing our farms, supporting each other, and celebrating newfound independence.**
>
> Rinaben, Member of Women's Farmer Interest Group, Wankaner block, Gujarat

How Challenges are Addressed

The Drip Pool Irrigation Program did not encounter any major challenges where things did not work as planned. That said, the program staff identified some key watch points for future programs of this kind:

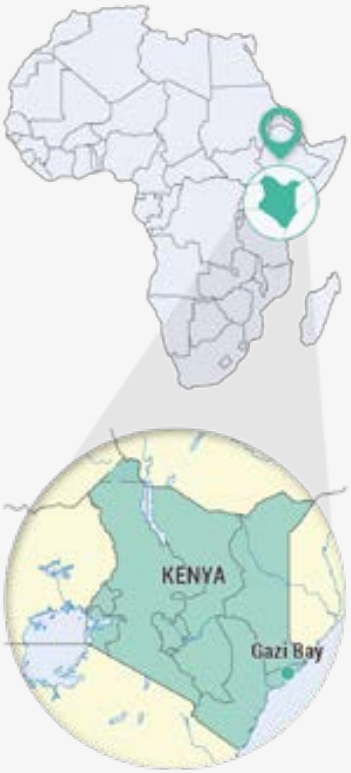
- **Structured repayment schedules reduce loan defaults.** The program achieved a zero-default rate in loan repayments because its workers maintained regular interactions with farmers to understand their situations and needs. Unlike other loan products, repayment schedules were not rigidly fixed. Instead, they were designed according to farmers' cash flows from agricultural activities, as well as other sources such as dairy and horticulture. The establishment of a community financing mechanism managed by the farmers themselves, allowing lending to other farmers in need, fostered a collective responsibility for timely repayment: the FPCs.

- **The formation of farmer organizations ingrained institutional sustainability.** Participating farmers were organized into FPCs to benefit from collective economies at both the input and output stages of the agricultural value chain. These FPCs received training in adopting better practices and group management. The goal was for these institutions to independently manage community finance and extend the reach of the Drip Pool Irrigation Program, ensuring its continuation after external support concluded. Going forward, FPCs would charge a token interest on loans to cover administrative and operational costs.
- **Water saving went beyond drip irrigation and the program embraced an integrated water resources management approach.** The work of the Drip Pool Irrigation Program highlighted that adopting drip irrigation and similar technologies alone is insufficient to address water scarcity in the region. In areas with limited water availability, the benefits of drip technology are constrained. Therefore, there is a need to emphasize an integrated approach that promotes water harvesting, conservation techniques, and the adoption of drip irrigation. Consideration should be given to allocating a portion of funds for these activities and the conservation of water collected during the rainy season. This would ensure a more consistent water supply throughout the year and increase cropping intensity in the intervention areas.
- **Supportive government institutions enhance program delivery.** The presence of GGRC at the state level played a crucial role in shaping the financial and institutional framework of the Drip Pool Irrigation Program. GGRC's initiative to subsidize the installation of micro-irrigation technologies in the state greatly influenced the program's design. The program's success would have been challenging without this Gujarat government scheme and the GGRC's support. Transparency and official monitoring also played vital roles in sustaining the program's effectiveness.
- **While the program has achieved commendable results, significant attention was required to planning and ensuring its long-term financial sustainability.** The Drip Pool Irrigation Program recognized the need to develop mechanisms that go beyond initial financial support and focus on creating self-sustaining community-based financial institutions. This included establishing FPCs (which would pool savings to offer loans to members) and exploring market linkages, to create enduring income generation opportunities.
- **The success of agricultural interventions in this region relies heavily on effective extension services.** The ability of these extension services to provide farmers with training on improved agronomic practices and water conservation techniques was crucial for maximizing the benefits of the Drip Pool Irrigation Program. Furthermore, strengthening the partnerships between agricultural extension services and government institutions, agricultural universities, and knowledge centers enhanced the reach and quality of extension services, ensuring farmers have the necessary skills and knowledge to adopt and sustain best practices. An advisory committee consisting of experts from organizations such as the International Water Management Institute, Indian Institute of Management, Navasari Agriculture University, and senior members from the Aga Khan Foundation and the C&A Foundation guided good agricultural practices and emerging crop solutions.

These key lessons have provided AKRDP-I with valuable insights into the areas that require further attention and improvement. By integrating these learnings into future initiatives, the organization aims to enhance the impact and sustainability of its programs, contributing to the well-being of the communities they serve.

THE MANGROVE STEWARDS OF GAZI BAY

As narrated by Anne Wanjiru, Project Impact Officer, Mikoko Pamoja[18]



Mangroves are among the most endangered ecosystems in the world. They are also among the most critical, for biodiversity and for humanity.

According to **The State of the World's Mangroves**, these "blue forests" prevent more than US$ 65 billion in property damages from storms and reduce flood risk to some 15 million people every year. About 4.1 million small-scale fishers depend on mangroves worldwide. Functioning coastal ecosystems are a haven for diverse species and provide substantial social and economic benefits, particularly for low-income coastal communities. Yet humans are responsible for over 60% of mangrove loss, primarily for the conversion of land to farmland, agriculture, and/or urbanization.[19]

The community in Gazi Bay, on the southern coast of Kenya, is leading the way in showing the world how to reap the immense benefits of mangroves without their destruction. They have pioneered the world's first conservation project to link mangrove forests to the global carbon market and won the 2017 Equator Prize for their efforts.

Local woman planting mangroves in Gazi Bay.

Fishermen of Gazi Bay.

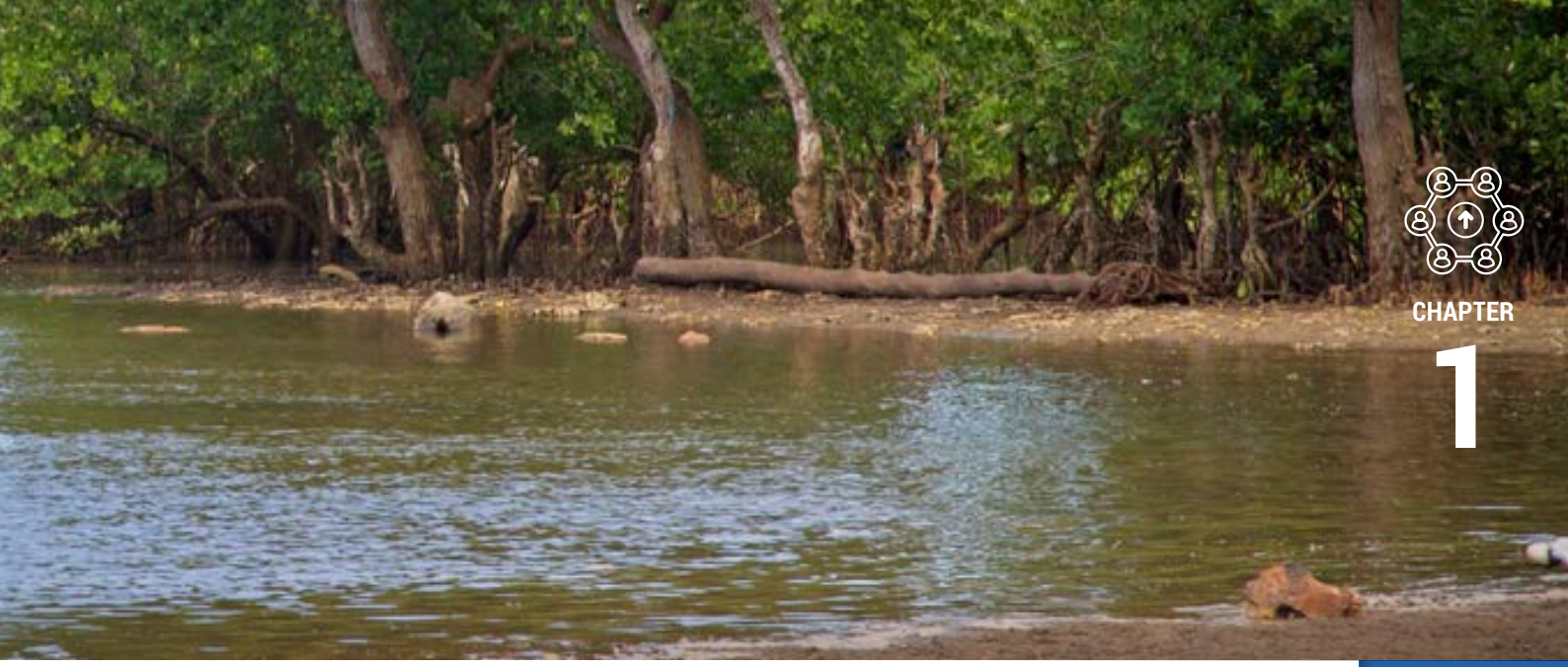
Mangrove forests are important to the community in Gazi Bay – 90% of the local population depends on the fishing industry, which is sustained by the mangroves, for their livelihoods.[20] However, by 2010, 20% of these forests had been lost to the timber industry.

In 2012, the two villages of Gazi and Makongeni came together as a result of two decades of research and community engagement by James Kairo from the **Kenya Marine and Fisheries Research Institution** (KMFRI) and Mark Huxham from **Edinburgh Napier University**. Local elders from the villages challenged the two scientists to go beyond simply demonstrating the benefits of the mangroves, to using their scientific work to bring benefits for people and nature. This resulted in a partnership between the residents of Gazi Bay and the Scotland-based **Association for Coastal Ecosystem Services** (ACES) and **Plan Vivo Foundation** to launch the **Mikoko Pamoja** ("Mangroves Together" in Swahili) mangrove conservation and restoration project.

Mikoko Pamoja was established as a community-based organization, which was granted co-management rights to the forest under Kenyan legislation. It is managed by three groups: the Mikoko Pamoja Community Organization (MPCO) consisting of representatives of Gazi Bay, specifically the villages of Gazi and Makongeni; the Mikoko Pamoja Steering Group (MPSG) providing technical support to the MPCO; and the Association for Coastal Ecosystem Services (ACES) as the project coordinator.

The community runs mangrove tree nurseries, transplants the seedlings into reclaimed mangrove forests, and nurtures them into full growth. Community scouts conduct surveillance to prevent illegal harvesting. The initiative conserves 117 hectares of mangroves and restores further acreage every year. Nearly 500 people, from local schools and villages, regularly plant mangroves[21] with technical inputs from the KMFRI.

Mikoko Pamoja also generates income for the Gazi and Makongeni communities through the sale of carbon credits. In addition to the other benefits they provide, mangroves are champions at capturing and storing carbon dioxide within tree roots and surrounding soil – much better than other major forest types. These credits are generated through a Payment for Ecosystem Services agreement between the Plan Vivo Foundation and the community.



Plan Vivo has an Offset Project Standard for land use projects that places particular emphasis on the socio-economic development of less developed nations, allowing for flexibility in project design to enhance accessibility for small projects. With support from scientists, the total volume of biomass in the forests regenerated by communities is translated into tons of carbon. The project only calculates carbon stored in the tree itself – even though mangrove forests store a lot of soil carbon, calculating soil carbon is a resource-intensive undertaking for small projects. In general, 50% of above-ground biomass is carbon. This figure is then relayed to the Plan Vivo Foundation, which certifies the calculations and issues Plan Vivo Certificates (PVCs) to Mikoko Pamoja. One PVC is equivalent to one metric ton of carbon dioxide emission reductions. The PVCs are submitted to ACES, which offers them for purchase by individuals and organizations to offset their carbon emissions, generated through activities such as fuel and energy consumption, and travel.[22]

From 2014 until the time of publication in 2023, the Mikoko Pamoja project has counted emission reductions of 18,052 tons of carbon dioxide, which have generated payments in carbon credits totalling US$ 143,976 to the community.[23] Revenues from sale of carbon credits are deposited in a community development fund, which is used for the project work and for community projects in water and sanitation, education, health, and environmental conservation. For example, the fund has supported water supply for 4,500 community members and education for 700 local schoolchildren, including through building of wells, school building repairs, provision of schoolbooks, and funding for local community groups such as children's football clubs.

How Challenges Are Addressed

The project is relatively small-scale in carbon market terms, which means it does not qualify for global compliance carbon markets, such as the **United Nations Framework Convention on Climate Change** mechanisms.[24] However, sometimes "small is beautiful" and confers versatility on the community institutions in charge. The credits are still able to be marketed on the voluntary carbon market via Plan Vivo, a carbon credit aggregator, which provides the steady revenue flow that the community needs.

The lessons learned are being spread far – Mikoko Pamoja constantly hosts local and international university students and participants of international mangrove training courses conducted by KMFRI.

SAND RIVERS OF THE LIMPOPO

In the arid and semi-arid regions of Zimbabwe, the distance between homes and the nearest water point is sometimes as much as nine kilometers. In the dryland regions of Mozambique, women are known to walk ten kilometers in one direction to collect water. Carrying 20 liters of water – weighing 20 kilograms – over this distance yields only the absolute minimum requirement for just two people.[25]

In such arid environments, the extraction of water from sand rivers – called *wadi* in the Arabic-speaking world – is often rooted in tradition. In sand rivers, water is retained in the sediment of sand river channels, although it is not always visible on the riverbed. The water is clean and is subject to less evaporation than open dams. The supply of water in the sediment can last all year round in a large river system. For centuries, communities have accessed this water through temporary and shallow sand wells dug in the riverbed, which are deepened as the water level drops.

The presence of sand rivers in the Limpopo basin, such as the Shashani and Semukwe tributary rivers in Zimbabwe and the main Limpopo River itself in Mozambique, provide optimal hydrogeological conditions for sustainable groundwater abstraction due to recurring and rapid recharge of the system every year, to form nature-based stored water at shallow depth, which is accessible for resource-poor farmers with limited means.[26]

"No storage dams need to be constructed nor irrigation canals need to be dug, because nature provides the main canal," say Paulo Sérgio L. Saveca of the Instituto Superior Politécnico de Gaza, Mozambique and Nobubelo Ngwenya of the Dabane Trust in Bulawayo, Zimbabwe. "Simple and low-cost hand-drilled shallow wells can be installed and with a solar or alternative pump water can be extracted. Farming families can individually and adaptively drought-proof and develop their farms, with immediate livelihood benefits."[27]

The Dabane Trust has been working with vulnerable communities in arid and semi-arid areas in the southern Africa region on sustainable land use, water management, and sanitation since 1990. The Trust has supported communities to develop and install hundreds of simple abstraction systems to provide clean water for household use and for small-scale irrigation and livestock water schemes.

According to Paulo and Nobubelo, farming families living in these drylands have been coping with climate variability for generations and have developed effective livelihood strategies. They develop riverside gardens, also called "brushwood gardens", along the sand rivers to cultivate crops such as *chomolia* (African kale), tomatoes, onions, and other vitamin-rich horticultural crops at a very small scale (typically between 50–400 m^2 per family), mainly for home consumption.

The crops were traditionally irrigated with watering cans, using water from hand-dug scoop holes in the sandy riverbeds, but smallholder farmers in both Mozambique and Zimbabwe are now acquiring solar pumps to irrigate their farms during drought periods.[28]

Brushwood gardens have proven a resilient farming strategy for generations, drought-proofing their farming systems while relying on the nature-based water storage in sand rivers. With the increasing unreliability of rainfall and intensity and scale of droughts, Paulo and Nobubelo are calling for this traditional method to be upscaled significantly so that more food crops can be produced using water from sand rivers.

KEY TAKEAWAYS

Why Ecosystem-based Approaches are a Popular Focus for Locally Led Adaptation

Ecosystem-based approaches are of great interest to local adaptation leaders and feature prominently in the stories we received, for three obvious reasons:

- **Ecosystems are the basis for human lives and livelihoods,** including food, water, health, and nutrition. Ecosystems are increasingly impacted by climate change but the features of intact and healthy ecosystems also provide multidimensional and highly valued resilience benefits to local actors. Among the tangible economic benefits cited by local actors as the motivation for embracing ecosystem-based adaptation are erosion risk reduction through suitable tree planting, pollinator services to bolster crop productivity through plant biodiversity, and flood risk reduction and water filtration services through wetland conservation, to name but a few.
- **Ecosystems are tied to people's cultural and spiritual beliefs, and personal and group identities** with further benefits that are difficult to quantify but which local people say are deeply important to them. (These are entwined with many forms of Indigenous knowledge – see Chapter 6.) For many of the contributors to this report, local environments shape and define their identities, their sense of belonging and self. They told us that their resilience to climate change, including psychosocial resilience, was in part generated by the possibility of protecting and restoring a clean, green environment around them and celebrating this with others, across generations. (*The Eco-Activists of Busia County* and *The Biochar Producers of Chiang Mai* in Chapter 4, and *Community Work Supporting Mental Well-being in Meru County* in Chapter 5.)
- **Ecosystems or ecosystem "pockets" with potential for conservation or revitalization are near or around most people.** For people living in rural and peri-urban areas with access to land and water bodies, or even for urban residents with access to some vacant or underutilized land and urban waterways, local adaptation leaders are signaling that there is much-untapped potential for ecosystem enhancement near them – physically within reach, and with the potential to be accessed via institutional and social negotiations. Furthermore, efforts to clean up, conserve, or restore ecosystems can often be initiated with modest initial resources.

  In *The Story of the Inga Tree* in this chapter, Mike Hands describes how the management of existing land resources is transformed for resilience. In *The Osukuru Women's Story* (**Chapter 3**), Constance Okolett describes how local women band together to cultivate underutilized land belonging to their members, for collective food security benefits. In *The Story of Mount Elgon's Community* in this chapter, Irene Walimbwa describes how negotiating a buffer area of the national park where communities were permitted to cultivate bamboo in a planned and regulated way (rather than harvesting it illegally and haphazardly throughout the national park) is a win-win situation for biodiversity and livelihoods.

Woman on the Gazi Bay boardwalk, Kenya.

JARGON-BUSTER: EBA AND NBS

Both the terms "Nature-based Solutions" (NbS) and "Ecosystem-based Adaptation" (EbA) are used widely in the context of adaptation. What do they mean, and how do they relate to LLA?

The answer is not straightforward and depends on who you speak to, and where. In many countries and contexts in Latin America, the term "Nature-based Solutions" is reported to be a widely-used and important anchoring concept for the sustainable management and regeneration of natural ecosystem features to provide climate change adaptation and mitigation, as well as other, multidimensional benefits for biodiversity and people.[29] However, the framing is not ubiquitous on the continent: framing that follows Indigenous belief systems in Mother Earth are also important in certain Latin American contexts, in both customary governance and formal state policy.[30]

The IPCC notes in its Sixth Assessment Report that the term "Nature-based Solutions" is not universally accepted worldwide; and notes that the Convention on Biological Diversity uses "Ecosystem-based Adaptation", which the IPCC also prefers.

Some scholars and activists have come to view framing "Nature-based Solutions" with suspicion because they worry that it provides a greenwash for extractive activities that disadvantage local communities. This anxiety is not misplaced. There is indeed considerable evidence of poorly designed climate change mitigation projects that constrain local people's access to natural resources and have net negative impacts on communities. Examples are monoculture plantations for carbon sequestration or crops for biofuel production, which might cut off local food security, medicinal and other uses of land and natural resources, even if they create some wage labour jobs for some local people in the short term. Women and girls are particularly likely to be disadvantaged by poorly designed schemes of this type.[31] Depending on the species and planting methods, such schemes may also use a lot of water and chemical agricultural inputs (even if the plants themselves are meant to sequester carbon) and so considerably reduce biodiversity, including its soil health and pollination functions.

JARGON-BUSTER: EBA AND NBS ... *(continued)*

The International Union for the Conservation of Nature's NbS Gold Standard was developed precisely to guard against single-purpose ecosystem-based projects that could inadvertently undermine human development, the climate and/or biodiversity. For this reason, IUCN has defined NbS as: "actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature." The NbS Gold Standard aims to establish safeguards to ensure that multidimensional local needs are adequately addressed, as well as national and global climate and biodiversity benefits.

The NbS Gold Standard includes a typology of many different types of NbS. This may be useful for researchers and international practitioners who are trying to monitor, evaluate, and learn from the diverse types of solutions available, as well as their benefits for different social groups, and species, over time.

EbA is defined by some as "a wide range of ecosystem management activities, such as the sustainable management of forests, grasslands, and wetlands, that increase the resilience and reduce the vulnerability of people and the environment to climate change."[32]

Ecosystem-based disaster risk reduction used to be discussed as its own category of intervention, but IUCN now increasingly couches adaptation and DRR as a spectrum. This is very much in keeping with advancing global understanding in the IPCC and in climate policy: "Ecosystem-based disaster risk reduction (Eco-DRR) and ecosystem-based adaptation (EbA) are related approaches that can be thought of as a continuum, from mitigating large-scale disasters, such as tsunamis and landslides, to adapting to different climatic conditions."[33] Certainly, in practical terms and as explored throughout the examples in this chapter, communities view the climate adaptation and risk reduction benefits of healthy ecosystems as a package that they are willing to invest in.

How Communities are Embracing Ecosystem-based Adaptation

Tackling the drivers of destruction

Across the world, the greatest drivers of ecosystem degradation are human mismanagement including over-extraction of species and habitat destruction. These are followed by the spread of alien and invasive species, and climate change as further, major drivers of the loss of ecological function and biodiversity.[34] The LLA stories reflect these meta-trends, in microcosm. Local leaders are not merely dreaming of ecological restoration, but they are often challenged by real-time environmental degradation and motivated to stop it to preserve the foundation of their livelihoods and food and water security.

The root causes of environmental degradation are context-specific. In rural Uganda, for example, Irene Walimbwa (see *The Story of Mount Elgon's Community* in this chapter) recognized that the unsustainable cutting of bamboo and other trees on the slopes of Mount Elgon was raising erosion and landslide risk. A fatal mudslide in 2010 shook the community to its core. Here, local people were trespassing within the bounds of the Mount Elgon National Park to cut bamboo because families were hungry and desperate for food and had few options. Conflicts abounded between the UWA and communities. A change of direction was required.

Bamboo stand, Uganda.

Instead of fencing people out, Irene negotiated a Memorandum of Understanding with the authorities to set aside a portion of the Mount Elgon National Park for sustainable cultivation of Highland bamboo and other indigenous tree species, and employment of local people. Now the sustainable use area managed by Irene's enterprise, AW Bamboo Enterprises, is stabilizing soils and shoring up green infrastructure, as well as offering work and food within that area – which should help protect the other natural ecosystems within the national park. It is a pilot project, so longer-term monitoring of the tree cover and biodiversity consequences will be needed.

In Honduras, the Land for Life project (see *The Story of the Inga Tree* in this chapter) was created to give families an ecologically and economically sustainable alternative to slash-and-burn agriculture, which had been practiced in the rural areas for many years but was decimating the environment: farmers were slashing and burning the forest to open it for agriculture, but the systems were depleting soil nutrients and undermining the productivity of the land over time, leaving families destitute. On a global scale, slash-and-burn agriculture is a massive contributor to greenhouse gas emissions. However, the solutions lie locally in addressing rural families' poverty and hunger.

Tackling the root causes of ecosystem degradation not only concerns addressing the extraction of resources by local people: some of the stories are about local environmental defenders, seeking to stop environmental degradation by external actors. These stories describe local people's work to apply customary and national laws for environmental protection against external actors, including powerful commercial interests.

The Santo Sunset Environment Network (see **Chapter 6**) describes how this network in Vanuatu has dedicated a significant proportion of its LLA effort to mapping and monitoring risks to the Key Biodiversity Area in its island territory (where the Key Biodiversity Area is an area of outstanding biodiversity, including endemic species, designated for protection by the Vanuatu national government and supported by the local people). George Koran describes how environmental champions in the network, including a significant cohort of women rangers, are trained to track environmental threats and engage with political leaders. When they identified a threat from foreign logging and mining companies to the montane forests in the biodiversity area, for example, they intervened rapidly to convince local chiefs to reject logging agreements that are against community interests.

Restoring degraded lands

Hand in hand with tackling the drivers of degradation, local adaptation leaders have initiated a vast number of ecosystem restoration initiatives. The call for stories for this report generated a full postbag describing initiatives to plant trees in rural, peri-urban, and urban areas. All the LLA champions involved described how they were motivated by the multidimensional benefits of ecosystem restoration. We heard especially about:

- **Agroecological and agroforestry methods.** These are favored for regenerating depleted soils, enhancing soil fertility, reducing chemical inputs, and consequently improving agricultural output and related incomes from increased productivity. Furthermore, the reduced need for artificial inputs is credited in some stories with reducing farmer debt. *The Organic Farmers of Kiambu County* in this chapter tells of how agroecological methods are being used in combination with value chain activities and improved marketing to strengthen the livelihoods of women farmers, as well as to reduce or eliminate personal debt. *The Story of the Inga Tree* in this chapter shows that agroecological and agroforestry methods can also be used to diversify the range of crops grown for both sale and farming families' use.
- **Reforestation or forest conservation in rural areas.** The stories of local adaptation leaders focus on the income-generating and nutritional benefits of tree planting as particular motivations: on non-timber forest products such as fruits, barks, leaves, and saps and their many uses for people's food, animal fodder, construction, and handicraft fibers and medicines. (See *The Biochar Producers of Chiang Mai* and *The Eco-Activists of Busia County* in Chapter 4.) However, disaster risk reduction – planting trees to stabilize soils and prevent landslides – is also a direct concern in many locations. (See *The Story of Mount Elgon's Community* in this chapter.)
- **Afforestation in urban and built environments.** This should be embraced for the multifunctional benefits trees can provide in cooling urban heat island environments and enhancing the quality of life as well as the function of afforested areas and green features such as urban parks to create sponginess (enhanced water filtration), which reduces flood risk. A recent report on green infrastructure in Africa documents how the afforestation of catchments in Freetown, Sierra Leone, and eThekwini, South Africa is significantly reducing flood risk, enhancing water quality, recreational qualities, and livability of those areas, via multistakeholder initiatives led by local governments and communities.[35]

Integrated water resources management

Water management for climate-resilient development ranges from major infrastructure including management of existing large dams and irrigation schemes to small, community rainwater harvesting structures and features. Stories of water initiatives received in response to the call for this report that were truly locally led were of the latter type. They focus on ecosystem-based ("green") approaches to water management that communities initiated with modest resources, or hybrid ("green-grey") approaches that utilize low-cost technology. These include the following:

- **Wetland protection.** We have heard from local adaptation leaders who recognize wetlands as particularly important public goods that are also at high risk of 'tragedy of the commons' – open access and overexploitation – unless local people organize to protect them and/or secure partnerships for law enforcement and negotiated use. *The Osukuru Women's Story* (Chapter 3) tells how members of this network in Uganda had historically grown food in the wetlands. Following persistent, damaging floods, they recognized that the wetlands are an important "sponge" for rainwater, helping to regulate water through drought and flood. Consequently, members have stopped farming there and are trying to convince others to do the same.
- **Sand rivers and sand dams.** Several stories described local communities' managing sand rivers in arid and semi-arid regions, as a way of adapting effectively to increased drought and erratic rainfall. We heard how in stretches of the Limpopo River basin in southern Africa, a locally led Mozambican and Zimbabwean initiative is accessing water from sand rivers as a low-cost, low-maintenance, and community-led approach to freshwater management. (See *Sand Rivers of the Limpopo* in this chapter.) A variation of using sand rivers as a natural ecosystem-based solution is to introduce a built element or "green-grey" infrastructure with a sand dam. Sand dam technology, which is widespread in Kenya, as well as present in southern Africa and in other arid contexts worldwide, traps a proportion of sand behind a built structure. The sand retains water even through the dry season, minimizing evaporation and making the water easily accessible to local people. They need only dig a hole in the sand and the water filters into it for extraction, or they may pipe water out.
- **Baskets of rainwater harvesting and water efficiency measures at farm level.** Local champions living in dry and increasingly drought-prone areas also emphasized that while indigenous, modern, or hybrid management techniques and technologies can be important, a multi-method approach is best. Naveen Partidar of the Aga Khan Rural Development Program notes that in India's arid lands, drip irrigation technology is beneficial, but not the complete answer. It is most successful for farmers if nested in a broader suite of water harvesting and conservation techniques – and budgets should be allocated across diverse activities accordingly. (See *The Drip Pool Irrigators of Gujarat* in this chapter.)
- **Restoring degraded coasts.** The negative effects of climate change are felt acutely on low-lying coasts. Communities are increasingly observing slow onset effects, such as mean sea level rise and changes in the abundance and composition of fish catches – the latter driven by overfishing and by the impacts of warming seas and less oxygenation in ocean waters on marine wildlife.[36] They are also observing the dramatic physical damages of coastal erosion, which are accelerated by weather and climate extremes, such as storm surges on the coast.

Aerial view of Vanga Bay, mangrove rehabilitation site, Kenya.

Healthy, intact coastal ecosystems can play an important part in reducing the disaster risks of such extremes: mangrove forests help diffuse wave energy, anchoring silt and stabilizing coastlines. Seagrass meadows are also nature's powerhouses, in providing habitats for diverse fauna.[37] Both mangroves and seagrass meadows have – until relatively recently – been overlooked for the immense carbon storage co-benefits they provide, for climate change mitigation.[38]

From a community perspective, and like other ecosystem-based adaptation measures discussed in this chapter, the protection and restoration of coastal ecosystems is of paramount concern because it yields multidimensional benefits for local people's well-being. These protected and restored ecosystems can demonstrably improve biodiversity, enhance local fisheries production, and protect coastal communities from sea level rise and storm events.[39]

In the call for stories, we heard especially about mangrove restoration for multidimensional resilience. The Mikoko Pamoja mangrove restoration initiative in coastal Kenya is now well-established and fully owned and driven by the local Gazi Bay residents. The impulse for its creation was the villagers' experience of increased coastal erosion – accelerated by climate change – and decreasing yields from fishing. Now, after 13 years of dedicated research and implementation, the mangrove restoration is firmly established to protect the coastline, providing hatchery habitats for fish and boosting livelihoods directly. It is also generating the sale of carbon credits to fund other community development needs. The model has proven sufficiently attractive that it is now being taken up by other communities along the Kenyan coast, such as by the Vanga Blue Forest Project.[40] Mikoko Pamoja has won international attention through awards such as the Equator Prize.[41] (See *The Mangrove Stewards of Gazi Bay* in this chapter.)

Implications and Recommendations

When it comes to understanding the intersections of ecosystem-based approaches and LLA, it is important to highlight key gaps in our understanding and conceptualization. The following questions need further dialogue and reciprocal learning among stakeholders, based on experience:

- Defining "locally led adaptation" as the "lowest appropriate level" of action is a complex question when it comes to ecosystem-based adaptation (LLA Principle 1). For example, integrated water management decisions – both strategic and operational – need to be taken at the catchment scale and with inter-jurisdictional cooperation, sometimes even with transboundary cooperation. Local leaders need to be involved in formal processes of information exchange, planning, and early warning systems with other local leaders and ecosystem-wide decision makers, to ensure that flows of water and other ecosystem services are managed at landscape as well as local scale.
- Long-term monitoring of ecological and social, as well as economic impacts of ecosystem-based LLA approaches, are missing for many (perhaps most) initiatives – although there is notably rich, long-term, and community-based evaluation and learning for the Inga Foundation and Gazi Bay initiatives described in this chapter. Documentation tends to be short-term, captured in the documents of funded projects, and focused on immediate livelihood and agriculture/forest productivity gains, or estimated reductions in disaster losses, from ecosystem-based interventions. These are vitally important elements to capture and reflect the livelihood and disaster risk reduction drivers or rationales for most projects. However, monitoring and evaluation (M&E) is scant when it comes to the knock-on hydrological and ecological impacts of such initiatives, including within broader ecosystem units such as watersheds or eco-regions. These knock-on effects are very often positive, but they may be inadvertently negative or maladaptive, which is why there is a greater role for local actors to work together to create joined-up monitoring across localities.
- At present, the M&E analysis of ecosystem-based approaches also tends to become stuck at the level of governments and technocrats, and not filtered back in reflexive learning loops to the community members themselves. However, some community-based and non-governmental organizations are working hard to counter this tendency. This is well illustrated by the stories in this chapter of the Organic Farmers, Drip Pool Irrigation, Inga Foundation and Gazi Bay.

Honduras family farm.

Mangrove Boardwalk office.

Despite these gaps in understanding and the need for greater learning, we can draw some important early conclusions about how local leaders and communities are achieving ecosystem-based adaptation and what they need to support their efforts.

As the stories of resilience show, the work of conserving and restoring ecosystems, including agroecological methods that restore soil health and fertility, delivers multidimensional benefits across rural, peri-urban, and urban communities. Communities value healthy ecosystems, including environmental features in cities, for many reasons, including their centrality to natural resource-based livelihoods. They also value them for disaster risk reduction purposes (such as reducing floods, erosion, and landslide risks, and providing cooling benefits during hot weather), for cultural-spiritual reasons (such as providing sacred places and providing natural products that are central to local cultural ceremonies) and for recreational and psychosocial benefits. Many of these are non-economic benefits.

A clear message is that the ecosystem of *actors* that exerts control and influence is as important as the biophysical ecosystem. This ecosystem of actors, which includes the institutional landscape, can present significant opportunities and risks for locally led adaptation.

At its best, local adaptation champions access resources from and create partnerships with supportive actors working at different scales, whose interests and incentives are well aligned with local communities' wishes for ecological restoration and sustainable livelihoods. This alignment is evident across many case studies:

- In rural Honduran communities, the reducing viability of slash-and-burn agricultural plots is driving farmers to more sustainable and resilient alternatives, which the Inga Foundation provides.
- In Kiambu County, Kenya, the county government incorporated the priorities of local organic farmers in the five-year agriculture strategy.
- In Gujarat, India, the Drip Pool Irrigation Program linked farmers with government programs for grant funding and concessional loans.

Mount Elgon National Park, Uganda.

- In Bududa District, Uganda, Irene Walimbwa joined forces with the UWA and district government to carve out a buffer area where community members could grow bamboo and other species while restoring tree cover.
- In Gazi Bay, Kenya, the community owns, takes care of the mangrove forests, and leads the overall initiative, but also works with national and international researchers and marketing partners to measure carbon, sell carbon credits and generate long-term revenues.

In all these cases, self-organizing by community members was critical, not just for pooling resources (such as savings and grant funds for local investment), but also for articulating shared needs and concerns regarding external partners. Self-organization varied from the establishment of formal institutions such as the FPCs in Gujarat or AW Bamboo Enterprises in Kenya, to the more informal coalition of local organizations in Kiambu County, Kenya.

At its worst, the interests of external actors are misaligned with the priorities of local communities and threaten to undermine adaptive capacity and resilience. Powerful commercial actors and interests, particularly in the extractive industries, may threaten community needs, and local people's established rights to resources. In this case, locally led adaptation goes far beyond empowering local actors with knowledge, skills, and access to technology and finance. In places such as Santo Island, Vanuatu, it is about environmental defense. This case study demonstrates how "climate risk" from the perspective of a commercial extractive entity, looking to expand and maintain its supply chains, looks very different from "climate risk" to the communities who are the customary guardians and users of natural resources. As the Vanuatu experience shows, education and skill-building of community members cannot focus purely on techniques for sustainable ecological management but must extend to knowledge of legal and policy processes. Alliances and networks are needed with fellow environmental champions outside the community – in their case, such as the Vanuatu Climate Action Network and broader networks in the Asia-Pacific – who can leverage research, communications, and policy engagement capacity to halt the environmentally damaging practices of external, including transnational, actors, and secure environmental protection for local needs.

CHAPTER 2

COMMUNITY PIONEERS TURN WASTE INTO WEALTH

HIGHLIGHTS

- Local adaptation leaders and community groups are recognizing how unmanaged solid waste, at increasing volumes, interacts with climate change to create deadly impacts on communities. It is worsening climate change-induced flooding, polluting scarce and precious sources of water, destroying soil quality, and contributing to further vector- and water-borne disease burdens.
- Stories tell of how community leaders are taking matters into their own hands to clean up solid waste and even start enterprises based on reuse, recycling, and upcycling. The need to establish worker health and safety, mobilize finance for all aspects of the business, and comply with regulations adds complexity to these efforts – but also rich grounds for reciprocal learning among city governments and local enterprises.
- Whether local enterprises collect waste at household level or municipal level, they are managing to create financially viable businesses by recycling and reconditioning waste into new commercial products – returning margins of well over 30% on recycling organic wastes into fertilizers and margins of 40%–50% on recycling plastic into durable fabric bags.

Devolving decision making

Addressing structural inequalities

Investing in local capacities

Collaborative action

IN THIS CHAPTER

Omer Jeanin Wendkaato Ilboudo.

THE STORY OF THE SONGTAABA ASSOCIATION

As narrated by Omer Jeanin Wendkaato Ilboudo, President, Songtaaba Association[42]

In Moore, the language of the Mossi of Burkina Faso, *song taaba* means "mutual aid". The **Songtaaba Association** in Ouagadougou, the capital city, is a local collective comprised mainly of women. Fed up with the fast-growing piles of garbage where they live, members of the association decided to take matters into their own hands. They started an initiative to reclaim garbage from the streets and convert it into sustainable products for local markets – and by so doing, create stable jobs for those most in need.[43]

The lack of waste management systems in the cities of Burkina Faso poses a serious problem, causing flooding, water stagnation, and waterborne diseases. Climate change, with more intense rainfall events and flooding risks, makes the situation worse.[44] The uncontrolled dumping of waste, especially plastic bags with a lifespan of 400-plus years, is causing a chain of environmental problems. This waste makes the soil impermeable, so run-off water cannot infiltrate the soil. As a result, crops run out of water and agricultural yields are compromised. Thousands of animals die after swallowing plastic bags, with considerable negative impacts on the economy. The decomposition of waste releases methane (a potent greenhouse gas), as well as toxic elements (such as heavy metals) that contaminate soil and groundwater.

Workers from the Songtaaba Association collective.

Collected waste.

When intense rainfall arrives, the plastic pollution clogs drains and further prevents the water from infiltrating the ground, making flooding worse.

With the demand for consumer goods rising in Burkina Faso, the per capita rate of waste production is also rising fast. At present, residents of Ouagadougou produce around a kilogram of waste per person per day.[45] The collection and disposal of household waste is becoming a constant preoccupation for municipal authorities. The sanitation, transfer, and disposal services involved in urban waste collection are inadequate. In 2020, the city of Ouagadougou, with a population of around three million, produced 680,000 tons of garbage. This is three times more than 20 years ago and around a third of this waste is plastic.

Despite current efforts, the municipality and private cleaning companies are only able to collect half of the waste produced in Ouagadougou. The large quantity of uncollected waste poses a danger to the environment and people, as piles of rubbish continue to invade the streets.

The collected garbage is not recycled in any significant way – it is simply moved to landfill sites. These landfills were once located outside city limits. Now the city has sprawled, and the landfills are on the city's outskirts – lying uncovered and without any protective measures. Against the backdrop of the country's economic crisis, the search is on for a cost-effective and efficient approach to waste management through recycling and disposal.

Songtaaba Association income-generation activities, selling goods they have produced.

> **The neighborhoods on the edges of Ouagadougou risk becoming nothing more than a vast garbage dump.**
>
> Omer Jeanin Wendkaato Ilboudo, President, Songtaaba Association

In this context, the Songtaaba Association devised the YOLEMDE method to reclaim useful materials from household waste streams, and then reuse and recycle them into useful and marketable products. The YOLEMDE method recycles organic waste into fertilizer and plastic waste into utilitarian objects. This addresses waste collection at the source – thereby reducing pollutants and waste that worsen flooding during heavy rain. It creates value for local workers in the circular economy.

> **YOLEMDE is helping to clean up the city, provide fertilizer for healthy farming, and make life happier for the population.**
>
> Omer Jeanin Wendkaato Ilboudo, President, Songtaaba Association

The association also has a social enterprise function. Some members come to the Songtaaba Association under duress and feeling rejected by society because of unwanted pregnancies, internal displacement, religious intolerance, or such desperate poverty that they have been driven to beg in the street. The Songtaaba Association provides a route out of poverty through gainful employment and psychosocial support to its members.

Social Enterprise Launches Ouagadougou into the Circular Economy

The YOLEMDE method relies on incentivizing householders to separate their waste into biological and non-biological waste streams. Then, members of the association convert the biological wastes into compost for urban gardening and agriculture, and they craft the plastics into practical products, such as laptop bags[46] and digital tablet covers.[47]

Since the launch of the project in 2022, the Songtaaba Association has developed ten products, utilizing more than 100 tons of waste, which it has converted into commercial sales (to July 2023). These activities have created ten new permanent jobs in waste management and organic fertilizer production, and more than 40 direct jobs in the manufacture of recycled plastic products.

Women's economic empowerment is a particular focus – and the economics are favorable. Producers can make a net income of 30% per ton from fertilizer sales (with the exact sales prices determined by the Burkina Faso National Soil Office product rating). Net income is 50% for recycled plastic products.

There are varying estimates of the composition of waste in the Ouagadougou area: perhaps based on which streams are measured (those that enter landfills formally, compared to estimates of all waste), as well as differences in the municipal boundaries or catchment used. According to one estimate, 22% of the waste produced by the city is food waste, 5% plastics, 6% paper, and 67% "other materials".[48] Another estimate put the city's waste volume at 922,000 tons per year – 2,500 tons of waste per day – of which plastic waste is 14%, or 356 tons per day.[49]

Economics of the Process

TABLE 2.1 Economics of converting 2 tons of organic waste into 30 bags of fertilizer (in West African Francs, XOF)

ACTIVITY	AMOUNT (XOF)
Purchase of organic waste from households at XOF 50/kg for organic waste, plus transport costs	125,000
Labor	50,000
Water and other raw material	5,00
Dolomite (calcium magnesium carbonate, a naturally occurring mineral compound added to improve the decomposition of waste)	10,000
BIO+ compost activator (added to accelerate the formation of organic waste)	20,000
Bags for packaging	10,000
Total cost to produce 30 bags of fertilizer	220,000
Sale of 30 bags (XOF 10,000 each)	300,000
Net profit per 2 tons of waste (XOF 2,667 per bag)	**80,000 (≈ US$ 134)**

Urban agriculture in Ouagadougu.

TABLE 2.2 Economics of converting 1 ton of plastic waste into 50 art bags (in West African Francs, XOF)

ACTIVITY	AMOUNT (XOF)
Purchase of plastic waste from households at XOF 125/kg and transport	125,000
Labor for processing and packaging	100,000
Further materials inputs (wire, etc.)	80,000
Total cost to produce 50 art bags	305,000
Sale of 50 bags (XOF 10,000/bag)	500,000
Net profit per ton of waste (XOF 4,500/bag)	**195,000 (≈ US$ 325)**

The enterprise finances ten direct and around 40 indirect jobs. Of the ten direct jobs created, each worker earns on average XOF 50,000 per month. Profits are ploughed back into the Songtaaba Association.

Outcomes of the Recycling Enterprise

The Songtaaba Association's current recycling throughput is ten tons of waste per month, with the goal of scaling up to 100 tons per month by late 2024. Their activities are monitored by the mayor of the district and his staff, together with Songtaaba's environmental monitoring staff. They share the following lessons and results so far:

- Waste generation is addressed at the source, where the waste is produced. Residents are trained through the organization of sanitation days, as well as online and radio campaigns. The involvement of local chiefdoms in promoting awareness and markets for products is helpful. Consequently, households are gaining an improved understanding of the importance of good waste management practices. They are motivated by the opportunity to earn an income by selling their waste, but also by the improvement they see around them when waste is removed and flood risks are reduced.

- Their clients – the farmers and gardeners who buy their fertilizer – express their satisfaction with using organic fertilizers for food production instead of chemical fertilizers. The sale and use of organic fertilizers is already showing "downstream" environmental benefits by displacing chemical fertilizer use. The Songtaaba Association has partnered with provincial agricultural and water authorities to trial organic fertilizer as a timesaving, efficient means of fertilizing fields and kitchen gardens. They have been experimenting with reducing the proportion of chemical fertilizers used, with the aim of phasing out chemical fertilizers completely in future years.

> **YOLEMDE reduces mineral (chemical) fertilizer use by 25% and considerably reduces environmental waste.**
>
> Omer Jeanin Wendkaato Ilboudo, President, Songtaaba Association

- The recycling of plastic is gaining local people's attention as a way of rescuing valuable materials from waste heaps. The Songtaaba Association believes that their locally led plastic recycling venture is slowly driving people's behaviors from a purely consumer economy towards a more sustainable economy.

The Songtaaba Association has further projects in development with the country's renewable energy and energy efficiency agency, the **Agence Nationale Des Energie Renouvelables et de l'Éfficacité Énergetique**, to establish a solar thermal pyrolysis unit to transform plastic waste, as well as waste oil, into household gas and fuel.

How Challenges Are Addressed

The principal challenges are the following:

- Considerable work is involved in sorting waste into appropriate, usable streams, due to the mixing of waste streams at source by households and businesses.
- There is a lack of capital equipment for converting waste materials into useful products, including the specialist equipment required for combining non-heavy metals and electrical waste into useful raw materials for manufacturing use.
- Worker training is required on diversified forms of recycling and reuse, such as with glass bottles and windows, to enable even more waste reclamation and further reduce landfill volumes.
- There is a lack of adequate physical space to organize plastic and organic materials recycling, and to conduct experiments on industrial waste and wastewater.

To face these challenges, the Songtaaba Association is working with the resources at hand – its existing workforce, equipment, product line, and abundant waste material – to provide proof of concept for its enterprise model. The association has already demonstrated convincingly the demand and financial viability for its products, and the environmental gains of removing solid waste from the urban environment and processing it into eco-friendly fertilizers and consumer goods. It is now seeking investors to grow the initiative.

THE BLACK SOLDIER FLY FARMERS OF KASESE

As narrated by Wambui Kuria and Rahmat Eyinfunjowo, Intellecap East Africa[50]

Augustine Babughirana founded Ugavoil in 2018 as a private agribusiness in Kasese district, Uganda, to "decouple economic activity from the consumption of finite resources". Ugavoil is committed to using byproducts as a raw material for other processes and products, to promote sustainability of livelihoods and the environment. The company farms black soldier flies to recycle organic waste into fertilizer and livestock feed, to reduce landfill waste and greenhouse gas emissions.

Native to many regions of Africa, the black soldier fly (*Hermetia illucens*) is a non-pest insect known for its remarkable waste-conversion abilities. With its voracious appetite for organic waste, rapid growth rate, and nutrient-rich larvae (maggots), this insect offers a multi-faceted solution to the twin challenge of biowaste management and climate change.

Ugavoil's CEO, Augustine Babughirana, at an exhibition showcasing black soldier fly livestock feed and fertilizer.

The flies lay eggs in decaying matter where the larvae, the true stars of the show, develop. As they feed, the larvae break down a wide range of organic materials, from food scraps to animal manure, agricultural residues, and even sewage sludge. These larvae convert the waste materials into two highly valuable resources for the agriculture sector: protein-rich larvae biomass and nutrient-rich natural fertilizer or "frass".

The nutrient-dense biomass can be harvested and used as livestock or fish feed, or can be converted into biofuels. The larvae themselves are a protein-rich food source for animals, offering a sustainable alternative to traditional livestock feed.

The second product, the nutrient-rich frass, can be used as a potent fertilizer, thereby replacing synthetic fertilizers that contribute to climate change through high energy consumption at manufacture, nitrogen oxide emissions during production and use, and soil health degradation and water pollution after use.[51]

Ugavoil sources its organic waste from markets and households in the county, as well as from an avocado processing factory. It collects 40 metric tons of waste (including plastic, paper, excavated soil, and textile and food waste) per day from the municipal authority. A quarter of this (ten tons) is organic waste that can be sorted to feed the black soldier flies. The municipal council sensitizes market vendors on waste management; interested farmers receive training on how to sort, process, and convert waste to agricultural products. The avocado processing factory provides four tons of avocado pulp waste every day.

Farmers interested in using the resulting agricultural products are also trained on how to use and apply the fertilizer and livestock feed for optimal yield.

TABLE 2.3 Economics of farming black soldier flies in Kasese, per 1 ton of waste (in Ugandan Shillings, UGX)

ACTIVITY	AMOUNT (UGX)
Cost of waste	0
Production costs (electricity, water and other materials) per kg of waste	350
Cost of production for 1 ton of waste, to produce 200 kg of larvae for feed (300 kg of fertilizer produced as a by-product)	70,000
Gross revenue from sale of larvae (200 kg sold at UGX 1000/kg)	200,000
Gross revenue from sale of fertilizer (300 kg sold at UGX 300/kg)	90,000
Tax on sale of larvae and fertilizer	87,000
Total revenue per ton of waste	290,000
Total costs per ton of waste	157,000
Net profit per ton of waste	**133,000 (≈ US$ 35)**

Ugavoil employees earn the equivalent of between US$ 100–250 per month, excluding welfare costs such as breakfast, lunch and statutory contributions. There are ten permanent and four temporary employees.

Nursery of neonatal larvae shortly after hatching.

Fresh black soldier fly larvae after harvesting.

While the impacts are not actively tracked, the business has shown many benefits:

- It has reduced emissions from the burning of market and household wastes.
- Incidences of floods and pollution of water bodies.
- It has reduced methane emissions from decomposing market and household wastes. The contribution of black soldier fly farming in reducing methane emissions is recognized globally.[52]
- It contributes to controlling vectors such as rats, mosquitoes, and flies that transmit diseases such as malaria, cholera, typhoid, and dysentery, and the adverse health impacts of strong odors.
- It creates jobs and has gender impacts by proactively targeting women for training and economic empowerment in the business. Ugavoil works mostly with women and sees black soldier fly production as an opportunity to empower women across the agricultural value chain, from waste management to larvae harvesting, processing, and distribution. They have a key partnership with the East African consultancy **Intellecap**, to further the women's economic empowerment potential of the business.[53]

How Challenges Are Addressed

The practitioners in Ugavoil have a range of experiences in trying to engage communities to embrace black soldier fly farming as a regenerative process to recycle waste and use its products:

- Farmers are initially cautious about using maggots as farm inputs, until they see demonstrated success. Such positive results are instrumental in engaging others.
- Farmers adopt and continue to use the products due to two key factors: better yield of crops and livestock, and lower production costs than traditional alternatives.

Nevertheless, at present, challenges of space and resources inhibit implementation and scaling up for farmers who are being trained to convert waste into commercial products. Black soldier fly farmers do not typically have access to the land and funds needed for waste processing. Enabling policies and financial support from governments and business incubators could be helpful in getting more of these initiatives off the ground.

THE WASTE ENTREPRENEURS OF LILONGWE

The lack of waste management services, and the subsequent flooding this causes, is a key contributor to the climate vulnerability of informal settlements – including in Lilongwe, the capital of Malawi, where some 76% of the population live in informal settlements.[54]

The Centre for Community Organization and Development (CCODE), a Malawian non-governmental organization working in the informal settlements of Lilongwe, started a circular economy experiment to clean up and reuse waste in 2010. At that time, hardly any slum residents could access waste collection services. The dedicated efforts of the community residents to collect data about climate change impacts and climate-resilient development needs were documented in the Global Center on Adaptation's *2022 Stories of Resilience*.[55]

Residents had to either rely on informal, private waste collectors or manage the waste themselves. Private collectors are expensive, so most households took the latter option and dumped their waste in the open. Every common bare piece of land in the informal settlement – along the riverbank, the drains on the roadsides, even the graveyards – has been turned into illegal waste dumping sites. This was already a public health hazard. The waste was a direct source of pathogens for anyone who came in contact with it, and it was also seeping pollutants into the groundwater, the community's main source of freshwater.

Climate change has made the problem worse. The city receives heavier rainfall than previously, but the drainage system is blocked where riverbanks have become dumping sites. The informal settlements were already in a floodplain area and disaster-prone. Now, with every heavy rainfall, solid waste and water back up and spill over the drainage channels – flooding the informal settlements extensively with dirty water and exposing residents to further hazards.

As a solution to the solid waste challenge, CCODE decided to pilot waste management systems in the informal settlements Mtandire and Area 25. The idea was to enable and incentivize communities to monetize waste streams and derive secure income from selling the waste for reuse and recycling and convert it into commercial products.

CCODE Malawi members meeting.

... (continued)

THE WASTE ENTREPRENEURS OF LILONGWE ... *(continued)*

CCODE took responsibility for mobilizing community members. They formed two community waste entrepreneur groups: one to sort and collect non-biodegradable materials such as plastics and metal scraps, and the other to sort and collect organic waste for making compost.

For partners who could provide a supportive legal and policy environment, technical support, and a market for recycled materials, they allied with:

- The Lilongwe City Council, to review and revise the laws to permit communities to become involved in waste management, because in 2010, this was not yet legally permitted.
- The Lilongwe University of Agriculture and Natural Resources (LUANAR), to help with training community members in the safe handling of waste streams and to quality-assure management procedures.
- A private sector firm, Four Seasons Ltd, to receive the raw material from community suppliers, process it, and market or sell the resulting product as a commercial venture.
- The United Nations Development Program (UNDP) for financial support.

The partnership got off to a good start: the Lilongwe City Council changed local by-laws to allow small businesses to get involved in waste management. CCODE created incentives for households to use the new services by offering to pay if households sorted their waste into organic and non-organic streams for collection. This contrasted with the previous private services model, whereby households had to pay to have their waste removed.

The initiative created employment in the communities. Initially, the project managed to identify 34 community waste entrepreneurs who were trained in effective waste management. Over the years, a total of 217 community waste entrepreneurs (44 men and 173 women) have been employed and are involved in the various value chains. The training equipped workers with skills in integrated waste management. Although the initiative has now finished as a project of UNDP, it has been credited for various achievements:

- The project improved solid waste management in the targeted informal settlements through community awareness campaigns – this required considerable time and effort on the part of civil society to achieve. Zilire Luka, CCODE's Director, credits Malawi's "vibrant civic space focused on climate change adaptation and mitigation" and the united voice of civil society organizations on waste management with shifting public opinions and practices.
- The project also set up community-based enterprises that continue to collect household and public waste for composting and the reuse of non-biodegradable waste.

"It was hard to engage and mobilize other women around waste management. The household role as a woman and mother, and the perception, attitude, and practice of the community regarding waste management was an obstacle. However, a decade down the line, the waste management business is a source of employment for more than 217 women and youth from informal settlements. This is empowering and has another chain of positive impacts by building women's financial independence and strengthening their capacity to contribute to their families, communities, and the environment," says Norah Baziwelo, a community organizer with CCODE.

... (continued)

THE WASTE ENTREPRENEURS OF LILONGWE ... *(continued)*

Several lessons arise from the experience:

- The public-private partnership (PPP) is an essential part of the concept; however, partners worked in isolation at times, lacking coordination for the smooth functioning of the project. This created delays in the procurement of equipment and the delivery of project activities, and underspending on budgets. CCODE concluded that partnerships of this type require an adequately resourced coordination unit, particularly when they involve different types of public, private, and community organizations.
- The lack of access to land for the waste entrepreneurs also hampered project progress. Currently, every piece of land in informal settlements is owned by an individual or a family. Therefore, chiefs or the Lilongwe City Council do not have land for allocation to the waste entrepreneurs. The lack of land led to delays in actual work as the support institutions had to buy land not included in the project budget. The delay led to the demotivation of some waste entrepreneurs. It is necessary to budget adequate time and money for land acquisition and related compliance.
- Until now, Malawi's local governments have been very constrained by their lack of funding for adaptation action. Malawi started implementing decentralization reforms in 1998. The transfer of authority is still incomplete today. Local governments have been given some increased decision-making and administrative powers but do not have sufficient budget to support community-led adaptation initiatives. How can the fiscal space for local government be increased? More generous allocations of central or regional funds to local government, and increases in revenue-raising capacities at the local level (fiscal decentralization) might strengthen locally led adaptation action.

Beyond this, CCODE's experience stresses the need for local political support to supply the enabling environment for effective adaptation action. They needed regulatory reform – a change in local by-laws – to enable their activities. Allyship with authoritative external actors can be important. In this case, UNDP provided not only finance but also moral support, and legitimized and strengthened requests from the community entrepreneurs for changes in local by-laws. "If UNDP had not been there, it would not have been easy to change the by-laws," says Zilire.

Finally, the Malawi experience shows that relying on only one private sector partner to buy and process waste from communities encourages a monopoly-type situation. A case can be made for a more open and competitive commercial procurement model, to drive higher performance.

SALUBATA RECYCLES PLASTIC WASTE INTO SHOES

Salubata, a company founded in Nigeria, seeks to meet people's practical needs for footwear and create a desirable fashion brand by recycling plastic waste into shoes. After a phase of researching manufacturing techniques, Salubata's founders discovered the durability of recycled plastic in shoes and decided to create a partnership model with local communities to sustain material flows for their manufacturing plant: "The fashion industry is one of the largest contributors to pollution and waste, with shoes being a significant part of the problem."[56]

Salubata engages with local communities in Nigeria to source plastic waste and to produce recycled plastic shoes: "We prioritize community engagement and participation by seeking feedback, conducting workshops, and co-creating solutions with local stakeholders. This ensures that our products and initiatives align with the specific needs, values, and cultural contexts of the communities we serve," says co-founder Yewande Adebowale.[57] The company's operations are also intended to create local economic empowerment and to raise local awareness of environmentally sustainable practices.

The shoes are created as modular: each base pair has a durable sole and fabric upper, all made from recycled materials. Unusually, the fabric upper can be zipped on or off the sole. To change the look or refresh the shoe, users can simply purchase a new upper and zip it into place.

So far, Salubata has processed a million tons of plastic waste. The company works with around 50 waste collectors, including a group of women who sweep roads and collect empty plastic bottles to sell to Salubata's recycling partners on a per-kilogram basis.[58] Salubata's founders won a cash award from the Global Center on Adaptation, together with the African Development Bank and Climate Investment Funds, as part of the Africa Youth Adaptation Challenge to invest in the manufacturing and upscaling process.

Modular shoes made from recycled plastic fibres sourced from Nigerian cities by Salubata.

KEY TAKEAWAYS

Solid Waste: An Adaptation Issue and a Local Governance Issue

The stories of "waste to wealth" in this publication tell a larger story that is unfolding around the world, especially in burgeoning informal settlements. Worldwide, the generation of solid waste is growing at twice the rate of population growth.[59] Around one-third of that solid waste is improperly treated or not treated at all – it is simply dumped.[60] The direct risks to people's physical health, psychosocial well-being, and broader environmental health are obvious.

What emerges from these stories of resilience is the degree to which solid waste management has also become a climate change issue. Local communities have quickly identified the role of unmanaged solid waste in making climate hazards far more dangerous to people.

Garbage prevents drains and ditches from functioning adequately, at the same time as climate change is causing rainfall to become more intense in many places. Fast-flowing flood water can be a direct threat to human life and property. It may also cause indirect harm, by spreading pathogens and waterborne diseases, and creating more environments for the proliferation of mosquitoes and other disease vectors.

Maxensia Nakibuuka, of the Kampala-based **LUCOHECO**, first identified the intersections between climate hazards and solid waste from her perspective as a community health worker: "The undrained channels with tips of garbage due to poor garbage disposal flood the residents' households and destroy their properties. Yet, they have limited capacity to immediately replace [those assets] especially the long-term assets, in addition to the loss of lives especially those of helpless children. Relatedly, some of the flood waters have human wastes from latrines and toilets of those who reside near the drainage channels." (See *The Women of Kampala's Slums* in Chapter 3.)

The relationship between effective solid waste management and reducing climate risk is therefore quite clear. What is less tangible but also important is the link between solid waste and climate change mitigation. The decay of the organic portion of solid waste is estimated to contribute 5% of global greenhouse gas emissions every year.[61] Therefore, the more that communities can do to divert organic wastes from landfills and use them to regenerate land and soils, the more effective they are in contributing to a safer climate.

As well as being a quality-of-life issue that is close to home for most people, solid waste management tends to be governed by local authorities.[62] The levers of change for communities to improve solid waste management tend to be local.

Malawi women participating in waste clearance.

Municipal and district governments often create by-laws for waste management, including who manages it, and where it is handled or disposed of. Local authorities are often supposed to enforce laws to prevent inappropriate waste dumping (although they often lack the resources for such law enforcement). They also have the power to authorize local actors to implement solutions.

As discussed in the stories above, municipal governments may issue permits to cooperatives and social enterprises to take on new waste management roles. They may be in charge of health and safety regulation of waste-based enterprises. Local governments may be able to provide resources in the form of information and finance to support safe, healthy workplaces, and to galvanize public support for responsible waste management.

Creating Decent Jobs in the Waste Sector

Local adaptation champions are not just removing solid waste from the environment. They are also generating new jobs and improving the quality of existing jobs in the waste management sector. Often waste workers face prejudice and discrimination, despite their provision of lifeline services to urban communities.

Adaptation leaders are organizing workers for decent working conditions including decent pay, and recognition and respect for what they do. When the quality and security of waste management jobs are strengthened, then local waste management enterprises, systems, and processes can enhance the social, economic, and environmental dimensions of climate-resilient development holistically.

Eva Mokeona, Director of the **African Reclaimers Organization**, has remarked: "Waste reclaimers have always been looked down upon and were never given proper recognition, legality and respect by citizens."[63] The group has been responsible for major clean-ups of solid waste in the streets and waterways of Johannesburg, South Africa for two reasons: "First, to clean up the city and environment; and second, to legitimize our existence to city dwellers," she said.[64]

Waste management workers in Colombia have faced similar prejudices and a lack of legal status. During the Covid-19 pandemic, many local groups self-organized under a national umbrella group, the National Association of Waste-Pickers, to call for legal status as essential workers. This was achieved via a national decree in 2020, and the national government set up further safety protocols for workers to follow. "The recognition as public service providers and formal remuneration bolstered the financial resilience and stability of waste-pickers' livelihoods," according to Federico Parra, one of the waste pickers' leaders.[65]

Where possible, local leaders are trying to formalize the work – particularly to ensure greater worker safety and prevent or minimize exposure to sharp, heavy, or chemically hazardous substances.[66]

The stories of the empowering role of economic cooperatives underscore similar findings in the *2022 Stories of Resilience* by the Global Center on Adaptation. The role of solidarity movements in supporting cooperative economic activity and merging it with political advocacy for local people's rights is explored further in **Chapter 7**.

Catalyzing a More Circular Economy

The idea of the "circular economy" is now a well-developed concept. At its fullest, it involves designing products from the outset so that they can be reused, repurposed, or recycled once their initial use has expired. It is about keeping materials in high-value forms and adopting a lifecycle approach.[67] As an illustration of this principle, many countries have legislation that requires the manufacturers of certain electrical goods, batteries, and other products to take back the goods for dismantling, recycling of parts, and safe disposal, once consumers have finished using them.[68]

It is important to point out that following this principle is not the whole solution. Waste needs to be reduced as well; sometimes this calls for government regulation, such as restrictions on plastic packaging and bags.

The local adaptation leaders who wrote to us are principally involved, at community level, in reusing and recycling the waste materials around them with minimal capital requirements. They are all motivated by removing harmful waste from urban environments as quickly, efficiently, and safely as possible, as well as using low-cost methods to generate value addition. These homegrown initiatives are broadly characterized by:

- Separating waste into organic and non-organic streams.
- Converting organic waste into rich, productive inputs to agriculture, including fertilizer, to support regenerative agricultural systems.
- Capturing non-organic materials such as plastic and metal for reuse, recycling, and upcycling into commercial products, as well as minimizing the residual waste stream going to landfills.

Organic Waste too Good to Squander

Some collection and recycling initiatives for organic waste, which began as small local pilots have now grown to a significant scale. In Nairobi, Kenya, Sanergy installs toilets throughout the city's informal settlements, collects the waste in sealed and hygienic containers, and transports them to a central facility for treatment and the production of fertilizers. Sensors are used to track how full units are and when they need collection – linked to mobile phone apps, and this has helped to professionalize and increase the efficiency of the local network.[69]

In different parts of Africa, insects are being used to revolutionize the conversion of organic waste into commercial products The potential of black soldier fly farming is clearly shown in *The Black Soldier Fly Farmers of Kasese* in this chapter, and its experience is increasingly being replicated across the continent.

In Mukuru, the largest informal settlement in Nairobi, solid waste management is a foremost community priority, because waste blocks drainage channels and increases flood risk. The urgent need to manage this waste, and the consequent flooding and water pollution, was highlighted in a People's Plan produced by the residents of Mukuru. With support from the Global Center on Adaptation, African Development Bank and **DanChurchAid**, black soldier fly farming units are now being installed in the community. It is a double adaptation win: not only does the project remove waste from the environment and reduce flood risk, but it also produces fodder. Recent droughts have created a shortage of fodder in Kenya, so using the larvae to produce much-needed animal feed is extremely welcome.[70]

The black soldier fly pioneers at Ugavoil and their partners Intellecap in Uganda put forward a range of complementary proposals for consolidating progress and scaling up black soldier fly systems. These would involve governments, businesses, NGOs, researchers, farmers, and consumers working together to:

- Disseminate credible information on the results of existing efforts.
- Support research and training centers for waste-to-agriculture entrepreneurs and research and development more generally.
- Create tax holidays or tax breaks for enterprises in the waste-to-agriculture sector and investment in waste-to-agriculture infrastructure to encourage adoption.
- Formulate and endorse public policies and regulatory frameworks that incentivize and support sustainable agriculture and waste reduction.[71]

Organic fertilizer produced by the Songtaaba Association.

Marketing recycled products in Ougadougou.

Production with recycled fibres.

Refashioning Plastics and Metals

The reclamation of plastics and non-heavy metals from the waste stream also starts with the public education process, collection, separation, and sorting of wastes. Waste reclamation requires considerable work to secure legal and regulatory permissions, train workers in safety protocols, and educate and incentivize households and businesses on waste sorting and handling.

The value chains for the use of reclaimed and recycled plastics and metals vary from place to place, depending on the market potential for different products, as well as local actors' access to technology and finance for manufacturing.

At one end of the spectrum are locally led industries that employ production and marketing processes to turn plastic waste into elegant but simple consumer goods without the need for complex technology or significant investments in manufacturing plants. These include, for instance, the **Street Waste Company** in Lagos, Nigeria, which is making household objects such as containers and vases by repurposing plastic bottles.

At the other end of the spectrum, higher-value products such as shoes, with more complex manufacturing processes, are being made from reclaimed waste. These involve the employment of a larger pool of workers to sort and process waste streams into different non-organic material types – and hence, engagement with multiple communities. They rely on good relations between manufacturers and source communities from which workers are employed. The greater degree of technology and investment in manufacturing plants implies a larger scale of operation and heavier financing demands. This is the case for Salubata, the private company in Nigeria, which makes shoes from recycled plastic. (See *Salubata Recycles Plastic Waste Into Shoes* in this chapter.)

Health and Safety, Regulatory Compliance, and Finance: Intertwined Challenges for Local Start-ups

Although the stories submitted for this study identified solid waste management as a dominant theme of locally led adaptation, they also highlighted how complex it is to address this issue. Motivated as local champions may be, the solutions have health and safety and legal regulatory requirements that shape decision making and action. Meeting these requirements calls for money, training, and effort.

- **Health and safety.** Reclaiming, reusing, and recycling waste into worthwhile and usable goods bears health and safety risks. These risks must be minimized to protect people. Risks reflect the nature of the environmental hazards to which people might be exposed, the availability of risk mitigation measures, and the cost and practicality of those measures. In *The Women of Kampala's Slums* (Chapter 3), Maxensia describes how she brought together a group of youth volunteers to remove plastic bottles from community waterways that were blocking drains and exacerbating flooding. Depending on the circumstances, removing plastic bottles could carry a minimal risk of injury or disease, and health risks could be mitigated by wearing protective gloves. As such, this is relatively easy to organize and carry out.

  In the case of CCODE's work in Malawi, environmental hazards are involved that carry a higher risk of injury and disease for workers, such as collecting household and livestock organic wastes, as well as non-organic wastes that could have sharp parts, including metals and plastics. In such cases, workers may need more intensive training and higher-grade protective equipment for waste handling to prevent becoming infected with disease or injury, as well as to sort and make the materials usable for the next stages of processing. As Zilire Luka described, experts at a local university were engaged to give technical guidance and training to build capacity and protect the workforce.
- **Legal and regulatory requirements.** Partly because of the health risks concerned, there is typically some degree of regulation on the handling of solid waste. In Malawi, when CCODE first proposed to process waste into resaleable products, the city council undertook to review and revise by-laws to permit communities to become involved in waste management. Local authorities can have a "kingmaker" role in evaluating the merits of integrated solid waste management schemes and allowing relevant actors to become safely and responsibly involved.
- **Financial viability.** The local innovations described by adaptation champions range widely in scope, as do the financing requirements. Finance needs are not limited to start-up capital for equipment – it is also needed for public education in waste sourcing and reclamation, as well as for marketing and consumer engagement for commercial sales. The CCODE story from Malawi tells how a private company took on the mandate for commercial marketing of compost produced by community actors.

Celebrating new compost site at Mtandire.

Implications and Recommendations

The stories highlight some important roles for different stakeholder groups in addressing the solid waste scourge in cities, as an adaptation measure, and advancing circular economy projects as a source of economic, social, and environmental sustainability:

- **Local authorities have a significant role to play** in legal and regulatory permitting for solid waste management, and also in public education to support behavior changes (such as education on sorting and recycling wastes). In reality, local government tends to be vastly under-resourced in its staff numbers to play this role. Its staff may also require training in the technical aspects of waste management and regulation of related industries. Where value chain partners for waste recovery and reuse are lacking, and solid waste remains inappropriately dumped in settlements, public authorities should prioritize efforts to remove the waste and dispose of it correctly.
- **Grants to enhance local authorities' capabilities will often be needed:** Such grant funding normally flows from the central government (even if the source of funds is international). Fiscal decentralization is also an option and is being actively pursued in some countries, which means giving extra powers for taxation, such as waste levies, to local governments. However, this may yield poor revenues in low-income and informal contexts and/or areas of high demographic flux, where the effective tax base is very low.
- **National and international public funders and philanthropies also have a vital role in providing grants for feasibility studies and pilot projects** to establish proof of concept for viable waste reclamation, reuse, repurposing, recycling, and broader circular economy efforts. These actors, together with development banks, also have a role in supplying concessional loans for the purchase of manufacturing plants and access to new technologies, which can enable locally led initiatives to diversify and/or scale up. Such financing may go directly to social enterprises, non-governmental organizations, and public-private partnerships.

Engagement of Mtandire waste entrepreneurs.

- **Local waste-reclamation organizations could pool business efforts** to achieve local objectives in adaptation and livelihood enhancement but at scale and with greater efficiency. While groups such as the Songtaaba Association are undertaking important efforts of a modest scale, there is potential for multiple organizations of a similar type to collaborate. Umbrella organizations may be better placed to attract public and private investment for processing and manufacturing, including from international sources.
- **There is great potential for more peer-to-peer learning among waste sector organizations on the risks and strategic opportunities for managing and reusing solid waste**, as a climate change adaptation approach and a greater contribution to sustainable, climate-resilient development. Although every solution must be locally tailored and respond to local realities and legal-regulatory contexts, each waste-sector adaptation story also has lessons with broader relevance. Practitioners would have much to gain from sharing experience directly with others. Umbrella organizations and solidarity initiatives – as suggested by Omer of the Songtaaba Association – would have a valuable role as crucibles of learning, as well as offering a practical way to raise profile and source funding for conglomerations of local groups.

CHAPTER 3

WOMEN LEADING LOCAL ADAPTATION

HIGHLIGHTS

- Women organizing together for LLA are a powerful force. They are organizing to make local systems – such as food systems – more resilient to climate change. Gender inequality makes them more vulnerable to climate change impacts and inequality harms them in the aftermath of climate-related disasters. Because of discrimination, women and girls also suffer cascading impacts, such as increased gender-based violence and forced early marriages, following from the effects of climate change. Women's groups are addressing this complex set of issues holistically.
- Women often face resistance to their collective adaptation initiatives, in their households and communities. However, they are "proving by doing". By rising as local adaptation leaders, they are empowering themselves, raising their status in society, and demonstrating that their adaptation actions can improve entire communities' well-being.
- Governments and funders should support women-led local adaptation initiatives that both reduce climate-related risks and address discriminatory social norms and structures that undermine their well-being before, during, and after climate-related disasters and slow-onset impacts.

Devolving decision making

Addressing structural inequalities

Patient, predictable, accessible funding

Investing in local capacities

Building understanding

Flexible programming and learning

Collaborative action

IN THIS CHAPTER

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Constance Okollet in the network's organic garden.

> **Some local beliefs directly undermine women's human rights. Domestic violence is normalized in the chilling idea that 'if your husband doesn't beat you, he doesn't love you'.**
>
> Constance Okollet,
> Osukuru Women's Network

THE OSUKURU WOMEN'S STORY

As narrated by Constance Okollet, Co-founder, Osukuru United Women's Network, with Leon Franz[72]

When Osukuru, a town in eastern Uganda, suffered devastating floods in 2007, Constance Okollet was quick to make the connection with climate change.

As a health worker, she visited families from home to home. Constance saw how the floods triggered food and income insecurity for local people. She recognized this as part of a pattern of increasing climate risks, which the community had to confront.

Most families in Osukuru earn income from selling the surplus produce they grow. However, droughts and floods are becoming more frequent and intense, threatening this means of livelihood.

People's responses to climate shocks have distinct gender dimensions. After floods wash out the fields and destroy crops, as in 2007, men tend to leave the community to seek jobs in the cities. They leave their families behind and sometimes never return, exposing the women and children to further financial hardship and insecurity.

Meanwhile, climate-related disasters catalyze discriminatory practices. Income insecurity leads to early child marriage, and girls dropping out of school. Girls also walk long distances to fetch water and firewood. In this vulnerable context, they are often forced to engage in transactional sex work.

Gender-based violence is a stain on people's lives: Osukuru is located in Tororo District, a trading center in East Africa. The town has a strong sex trade that is associated with HIV/AIDS and many other sexually transmitted diseases. Without secure opportunities for income, many women and girls are forced to turn to the sex trade and are subject to violence and illness.

Constance banded together with 12 other health workers to tackle these compounding problems. Together, they formed the **Osukuru United Women's Network** (OWN).

Members of the Osukuru United Women's Network.

Uganda Women's Network Grows Community Resilience

OWN started a package of activities to empower women economically, socially, and psychologically, and to mitigate flood and drought risks. It initiated savings and loan associations, and supported women to develop productive, climate-resilient kitchen gardens. From small beginnings, OWN has grown to become a force of more than 2,000 women helping each other.

It all started, Constance says, when her observations about the changing climate were validated at an Oxfam meeting. That's where she heard about climate change trends and impacts in Uganda, and how effective it is to plant appropriate tree species and crops to help people adapt. She and her 12 health worker friends, each from a different village, fanned out to organize women in their respective villages, starting savings and seed-fund activities to increase each woman's self-sufficiency. The key was mindset change: encouraging village women to increase their confidence in autonomous livelihood activities.

> **As a community that largely depends on farming, the drastic changes in seasons affected them all. However, at home, the challenges were also similar. Most of [the women] had no income. They depended on their husbands for provision. … They decided to come up with the idea of forming savings groups which they could get the women in the different communities to be a part of. On top of that, they started inviting different experts to teach them about improving their livelihoods. Each woman was tasked to do something for herself and her family. Each household … to have a kitchen garden so they could have vegetables to prepare meals for their families. Each of the women was tasked to be accountable to another. That is how they were able to lobby the government to give them seedlings for food. They also started to trade in small businesses.**
>
> Sandra Coote, African Centre for Trade and Development (ACTADE), an affiliate of OWN[73]

A meeting of the Osukuru United Women's Network.

The saving associations and kitchen gardens have enabled women to leave behind dangerous sex work for safer occupations. The initiatives have helped women access funds and generate income for daily priorities, such as their children's school fees.

> **Savings can take away some of the problems because we tell our women members: Why don't we save and stop selling ourselves to the cheap men and the STDs [sexually transmitted diseases]? Most are victims of HIV/AIDS. So, we change them from sex work to businesses, to educate their children, to help their parents. People will tell you the reason they want to join sex work is to take their child to school. When you talk about the kitchen garden, you will have food year in and year out, you will have cassava and potatoes, and the kitchen garden doesn't need a lot of water. You take the water remaining from washing plates and you pour it on there and it gains the health, the food. So, you find a lot of activities came out of the floods and the harsh weather, and the drought and disasters that destroy.**
>
> Constance Okollet, Founder, Osukuru United Women's Network

Activities by OWN include:

- **Farming, processing, and selling climate-resilient produce suited to the local area.** Members produce diverse foodstuffs – from tomatoes to fish – both to eat at home and to sell. Cassava, the area's staple crop that is also a well-known climate-resistant crop, is cultivated collectively by members to bolster their food security and income. Processing is also involved, such as making cassava flour.
- **Tree regulation and cultivation to ensure greater tree cover.** Members cultivate tree seedlings and sell them for profit. Tree stewardship is also a community focus – if someone cuts a tree down, the local by-laws now require them to replant at least five more trees.
- **Reuse and recycling of organic matter.** Instead of following the convention of cutting bush grass to thatch their roofs, members now collect rice husk that would otherwise be discarded. They repurpose the husk into roof thatch – promoting the ethos of "reduce, reuse, recycle".

- **Wetland conservation.** Members had historically grown food in the local wetlands and drained the water off into ditches. However, members now recognize that the wetlands are an important "sponge". The wetlands help regulate water flows in times of floods and droughts, making them a vital natural asset in a changing climate. Members have stopped draining the wetlands for agriculture and they discourage others from doing this. They are working to provide local communities with alternative sources of income and alternative farming locations, to conserve the wetlands.

In the beginning, most men in the community were highly resistant to OWN. Some even forbade their wives to participate. But the women persisted, and over time, men became actively supportive.[74] The key, says Constance, was the women's economic empowerment: this has reduced stress in households, reduced friction and domestic violence: "When a woman has some money in her pocket, she will not wait for her husband's support. The husband also fears to beat their wife because she has a choice," Constance explains.[75]

The movement went from strength to strength. Now at more than 2,000 members, OWN has more than 40 sub-groups that work and organize independently. They focus mainly on spreading climate change knowledge and adaptation techniques through women's group meetings, and they still provide savings and loan functions. They have made it obligatory for every member to plant at least half an acre of cassava, as well as to maintain a kitchen garden. In this way, they have increased food and income security substantially in their communities.

Outreach initiatives by the members have gone a long way: the 13 founders approached local government departments, agricultural extension agencies, and non-governmental organizations to seek training, capacity building, and material inputs for climate-smart agriculture and climate-resilient value chains. In response, government departments at district, county, and national levels have provided training, as well as quick-maturing maize varieties that can withstand uncertain weather and climate conditions. Most recently, OWN managed to acquire funding from the local agricultural office to build a cassava processing plant.

How Challenges Are Addressed

OWN generates solutions, as well as facilitates and manages adaptation initiatives over the long term, without being dependent on project-based financier funding. With relatively few financier-funded projects, members still manage to develop and sustain solutions on their own. That said, it is difficult to grow the organization to the next level due to the lack of funding. Building long-lasting solutions often requires capital, which is difficult for OWN to acquire.

A case in point is the cassava processing factory: OWN raised money for the factory, contributing around one-fifth of the costs from its members, while the government's agricultural development fund paid the rest. However, the local administration, which built the plant and put the machinery in place, failed to connect the factory to the power grid, pleading a lack of funds despite their initial promises. Therefore, the factory is in place with all the necessary machinery, but it is not functional due to the missing power. This has been the case for over a year now. It remains one of the women's greatest challenges. Although technically the issue is straightforward to fix, the lack of funding and capital hinders progress.

OWN has now partnered with **Engineers Without Borders** to develop a design for an energy supply that relies on solar and biogas, which can be produced out of the waste of cassava processing. Still, the upfront costs are too high for OWN to progress this themselves, while financiers are difficult to attract.

A Ugandan farmer.

> **For grassroots organizations such as OWN it is extremely difficult, if not impossible, to find, attract, apply to, and convince traditional financier agencies and institutions, even if they have solutions in mind that will work very well. This is something we have seen repeatedly and it remains a big problem. They do not speak the same language (sometimes literally and almost always figuratively), nor do they have the technical/digital means to even get in touch. And keep in mind: the network is already quite progressive with an extensive network and reaches a comparatively large audience with Constance as their head. So really, LLA Principle 3!**
>
> Leon Franz, Osukuru United Women's Network

Challenges also include widening the leadership of the organization: there is, and always has been, the need to strengthen the necessary capacities in the community. Much responsibility rests on Constance's shoulders as the face and voice of the organization. The structure and future success of the organization could eventually be threatened when she is ready to retire. Moreover, many young people, especially educated ones, leave the sub-county to search for better jobs in urban centers. Exploring new forms of income-generating activities is a key strategy to retain more human capital within OWN, which simultaneously helps to establish OWN's future leadership.

THE WOMEN OF KAMPALA'S SLUMS

As narrated by Maxensia Nakibuuka Takirambule, Founder and Executive Director, Lungujja Community Health Caring Organization (LUCOHECO)[76]

Maxensia Nakibuuka Takirambule and her friends in Kampala, Uganda founded the **Lungujja Community Health Caring Organization** (LUCOHECO) in 2005 to "pay back" the community for the lifesaving support Maxensia received when she fell ill with HIV/AIDS. Patients with HIV/AIDS often face social stigma, but older women in the community offered Maxensia healthcare, moral support, and hope. She wanted to give back to others.

After nursing, and then losing, her husband and brothers to HIV/AIDS, Maxensia recovered from this personal tragedy to run in local elections and become a city councilor. Shortly after, she and her friends founded LUCOHECO.

At first, LUCOHECO was created as a community-based health and development organization in the Rubaga Division of Kampala, where 78% of residents live in slums. It aimed to offer practical healthcare support and economic empowerment to those most vulnerable and in need. As time passed, it became evident to the leaders that climate change was amplifying harm to community members. Urban flooding caused by intense rainfall and poor urban environmental management, wetland degradation, together with intense heat, were particularly to blame. It was only when LUCOHECO members visited residents for home-based care and community risk mapping to assess their needs, that the problem of urban waste contributing to urban flooding came to the fore.

LUCOHECO recognized that the rains were becoming heavier and more frequent as a result of climate change. Drainage channels and spring wells were blocked with plastic waste and were overflowing. Polythene bags, tossed idly into the streets, were the worst offenders. Heat waves were also taking a heavy toll on residents' productivity and well-being.

Maxensia Nakibuuka Takirambule

> **Most of the slums are in the wetlands, which have turned into residential areas, because they are cheaply acquired by the vulnerable communities and also because the government cannot provide low cost housing to these people.**
>
> Maxensia Nakibuuka Takirambule, LUCOHECO

A LUCOHECO meeting.

Cascading impacts in communities included increased incidence of mental disorders (such as anxiety and depression), worsening physical health and nutrition status for those living with chronic diseases, use of unsafe water sources, as well as greater prevalence of heat-induced illness and infectious diseases. Based on these observations and community concerns, LUCOHECO members were determined to become active in climate change adaptation.

> **In the urban centers where we work, climate change has worsened women's time poverty, reducing the time that women and girls could use to learn, work, and earn. This has led to increased gender-based violence and sexual exploitation among young women and vulnerable communities, forced marriages, exposure to intimate sex violence, mental disorders, poor nutritional support for people with chronic diseases, and dependence on unsafe water sources, as well as aggravating health inequities, and other heat-induced illnesses and infectious diseases.**
>
> Maxensia Nakibuuka, Founder, LUCOHECO, Kampala, Uganda

The environmental damage was closely entwined with social vulnerabilities. Kampala City is already overwhelmed by its current population, failing to adequately provide housing, employment, services, utilities, and amenities for the bulk of its population. The city also battles to absorb the current rate of in-migration.

LUCOHECO considered it impractical to address the urban environment without addressing the social problems faced by informal settlers. These included poor social safety nets (including insufficient HIV/AIDS care), poor sanitation and hygiene, and lack of economic empowerment – all of which exacerbate poverty and illness. Women and girls are the most affected and most vulnerable. Pregnant women suffer premature births and miscarriages, and even maternal mortality, from the lack of infrastructure and services.

In Kampala, where LUCOHECO is based, climate-related damages fall especially heavily on women and girls: labor and care work to clean up after natural disasters take them away from paid work and education, increasing their and their families' economic desperation. This, in turn, increases gender-based violence, sexual exploitation, and forced marriage among young women and vulnerable communities. A local organization cannot fight the effects of climate change in isolation from these factors.

A Holistic, Well-being Approach to Adaptation in Kampala's Slums

LUCOHECO's focus quickly expanded beyond conventional healthcare support. The organization expanded to address sustainable development issues comprehensively. This includes, but is not limited to, managing urban wastes and drainage to improve flood management, and piloting resilient kitchen gardening methods to reduce the impacts of climate change. This is accompanied by ongoing outreach and support of Community Health Workers in the targeted informal settlements, and training for community women, including in psychological resilience, healthcare skills, personal finance, and small business management.

Approximately 414,750 people live in the informal settlements of Rubaga Division where LUCOHECO works. (Rubaga Division has 13 parishes and 936 villages.) The organization has 56 active volunteers who work as community health workers or watchdogs at community level, and 506 members who subscribe to the organization. LUCOHECO is affiliated with many networks of grassroots initiatives within Uganda that work with community women and their families on good governance, HIV/AIDS, land and housing, livelihood, and climate resilience.[77]

LUCOHECO uses a theory of change encompassing the following steps toward locally led adaptation:

- **Strengthening women's empowerment.** LUCOHECO organizes community members and builds their leadership capacities and understanding of climate change: how it affects them and how they can craft locally relevant solutions. Its "women as leaders, not as victims" approach was built into the organization's DNA from the start. This approach is also consolidated and strengthened by LUCOHECO's participation in the Huairou Commission, for which Maxensia has acted frequently as an ambassador.

THE POWER OF NETWORKING

Local women adaptation leaders amplify their voices and influence through networks of grassroots women's groups. One such network, from which LUCOHECO has benefited from receiving profile, funds, and strategic knowledge, is the Huairou Commission. The commission supports public recognition for the leadership of organized groups of grassroots women in the context of poverty eradication and sustainable development; positions local women-led organizations as driving forces in public agenda-setting, political accountability, and global policy engagement; offers support towards building COVID-19 resilience and recovery; and supports dialogues on locally led climate change adaptation systems.

- **Gender equality training for everyone.** Acknowledging that equitable opportunities are needed for both women and men, LUCOHECO runs training for Community Health Workers to address gender inequality gaps and forms of marginalization. This is critical for de-escalating vulnerability, reducing risk, enhancing resilience, and empowering grassroots women at the center of climate action. They educate residents to understand and navigate the available resources, facilitate communication, and collect and provide feedback on data about the conditions and demographics of the communities. These activities help to inform LUCOHECO's planning processes, as well as to improve local services that address climate change.

A woman produces cassava flour in a wooden pod.

- **Building constituencies, and resilient and sustainable processes and networks.** LUCOHECO seeks to avoid working as individuals, and rather to achieve more as a collective. It does this through peer learning exchanges and grassroots academies, where grassroots women come together to share practices and learn from one another. For example, Maxensia leveraged her position as a local councilor to convene local policymakers, NGOs, and community representatives to document solid waste problems and seek solutions. She and LUCOHECO mobilized young people to collect plastic bottles to unclog drainage systems, and to bring the bottles to recycling facilities.

> **We used local dialogues to research, document a problem, and find solutions, then we would call other policymakers to debate this problem with possible solutions and challenges. This is how our advocacy started.**
>
> Maxensia Nakibuuka Takirambule, Founder and Executive Director, LUCOHECO

- **Influencing public policy and processes.** When LUCOHECO meets with Kampala city leaders, grassroots women lead the process of policy advocacy: alerting them to the community's priorities and needs, holding duty bearers accountable, and demanding access to available resources. LUCOHECO carries out local-to-local community dialogues among grassroots women's groups, women affected by HIV/AIDS, women with disabilities, older people, and grassroots local council leaders (both men and women), as well as development partners of LUCOHECO from civil society, government line ministries and departments, and the private sector. This brings together power holders, duty bearers, grassroots women, and women's organizations to discuss plans for increasing their mutual resilience on climate change, pandemics, and other future crises.

- **Mapping of risks, opportunities, allies, and assessment of grassroots women's understanding of their vulnerability and adaptability towards climate change.** In 2021, LUCOHECO conducted an action research mapping of women's access to resources and services, with a focus on disaster risk management, climate change and resilience of the targeted communities, as a result of the effects of COVID-19. The mapping aimed to update LUCOHECO's understanding of community needs and drive collective actions to improve access to resources and services that would reduce community vulnerability to climate change and other disasters. The findings were used to inform planning, not only for the sampled project area but the entire Lubaga Division and beyond. The research findings are also intended to be used by other civil society actors and development partners to re-orient their services and streamline innovative ideas from the communities into their programming, to improve services. The research will shape the plans of LUCOHECO itself, as it reveals the real needs of the community members. The research was channeled through the Huairou Commission. (See *The Power of Networking* in this chapter).
- **Procuring economic assets to enhance livelihoods.** LUCOHECO began providing sack gardening supplies, seedlings, and livestock to enhance participatory, community-based, demonstration gardens. Subsequently, LUCOHECO provided seeds to individual families to enhance their nutritional intake. These activities are aimed at diversifying and expanding kitchen gardens. Kitchen gardening offers promise for crowded and flooded informal settlements, where many families were endeavoring to grow flowers for sale, but their small plots were often flooded and the products destroyed. The technique of growing tubers in sacks was adopted to enable residents to exploit small urban spaces to grow food for direct consumption or to sell, while reducing the likelihood of flood damage.

  The organization also uses various education techniques to support community residents in planting fruit trees and trees for medicinal products, as well as maintaining organic gardens to strengthen food security, improve dietary intake, and enhance family and community relationships. The sack garden pilot scheme and follow-on activities aim to double the production and consumption of beans and legumes, as well as generate stable financial savings for families.

Kampala slum.

Watering tomato plants.

- **Providing financial literacy training.** LUCOHECO aims to give community members savings skills and knowledge about accessing microcredit. This includes support on how to start small-scale, income-generating projects for self-sufficiency. The training also covers mindset change to foster positive attitudes for improved resilience, business development, and record-keeping, as well as refresher training for community workers and volunteers to prevent burnout.

LUCOHECO uses these wide-ranging approaches because they recognize that climate change affects people differently – therefore, a holistic approach is important. These approaches put women at the forefront: not as beneficiaries of programs but as agents of change, because they are affected most by climate change.

How Challenges Are Addressed

Despite LUCOHECO's very considerable achievements – in direct livelihood support, care provision to vulnerable families, and the advocacy arena – Maxensia is open about the significant challenges. It is hard to support every family to be climate-resilient and sustain their route out of poverty. And it is difficult, if not impossible, to expect members of LUCOHECO, who work voluntarily, to volunteer indefinitely without compensation. The reward of assisting others – of "giving life" – is vast, but members are torn by their personal responsibilities and finances. Maxensia works tirelessly (formerly a local councilor, she is not paid any more), and others also need to be paid for work.

LUCOHECO is not alone: there is a gap in fair pay for the workers in many civil society-based organizations such as LUCOHECO. If access to small predictable and reliable sources of climate finance to local organizations were available and accessible, this would make a significant difference.

KEY TAKEAWAYS

Women are working both inside power structures to bring their climate-resilient development priorities into formal local decision-making spaces, and on the outside to self-organize as groups of women with common objectives to pool and mobilize resources for adaptation. Through such self-empowerment initiatives, many women are achieving life-saving and life-changing results with meager resources.

How Climate, Development, and Gender Intersect

By definition, low-income communities lack access to land and capital for economic development. However, women in those communities face a further "gender development gap". Women fall behind men on measures of income and wealth, education, healthcare, and political leadership.[78] Climate change impacts women and girls, in the aggregate, more heavily than men, and so climate change is an amplifier of inequalities. It pushes the gender development gap wider (See Figure 3.1 below).

Action on climate change, too, could drive gender inequality unless it is intentionally designed to address climate risks, needs, and concerns specific to women and girls. It is essential to provide a voice and meaningful influence in decision making and implementation of locally led adaptation for women, girls, and those marginalized groups whose views have traditionally been overlooked (LLA Principle 2).

FIGURE 3.1 The Gender-Development-Climate Gap

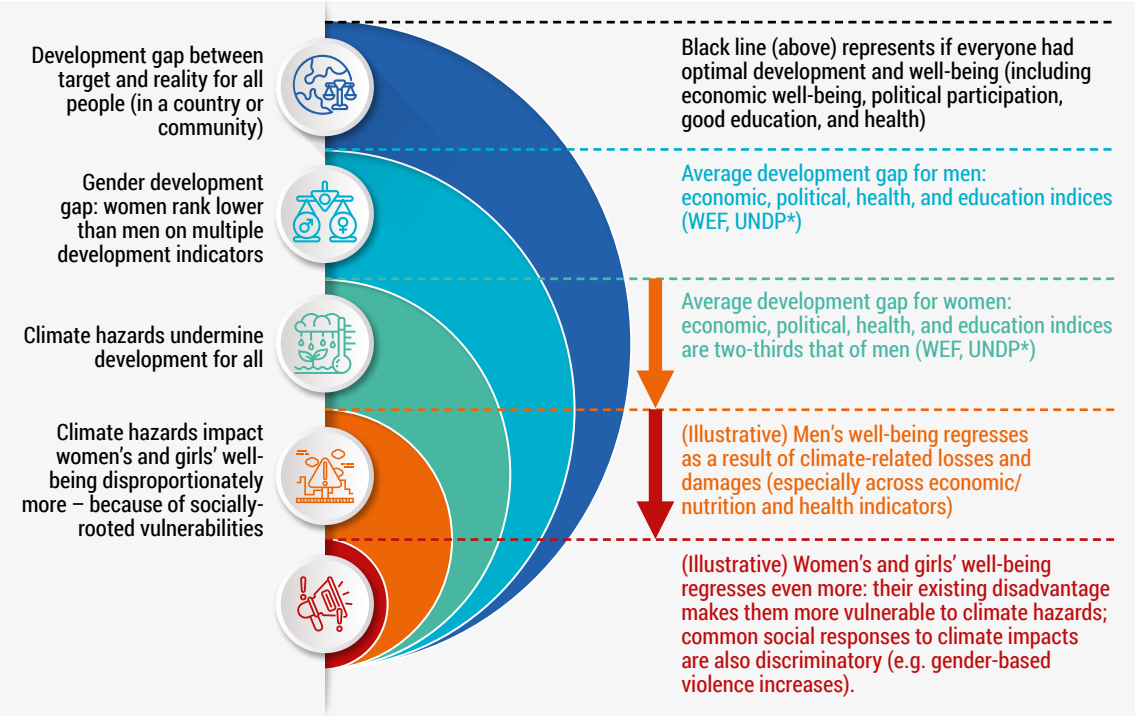


Diagram source: Mairi Dupar, CDKN Gender Training Pack 2023.
*https://www.weforum.org and https://hdr.undp.org/gender-development-index

Farmer tends her manioc crop.

How Are Women and Champions of Gender Equality Approaching LLA?

Climate change adaptation is essentially a development issue locally. Women are widely underrepresented in collective, formal decision spaces for local development: the forums where communities **identify problems**, **access information**, and **generate and select solutions**.

So, if we are concerned with local leadership of adaptation, how are women – in all their diversity – demonstrating local adaptation leadership, if at all, and how can their initiatives be enabled and permitted to flourish?

The stories demonstrate that community-based women are leading local adaptation in two ways:

- They are working parallel to, but outside, formal power structures, to create their own forms of mobilization in autonomous women's groups, led by women. The stories also describe women's groups within broader community-based solidarity networks and movements. Many of these self-help initiatives start with focusing on collective economic activities and/or health, nutrition, and well-being.
- Women are also trying to break the "glass ceiling" by stepping forward as individual leaders (often backed by social movements) to secure positions of collective decision-making power and influence in formal elected and representative governance structures.

Therefore, women are working both inside and outside power structures to lead climate-adaptive and resilient local development. We explore these strategies in other examples in this publication.

Barriers arise not just from poverty and lack of institutional resources, but from structural inequalities that constrain marginalized women's choices. These deficits are shaped by discriminatory social norms and attitudes – including, at its worst, gender-based violence. These include disproportionately low access by women to:

- Climate, environment, social, and economic information
- Climate change adaptation and resilience training and education
- Productive assets including land, finance, and climate-smart technologies
- Decision-making processes in climate resilient-development.

As shown in *The Osukuru Women's Story* and *The Women of Kampala's Slums* in this chapter, and other examples throughout this publication, individual women and women's groups are addressing these barriers through multi-faceted and holistic approaches, recognizing that there is no single solution.

Women Represent Women in Local Government

Many of the women leaders shared how they had engaged with public policy and budgetary processes. They are entrepreneurial and persistent in mobilizing financial and in-kind resources from public sources, to bolster women's climate resilience priorities. However, it is not easy. A preoccupation of women leaders is also how to plan for leadership succession among women and to spread the leadership load, as reflected in the examples below:

- Neusa Cadore ran for mayor of the town of Pintadas in northeast Brazil's arid region, backed by the decades-old solidarity movement of local women because she wanted to leverage public policy and investment to help the women. She subsequently spearheaded a pathbreaking initiative to install water tanks in every rural household's dwelling. (See *Solidarity Movement Makes a Mark on Bahia's Political Landscape* in Chapter 7.) Now a five-term lawmaker in the Bahia State Legislature in Brazil, Neusa continues to represent traditional rural communities' climate resilience concerns, especially those of women. She has championed a law, now enacted, to recognize the status of economic cooperatives and permit them to receive state funds. She has further sponsored a state law, now in force, recognizing the biocultural heritage of indigenous, climate-resilient plants of the region and preventing over-harvesting.

> **At LUCOHECO, we empower people to speak for themselves on issues that affect them. We don't give them what to say but they say what affects them – what we do is to empower them in public speaking and self-confidence. Over the years, LUCOHECO has supported grassroots women to stand for public and political offices. These have ranged from leadership in local women's councils to councilors at ward level, to ensure women's voices are heard and their issues fairly recognized, prioritizing women's practical needs and issues in local government agendas, localizing the Sustainable Development Goals, broadening perspectives, increasing creativity and innovation, diversifying the pool of talents and competences, reducing conflicts, and improving the process of decision making.**
>
> Maxensia Nakibuuka Takirambule, Founder and Executive Director, LUCOHECO

- An appetite to leverage wider change is why Maxensia ran for and won a seat in her local council in Kampala, Uganda. This position enabled her to convene different stakeholder groups from the community, including schools, youth groups, and women's groups, to address urban flooding and support flood-resilient urban agriculture. (See *The Women of Kampala's Slums* in this chapter.)
- Sylvia Kuria, an organic farmer in Kenya, has mobilized women to pilot and adopt organic, agroecological farming methods. However, the farmers' group quickly recognized the need and opportunity to raise their voices and collectively influence the planning mandates and budgetary allocations of the county government. (See *The Organic Farmers of Kiambu County* in Chapter 1.)
- Irene Walimbwa, the Founder and Chief Executive of the indigenous tree-based rural enterprise employing up to 500 local community members in rural Uganda, has opted to grow her role as the CEO of a private business, rather than stepping into policymaking. Nonetheless, seeing the importance of engaging with government policy and regulation, she concluded a Memorandum of Understanding with the district and the UWA responsible for the national park in her area. This document permits employees in her social enterprise to plant and cultivate trees within the national park for sustainable use. This both stabilizes the soils and "green infrastructure" provided by the forest plantation and provides much-needed local income. (See *The Story of Mount Elgon's Community* in Chapter 1.)
- In Vanuatu, community women are linking across villages to address women's rights within the context of traditional norms and hierarchies, to better empower women to take leadership roles in locally led adaptation. (See *The Santo Sunset Environment Network* in Chapter 6.) The women's network focuses on women's mobilization within the greater Indigenous-led Santo Sunset Environment Network. The women's network has been "working together with all 42 communities within the western part of Santo by carrying out its activities in hosting communities and participants from other villages that come together to attend climate change adaptation training. Culturally, it is unusual for young women to be allowed to leave their community for a training or learning event. The trust placed in SSWEN by local chiefs and traditional authorities has enabled a new level of communication and coordination among women and girls. This led to their greater exposure to, and capacity building on, climate change and adaptation solutions.[79]

Constance oversees some of the recently-cultivated seedlings.

Women prepare fruit pulp for sale from native fruits in Pintadas.

Women Organize for Climate Resilience through Economic Diversification

In response to our call for stories for this publication, many stories came from women who are organizing to diversify economically as a climate adaptation and resilience strategy. Stories describe women mobilizing to:

- **Exchange knowledge about reducing the exposure of their productive assets to climate and weather.** For example, in Kampala, Maxensia describes how women are spreading the practice of "sack gardening" which allows them to remove their home-grown produce from harmful floods. (See *The Women of Kampala's Slums* in this chapter.)
- **Disseminate information on what climate change is, how it could be affected, and the potential of locally suitable adaptation solutions.** For example, in Kampala, Maxensia includes climate literacy in LUCOHECO's activities. (See *The Women of Kampala's Slums* in this chapter.) On Santo Island, Vanuatu, the Women's Network prioritizes climate literacy among its members. (See *The Santo Sunset Environment Network* in Chapter 6.)
- **Pool resources to access climate-compatible seedlings, livestock, and other agricultural assets and inputs.** Often savings and loans associations are involved. There are many stories of women's groups whose members cultivate fruits, vegetables, and grains in their kitchen gardens and sell what is left over via their micro-enterprises – principally as sole traders. (See *The Organic Farmers of Kiambu County* in Chapter 1, and *The Afro-Peruvian Community of Zaña* in Chapter 6.)

Women-led adaptation efforts, such as the ones described in this chapter, are initiated by women and within their sphere of control and influence. They are deploying intentional gender equality and addressing the structural barriers by creating climate-resilient economic opportunities and skills development, designed by women, for women, with their requirements foremost. The women-led initiatives are also intentionally creating spaces free from gender-based violence and trauma, recognizing the importance of providing psychosocial support to each other, as well as technical, logistical, and economic support. (See *Women-Centered Ways of Working* on the next page.)

WOMEN-CENTERED WAYS OF WORKING

Women are used to juggling disproportionate workloads of unpaid care work and poorly paid wage labor because of social and gender inequities. They have devised multiple strategies to address these challenges. These strategies have the potential to be tailored and adopted by women's groups elsewhere.

Creating Women-centered Spaces for Climate-Adaptive Working and Meeting

In Nawalparasi, Nepal, groups of women entrepreneurs have been resourceful in finding land and funds to create collective working spaces for their small businesses. They have organized to obtain the legal permissions, building materials, and labor to construct "women entrepreneurs' homes", from where they run businesses (like the manufacture of cups and plates made from locally available and sustainably harvested forest resources to generate income and displace plastic). Such collective working spaces are proving instrumental as a base for women's economic activities and their broader well-being, as spaces:

- to keep raw materials, machinery, and finished products safe from theft or damage;
- to spur innovation and creativity among women entrepreneurs;
- for meetings and cultural exchanges; and
- that are free from gender-based violence and trauma.[80]

These women entrepreneurs have sourced funding from an international project, the local government, and the Community Forest User Group (an existing local institution) to achieve their goals. The blueprint for these entrepreneurs' homes includes physically designated space to showcase products and store materials, to cook and eat, and for childcare and breastfeeding. "This infrastructure is not just grey concrete, but rather signifies the roof of unity, agency, and feminist compassionate leadership development," says a representative.

Designing Activities to Respond to Women's Lives

In Ndeiya Sub-County, Kenya, a group of organic farmers – led by women and comprised mostly of women – has created a way of working that recognizes women farmers' heavy workloads and seeks the most powerful policy influence for the least effort. (See *The Organic Farmers of Kiambu County* in Chapter 1.)

Sylvia Kuria, an organic farmer, says: "We were deliberate to only meet once every 6–8 weeks and when we had our meetings, we made sure that the meetings were only half a day. We would also ensure we are well aware of the dates for public participation (in ward and county political processes) and mobilize farmers well in advance. For the above to be successful, we had spent 2021 training women on agroecology. This in turn ensured they clearly understood why it was important for us to shift and push for more sustainable farming practices during the 2022 county policy engagement. I have been developing my farm as an organic/demonstration farm and we conducted all our meetings on the farm. This was a great encouragement to the women that agroecology works. We learned that there is power in showcasing proof of concept and cultivating buy-in for the effectiveness of agroecology."

These examples show how local adaptation led by and for women can be organized around the rhythms of life and the requirements that they define.

Combined Approaches for Women's Empowerment

Multifaceted strategies are needed to mainstream gender and social equity in local adaptation efforts and to grow the effectiveness of women adaptation leaders. There is no magic bullet. Women are using a variety of mutually reinforcing approaches, in combination, to respond within the local context:

- **Leveraging pro-equality policies and regulations** that recognize the importance of diverse and gender-equitable representation in decision making. In some countries, formal public policies and regulations require equitable representation of women in public decision making. In Nepal, there is a formal target for 50% of elected representatives at local level to be women – one that is not yet achieved, but inching closer to realization.[81] In Kenya, a recent constitutional court decision requires that no more than two-thirds of national lawmakers may be of one gender.[82] (This target does not extend to the local level, however.) Formal rules can go a long way to sanctioning space in decision-making forums for women, although they must be accompanied by other "soft" measures to enable meaningful participation and influence, as detailed below. Where such mandates do not exist, the power of women's groups and women's movements to mobilize and push for more equitable representation and participation is key, as described in *Solidarity Movement Makes a Mark on Bahia's Political Landscape* in Chapter 7, and other stories.
- **Operational measures to support women's participation**, such as the timing and format of meetings and processes, to accommodate women and their socially and physically defined roles such as childcare and breastfeeding. Operational measures may go as far as creating women-run safe spaces for adaptation action. (See *Women-Centered Ways of Working*.)
- **Efforts to build women's climate literacy.** While women, through socially defined roles, often hold specific types of Indigenous and local knowledge that is relevant for adaptation (see **Chapter 6**), the stories highlight that community women stand to benefit from strengthened knowledge and information on climate change and its implications for their current and future lives and work. This includes having enough contextual information about the climate change happening now and the projected future climate to make informed decisions on intersecting social and economic development challenges that are affected by the climate.
- **Solidarity building among community-based women's groups**, with similar goals, is a powerful approach for advancing women's climate adaptation knowledge, strategic policy-influencing abilities, and ultimately, their empowerment. This is such a powerful factor that it has its own chapter in this publication (**Chapter 7**).
- **Initiatives to build women's confidence** are important whether they are intentionally designed or happen more organically. The act of belonging to a women's group can have a confidence-building effect, and solidarity-building among groups of local women can further build confidence, knowledge, and skills. Women champions who are prepared to speak up for equitable gender norms – bold women taking the lead in communities – are often present and shine in the stories in this publication. Women champions may consciously step up and mentor others and/or be recruited into mentorship roles. (See *The Organic Farmers of Kiambu County* in Chapter 1.)

Moving the Dial on Gender-Based Violence and Discriminatory Attitudes

Women adaptation leaders frequently report that they persist in organizing women to address climate challenges in the face of men's skepticism or outright resistance. Constance told her story of overcoming resistance (see *The Osukuru Women's Story* in this chapter):

> **The women meet every week to talk about their struggles and identify solutions through the exchange of ideas and experiences. We also invite local leaders to speak to us, and along the way, [the women] discover that climate change is the cause of part of their problems. In the beginning, most men were very skeptical and sometimes even forbade their wives to participate. But our success was undeniable and over time, the group grew bigger and bigger and expanded to become an education and community hub with over 2,000 members today.**
>
> Constance Okolett, Founder and CEO, OWN

An equally common story is that when women begin to show favorable results, they win respect for their actions, and their standing in the community increases. In Zaña, Peru, Afro-Peruvian men were initially reluctant for women in their families to participate in group adaptation activities outside the household, said Rosa Elena Colchado Medina. However, over time, they gradually "recognized and accepted" women's leadership as the household income and food security benefits became apparent. (See *The Afro-Peruvian Community of Zaña* in Chapter 6.)

Women's challenges go beyond fighting skepticism: many women cited gender-based violence and toxic male views of women's inferiority as deeply engrained cultural norms that undermine women's well-being and hinder effective action on adaptation. It is not surprising that women should say this – gender-based violence is recognized as a "pandemic" worldwide according to the United Nations, one that only got worse during the COVID-19 era.[83]

How are community women's groups and women leaders tackling these issues effectively and seeking to alter discriminatory norms? They are running shared learning dialogues, which are a type of facilitated dialogue in mixed-sex groups, to discuss how to address women's differential access to power and resources, and their human right to freedom from violence. Shared learning dialogues can be held in schools, faith-based and secular community forums, and even in households.

Women are also using the power of demonstration – celebrating the small but powerful climate resilience achievements that the women have organized by themselves (as in *The Osukuru Women's Story* and *The Women of Kampala's Slums* in this chapter, and *The Afro-Peruvian Community of Zaña* in Chapter 6) to show their success to more powerful actors, often men, in the community, and cultivate their allyship in backing women- and youth-led initiatives. Constance explains how women are driven to unsafe sex work by climate disruptions in rural livelihoods, but climate-resilient economic empowerment through the network's kitchen garden program gives women viable alternatives that engender dignity and self-respect, as well as the greater respect of men in the community. In *The Afro-Peruvian Community of Zaña*, Rosa describes how community-based resilient gardening was undertaken in ways that enhanced cooperation between women and men and sought to avoid *machismo* norms in wider society.

It can be difficult to fund this work. Taking explicit measures to counter gender-based violence and highly toxic discrimination is not part of the conventional 'formula' deployed by government policymakers and international funders as part of climate action. However, community-based women are saying that addressing gender-based violence and discrimination is fundamental to LLA. Women's groups are tackling holistically the issues of gender-based discrimination and violence, climate resilience, and sustainable economic empowerment at community level. They are forced to be extremely resourceful in seeking multiple streams of funding and in-kind support from diverse institutions to be able to sustain this comprehensive work – each funding stream with its own transaction costs. External actors and potential supporters, such as governments and financiers, need to catch up with these practical realities.

Implications and Reflections

Lessons from the stories on women's leadership in local adaptation processes stress the importance of:

- **Valuing and investing in women's autonomous organizing and women-led solutions in communities.** Recognizing the diversity of women and the specific needs, concerns, and priorities of particular groups, including women's priorities by age, ethnicity, and ability. Women are stronger in transforming their vulnerabilities when they organize together in women-led groups. Women's multiple reproductive and productive roles can otherwise render them isolated and fragmented, with less power to negotiate many decisions that impact their lives. This is why collective action is important. "Empowering women in poor and marginalized communities involves a long and hard process as it inevitably confronts structures of power," says Maxensia. Once organized, women from "the poor and the marginalized communities have been able to extract concessions from authorities with a remarkable degree of success," she reflects. (See *The Women of Kampala's Slums* in this chapter.)

Three generations of the Grassroots Women Practitioners in Pintadas, Brazil.

A meeting of the Platform of Grassroots Women Practitioners of Resilience in Pintadas, Brazil.

- **Valuing and investing in initiatives to empower women as influential agents within power structures; that is, in formal public and political decision-making forums.** These initiatives should also be multidimensional, recognizing the innate disadvantage most women face regarding their literacy, access to information, time, and so on. They may benefit from access to mentorship, literacy, financial literacy, and technical support to enable grassroots and community women to shine and be influential in such forums.
- **Recognizing the power of climate risk and vulnerability data, disaggregated by sex, that illuminates the specific risks faced by women and girls.** Their gendered risks are caused directly by climate hazards (and the differential exposure and vulnerability that women and girls, men and boys have, to those hazards), and indirectly, by the different social responses to climate hazards, which often breach or undermine women's and girls' human rights and disproportionately affect their well-being. Documenting and mapping these data locally give a solid basis on which to advocate to authorities for interventions and investments that empower women and girls.
- **Evaluating the complete lack of pay in some cases, or gross underpayment of, marginalized women, and other economically disadvantaged groups whose labor is critical to climate change adaptation work.** A small amount of funding would go a long way to compensate fairly the legions of community-minded people who currently carry out local-level adaptation actions for free – as in the case of the bold and brave women of Kampala's slums. (See *The Women of Kampala's Slums* in this chapter.) It may be realistic to rely on some volunteer effort for locally led adaptation, but the magnitude of social and environmental needs calls for more resources to pay people for their labor. Climate finance should be far more accessible to community-based groups including women's groups. Climate financiers could deploy small, strategic, versatile funding modes with straightforward paperwork and accountability mechanisms that are aligned with the modest grant funds urgently needed by women adaptation leaders in widespread localities.
- **Stimulating respect for, and validation of, women's relevant local and Indigenous knowledge.** As a result of social and cultural shaping of gender norms, women often have quite different types of knowledge about weather, climate, and natural systems and climate-resilience solutions than do men. (See more discussion about this in **Chapter 6**.)
- **Fostering allyship with men.** Road-tested methods exist for fostering local dialogues and allying with male gender equality champions to achieve broader social acceptance of women's enhanced leadership roles. While the specific approaches will be strongly locally tailored, the principles are broadly applicable.

CHAPTER 4

COLLABORATION ACROSS GENERATIONS

HIGHLIGHTS

- The stories showed a trend for mixed-age community organizations that provide space for different generations to exchange LLA ideas and collaborate on climate-resilient practices. Younger people are exploring how to understand and apply "elders' wisdom" to LLA. Many older people have the time and intellectual curiosity to absorb and test new approaches and enjoy working with younger community members.
- In this chapter, we see how older and younger people battle stereotypes about their needs and interests. They are successfully forging alliances to transform the way their communities think about and approach climate-resilient development.
- The most important recommendation is to "drop the stereotypes", recognizing the valuable and complementary strengths each age group can bring.
- Given that young and older people have different sets of knowledge, skills and assets, community-based organizations may wish to recruit intentionally across generations for LLA; and/or, older people's and younger people's clubs may wish to partner with each other locally for climate action.
- A frequent theme from communities was the lack of climate change content in formal education: which is why we see so many young people creating alliances with teachers and elders to put climate change on the school curriculum in their locality, or to create informal climate teach-ins via other community institutions.
- Governments and financiers must address the gap in climate and adaptation information in schools. They must support local education authorities, teachers, and other community learning institutions to access a range of scientific, as well as Indigenous and local information, and to create modes of learning about climate change that are relevant, accessible, and engaging for all.

Devolving decision making

Addressing structural inequalities

Flexible programming and learning

Collaborative action

IN THIS CHAPTER

© SSEN

For older people, biochar production is a way to manage municipal green waste, transfer the knowledge to younger farmers, tackle air pollution in Chiang Mai and create opportunities for additional income.

Javeria Afzal, Climate Change Advisor, HelpAge International

Thai woman with rice – the crop wastes are suitable for use in biochar production.

THE BIOCHAR PRODUCERS OF CHIANG MAI

As narrated by Javeria Afzal, Climate Change Advisor, HelpAge International and Chanyuth Tepa, Program Manager, Foundation for Older Persons' Development, with additional written contributions from the authors[84]

In the hills around the city of Chiang Mai in northern Thailand, the air fills seasonally with the choking smoke of slash-and-burn agriculture. Farmers traditionally burn off crop waste to clear their fields for the next crop. Air pollution levels, especially particulate matter (PM2.5) are considerably higher than normal during the burning months.

The smoke causes people headaches, difficulty in breathing, and other respiratory problems. Furthermore, air pollution increases the risk of many non-communicable diseases, such as heart disease, stroke, chronic obstructive pulmonary disease, and lung cancer.[85]

Thailand is among the most polluted countries in Southeast Asia. In 2020, its particulate pollution levels reached five times the World Health Organization (WHO) guideline.[86] At current levels, air pollution is shortening the average Thai resident's life expectancy by 1.8 years.[87] Reducing ambient air pollution by 20% could prevent up to 25% of avoidable fatalities each year[88] and would stem losses in economic productivity.[89]

It is against this backdrop that Older People's Clubs (OPCs) in Chiang Mai began to develop biochar and associated products, as a way of addressing environmental health and, by extension, pursuing locally led adaptation and mitigation.

Biochar is recognized internationally as a promising way to lock up carbon and contribute to more fertile agricultural soils. It is a form of charcoal produced from burning organic material at high temperatures with little to no oxygen availability. This method locks up the carbon from crop wastes into a kind of semi-porous form of hard carbon, which can be added to soil as fertilizer. If the crop waste were simply left to decompose or burn in oxygen, it would release carbon dioxide.[90]

The potential of biochar for climate change adaptation is also very high: biochar is a very stable carbon form, and when incorporated in soils, scientists suggest it may lead to improved water-holding capacity, nutrient retention, and microbial processes.

Boonma (see the quote below) spreading biochar on the soil to enhance production.

The production and application of biochar is relevant technology for poor, resource-constrained rural households. Biochar enables them to achieve high crop yields because of its high moisture retention capacity, high potential to limit the leaching of nutrients, and suitability as a habitat for micro-organism growth.[91]

Older People's Clubs Dedicate Time and Wisdom to LLA

OPCs were established in 13 villages in Chiang Mai's Sarapee District, with the support of the Foundation of Older Persons' Development (FOPDEV). For the last three years, these OPCs have been actively producing biochar.

Their interest in biochar grew out of training provided by HelpAge International to leaders of three OPCs on limiting air pollution and sequestering carbon. Since then, the idea of creating biochar from agriculture waste – sourced from plant stalks and husks in the fields that would otherwise be unused – has become very popular. Other OPCs joined the initiative, producing biochar for household use. Recently, they started selling it for income.

> **I have kept on making biochar for income generating and as a soil enhancer for my own farming. I have provided training to older farmers and environmental community volunteers for expanding biochar making. Communities are using biochar in their home kitchen gardens.**
>
> Boonma Phukumsakda, a 60-year-old farmer, who is one of the resource persons on biochar making in his community

Since they were trained, the OPCs have increased the capacities of 100 local farmers, who are developing different biochar products. On average, farmers' income from selling biochar as a soil enhancer and source of fuel, together with biochar-derived wood vinegar, is US 180–200 per month.

Organic agriculture networks in Chiang Mai have shown interest in the OPCs' biochar, requesting the biochar as an input for their own activities, and providing access to biomass from *Longan* (a subtropical evergreen tree) as a raw material to create the biochar. OPCs also recently started producing wood vinegar as a byproduct of biochar production, for use as an insecticide.

I have worked with farmers to produce biochar to use as a soil enhancer, mixed with compost. These soil enhancers have been used by 26 club members and their families to grow vegetables for home consumption. This project has been expanded and integrated with the organic farming network in the municipality and in Chiang Mai province.

Boonrat Mihittri, 67 years old, Advisor to Tha Wang Tan OPC, Sarapee, Chiang Mai

Members of OPCs are also collaborating with local agriculture extension services, by showcasing their work and motivating farmers to avoid burning agricultural waste in the open. Importantly, their work translated into local policy: biochar production by the OPCs is now formally included in the agricultural plan of the Provincial Agricultural Extension Office in Chiang Mai. In locally led adaptation, local government plays a central role in reinforcing and scaling adaptation along with civil society to ensure accountability and the flow of information.

A dedicated ten-member resource team of OPC members has emerged. This resource team is training more farmers in biochar production, especially young farmers. The OPCs created a laboratory for training and practicing biochar making. So far, 100 farmers have been trained and more are showing interest. Members of the group are exhibiting their biochar and its by-products in local exhibition spaces. They are also beginning to establish relationships with private sector firms to sell the biochar at a better price.

I have decided to make quality biochar and wood vinegar to generate income and usage of biochar for safety and environmentally friendly home-based farming, making clean water for farming, and to make the air cleaner.

Nuttapong Punthakul, 70 years old, Deputy Chairperson of Tha Wang Tarn OPC, Chiang Mai

Biochar production activities have succeeded in putting older people, many living with disabilities and marginalized from decision making, at the center of a productive and sustainable agricultural development and circular economy process.

Soil enhancer produced from biochar.

Biochar production led by older people means improved health, both mental and physical, building community resilience and helping to prevent ageism. The project resulted in giving agency to older people – they are now managing, making decisions, and implementing biochar interventions.

How Challenges are Addressed

Mobilizing older people is important, not only for older people themselves but also to challenge the widely held opinion that they are a burden, rather than contributors, to society. Empowering older people requires dedication and regular follow-up to sustain motivation. When organized into groups or clubs, older people can be a powerful force for planning and implementing climate actions built on local wisdom and innovation and to enhance their mental and physical health. When engaged, organized, and empowered, they are powerful forces for change.[92]

HelpAge and its local partner, FOPDEV, have learned that organizing older people in groups is key to enabling them to support each other and to find common activities with which to engage. Seed funding, along with awareness of new climate solutions, can go a long way to inculcate new ways of doing things and be an inspiration to young community members. Leading from the front and convincing others is a skill that the older community brings to the table.

Young people around the world have taken a leading role in calling for action to address the climate emergency. In contrast to the agency of young people, older people are often viewed as vulnerable to extreme weather events and high temperatures caused by climatic changes. Collective action by older people challenges this narrative, as the key principle of OPCs is that almost 70% of the clubs' members are older and 30% are younger. This intergenerational collaboration brings the agency of older and younger people together for a whole-of-society approach, ensuring that no one is left behind.

Oscar Ryan Ouma.

> **As a young person, it's always like a tradition that once someone finishes school, he/she goes to the urban area, but with me, I choose to be in the rural area, working to save our community and the world.**
>
> Oscar Ryan Ouma, Founder, Kenge Content Hive

THE ECO-ACTIVISTS OF BUSIA COUNTY

As narrated by Oscar Ryan Ouma, Kenge Content Hive, Kenya[93]

Rural villages nestle along the shores of Lake Victoria in Busia County, Kenya. This is where Oscar Ryan Ouma grew up – and where he witnessed profound changes in the local environment, even in his first two decades of life.

He remembers from his childhood days how his community thrived with an abundance of food and ample yields stored in their granaries. The wisdom of the elders, who could accurately predict rainfall, contributed to successful harvests. However, over time, Oscar Ryan witnessed a significant transformation – and it was a disheartening one. Butterflies, once a common sight, began to disappear. The granaries slowly emptied. People struggled to feed their families and began to encroach upon marginal and fragile lands, leading to widespread deforestation.

Direct degradation of forests and the natural environment, combined with the impacts of climate change, have combined to create what Oscar Ryan calls "dire" consequences for local people. High temperatures became higher, the beating sun feeling intense, like "a divine punishment" at times.

His lived experience is borne out by the science: average annual surface temperatures over East Africa increased by 0.7°C–1°C from 1973 to 2013. There are significantly more warm nights, warm days, and warm spells. Since 2005, drought frequency has doubled from once every six years to once every three years.[94]

It was these profound changes in the environment that sparked Oscar Ryan's deep sense of inquiry and the need to understand why it was happening. Motivated to make a difference and to become an agent of change, he led in establishing the **Kenge Content Hive**, a youth-led, community-based organization. The name Kenge comes from the Indigenous Peoples who originally populated the area.[95]

Members of the Kenge Content Hive.

Young People Lead Ecosystem Restoration along the Shores of Lake Victoria

The Kenge Content Hive is an organization of young people raising their own climate literacy and awareness and spreading it in the local community. They are also learning by doing: mobilizing to plant trees on the shores of Lake Victoria that will restore ecosystem functions and biodiversity, and boost adaptation and mitigation to climate change. Oscar Ryan and other members are inspired by their forebearers' knowledge of nature. They aim to capitalize on Indigenous knowledge to guide their activities and tackle local manifestations of the climate crisis for the long term.

The vision is for a Lake Victoria Basin in Kenya where communities are actively aware of, and engaged in, ecological restoration, clean water, health and sanitation, energy access, youth leadership, economic empowerment, and sustainable development.[96] Oscar Ryan convenes information forums for the community, where he disseminates tailored climate information in a manner accessible to all. This includes those with limited literacy in the rural community, considering that a majority of community members drop out of school to pursue fishing livelihoods.

> **By combining traditional wisdom with contemporary practices, I was able to develop context-specific solutions that resonated with the community.**
>
> Oscar Ryan Ouma, Founder, Kenge Content Hive

Young people engaging in Kenge Content Hive activities.

Since 2020, they have successfully planted over 15,200 trees. The Kenge Content Hive also emphasizes nurturing the trees over time. Its members ensure that the trees are well-maintained and protected from threats, and that tree care practices are passed to young group members, for lasting impact. The group primarily selects species that are native to local ecosystems, and robust in the changing climate, such as Gravellier and African Oak (mitumba). They also plant *Casuarina* (whistling pine), croton, moringa, white sapote, acacia, neem, *Kigelia Africana* (sausage tree), cypress, jacaranda, Nile tulip (lusiola), *Ficus thonningii* (Mdodo), *Tamarindus indica* (Omukhuwa), yellow oleander (Omufulukutu), *Bischofia javanica*, *Albizia coriaria*, ghaf, mango, guava, and custard apple trees.

The efforts of the Kenge Content Hive have yielded positive economic, social, and environmental outcomes. They report that their tree-planting and sustainable agricultural practices have led to an increase in local food production and improved livelihoods. They have restored more than 20 hectares of degraded land, resulting in a 30% increase in crop yields for participating communities. Economically, over 800 people have received income through the projects, including from the establishment of tree nurseries. This has led to an increase in annual household incomes, making a tangible difference in the lives of those involved.

Also, the projects have helped control erosion, which is rampant in areas along the shores of Lake Victoria – this reduces the risk of soil degradation and preserves vital ecosystems.

The work has also fostered community cohesion and intergenerational engagement, as local residents actively exchange knowledge and experiences through the projects. Psychosocially, the initiatives have provided a sense of purpose and hope for individuals grappling with eco-anxiety, as they witness positive changes in their environment. The feedback received from the community underscores the success of the Kenge Content Hive's initiatives, with 95% expressing a desire to continue participating and enjoying the tangible benefits of the programs.

How Challenges are Addressed

Climate change continues to exacerbate poverty in Busia County, Kenya – especially through the negative effects of higher temperatures and more frequent, weather extremes on agricultural output. This indicates that far greater efforts in climate-resilient development are needed – not just by the Kenge Content Hive but through coalitions of actors and multi-faceted responses. Members of the group recognize the complexity of adaptation, as well as their need to continuously assess and adjust strategies accordingly. Members are also mindful of the long-term sustainability of their work. They want to create a long-lived ecological infrastructure that will lay the foundations for generations' worth of sustainable development in the future.

In Oscar Ryan's view, past efforts to conserve natural resources of the Lake Victoria basin have been largely ineffective due to the short-term period of projects, limited awareness of results, and limited funding. His vision is to address these challenges through a combination of approaches, such as strengthening the capacity of institutions to support and share climate-adaptive and low-carbon best practices, and forming partnerships among institutions for sustainable development goals. This further calls for aligned policies and regulations across institutions and agencies, educating the public on various alternative sources of livelihoods, and creating a conducive space that will allow organizations to tap into investment opportunities.[97] As a relatively new and highly motivated youth organization, the Kenge Content Hive has its work cut out!

Members of the Kenge Content Hive engaging in projects to control soil erosion.

Young people prepare a field for avocado cultivation.

OPPORTUNITIES TO IMPROVE CLIMATE EDUCATION

Marie-Martine Yobol, the Director of Centre de Documentation pour le Développement Rural (CDDR-SAILD) describes the vastly untapped potential for climate resilience-related education in Cameroon. Her NGO has managed to roll out climate literacy to just five schools so far, as part of local partnership agreements with schools. The learning modules stimulate pupils' leadership and use modern information and communication technologies such as Scratch, a simple form of computer programming. In each case, teachers and pupils have organized their own extension activities, which have been adopted beyond the initial year groups targeted.[98]

Meanwhile, David Arome, a health journalist in Abuja, Nigeria, describes "a huge knowledge gap on climate change and its corresponding impacts on communities in Nigeria".[99] He foresees that the formal education system will be forced to catch up with the many informal and spontaneous communication, engagement, and education initiatives that are now emerging outside the formal system.

David also commented: "In the course of my work and community engagement, I have had a series of conversations with community gatekeepers and community members on the subject of climate change. Shockingly, a good number of them do not know what climate change adaptation is all about, and talk more about adopting mitigation strategies to curtail it. I believe this narrative will change in a short while, as an innovative model of engagement moves beyond the conventional theoretical classroom education of young climate advocates in secondary schools, to practical demonstration, engagement, use of climate communication modules, and proactive involvement through evidence-based action. These new modes will enable everyone to champion the cause of local climate action in their respective communities."

FAITH GROUPS PROVIDE SPACE FOR YOUNG PEOPLE'S CLIMATE LEADERSHIP

The Methodist Church of Zimbabwe is profiling climate change education as an essential life skill in its youth program – as important as learning about drug and substance abuse. Marry Chiwara, National Youth Coordinator of the Methodist Church wrote to share how they are exploring "ways through which youth leadership can be improved and how the participation of youth can be increased at local level" on climate change issues.[100] They learned early on that a peer-to-peer approach works well.

In Rumbek, South Sudan, a Jesuit initiative, the St. Peter Claver Computer and Ecological Centre is a faith-based vocational training center that began youth-targeted climate activities.

To raise awareness of the climate crisis, the center introduced the Go Green Rumbek project in August 2022 to raise awareness of the climate crisis. It targeted youth to use music, art drama, and poetry in a way that will resonate with them and inspire them towards positive climate action. It involved nurturing the youth's skills and capabilities, and their knowledge of music, art, and drama to build the narrative around climate action. By targeting youth and facilitating collaboration among stakeholders, the project ensured the fight against climate change is informed by people from a diverse range of age groups and organizations, therefore fostering an inclusive and innovative approach.[101]

This then catalyzed several spin-off initiatives led by the young people themselves, which garnered praise and support from the wider community. The young people formed the Go Green Rumbek Environmental Club on their own initiative – appointing a chairperson, secretary, and their two assistants to lead the club, and with a WhatsApp group to mobilize the group for activities. This included a "community service" initiative to clear solid waste from Rumbek town center. The massive clean-up created a "ripple effect" by motivating other young people to action and raising awareness in the broader local community. The members have participated in local radio talk shows to discuss climate change, planted trees in different parts of Rumbek, and conducted drama performances in a primary school and in celebration of Women's Day in the town's Freedom Square.[102]

OLD AND YOUNG JOIN FORCES TO PROTECT PRECIOUS WATER RESOURCES FROM CLIMATE STRESS

In Rajasthan, India, an OPC has developed Old and Young Clubs to practice climate-resilient, integrated water management solutions. An NGO called Gramin Vikas Vigyan Samiti (GRAVIS) – the Centre of People's Science for Rural Development – has been supporting the clubs.

Over the centuries, people have lived in the desert in a sustainable manner and have devised Indigenous methods for dealing with water scarcity. Underground rainwater harvesting structures, such as the *taanka*, *nadi*, and *beri*, were developed by the people to store rainwater for use during the driest parts of the year. However, when the Government of India introduced piped water and hand pumps into villages in the name of safe drinking water, Indigenous rainwater harvesting methods were left by the wayside. Today, in Rajasthan, 90% of the water used by the population comes from government pipes or hand pumps. Not until faced with severe drought, inadequate supplies of piped water, and depleted or contaminated groundwater were the Indigenous methods remembered – by then too late.

GRAVIS believes that a revival of traditional rain harvesting systems is essential to the survival of the people of the Thar Desert. These structures are technologically sustainable and can be built at a low cost. Moreover, by using these structures, the people can achieve water security and therefore self-reliance.[103]

Examples of these traditional systems:

- A *taanka* is a small underground rainwater storage cistern. Rainwater from rooftops, a courtyard or natural or artificially prepared catchment flows into the paved underground pit where it is stored. The stored water can be used by one family, or a small group of families, for 4 to 6 months.
- A *naadi* is a human-made village pond. Rainwater from surface runoff is collected in a natural depression in the land and an embankment to hold the water in is built behind. The *naadi* or pond is accessible to all people in the village, livestock, and wildlife. It is also used for replenishing *taankas* that have been depleted of rainwater.
- A *beri* is a small well, used to collect rainwater from a catchment specially created for the purpose of supplying drinking water.

A girl drinks water in a desert village.

The Old and Young Clubs provide a forum for older people to share knowledge of rainwater harvesting structures that were traditionally used in communities to collect and store rainwater for use during the driest parts of the year. Supported by GRAVIS, they have delivered frequent workshops on water conservation in schools and villages.[104]

KEY TAKEAWAYS

Older and Younger People Have Different, Compelling Motives for Climate Action

Young people the world over share similar preoccupations: they want to establish their adult lives and livelihoods to the best of their abilities. They look to the future, conditioned by social expectations and demands, and empowered or constrained by education and job opportunities. Increasingly, the impacts of climate change are changing young people's local environments and their life choices. For young people in traditional farming and fishing communities, climate change combined with management practices is shaping the natural resource base on which they could develop livelihoods. Climate change impacts are shifting the profile of whole industries at local level. To give just one example: climate change is changing which commercial fish species are available in fresh and coastal waters.[105]

Public and private sector responses to climate change are creating entirely new job profiles and opportunities. These range from climate-resilient and zero-carbon or carbon-sequestering opportunities in agriculture, forestry, waste management, and related value chains (described in **Chapter 1** and **Chapter 2**). These offer chances for formalizing and increasing the remuneration and security of people's jobs, just as the "climate-compatible" character of work is also increased. In the professional or service sectors, entirely new job roles are emerging, open to those with the knowledge, skills, and wherewithal to secure them. A generation ago, "climate finance expert" or "sectoral climate risk assessor" would have been rare job descriptions. Now, these professional profiles are increasingly in demand. Needs are increasing, across sectors, for workers with the competency to manage climate risks.

Aside from climate change, the world of work is changing for other reasons, affecting young people's prospects. Automation is displacing labor in some industries and sectors, while spontaneous demographic shifts such as urbanization are causing labor surpluses in some areas and deficits in others.[106] Educational curricula and vocational training programs are struggling to keep pace with the rapidly changing skills base needed for young people to enter the world of work.

A large proportion of the stories of resilience we received came from young people, under 30 years old, or older adults working with groups of schoolchildren and younger adults. A dominant theme was young people's desire to receive education and skills training that would be fit for purpose in a changing world of work – including being climate-resilient and taking advantage of green job prospects. Another dominant theme, unsurprisingly, was young people's focus on securing a steady source of income. If locally led adaptation initiatives do not offer a decent income, they quickly turn away.

Susan Nanduddu, an affiliate of the Osukuru United Women's Network, said: "Emphasizing the income-generating potential of adaptation action increases its attractiveness for young people, and is a sound strategy for developing adaptation networks. Young people want to be more than subsistence farmers." (See *The Osukuru Women's Story* in Chapter 3.) She added that putting young people's needs and aspirations at the center of LLA could be key to staving off the brain drain from rural to urban areas.

Young farmer harvests avocados, Kenya.

Older people have a mix of motivations for spearheading LLA efforts. Older respondents to our call for stories shared their enthusiasm for environmental regeneration and enhancing the quality of life for all generations. Javeria Afzal of HelpAge International noted that members of OPCs are very willing to volunteer time, and delight in innovating local environmental solutions: "Their time is relatively abundant and they have know-how, accumulated over years of life experience, that they relish in applying to climate challenges."[107]

Climate Teach-ins are in Demand

Many stories of resilience came from young people who consider the formal education system to be inadequate in addressing climate change impacts and solutions.

Some stories suggest that the supply of climate education for young people does not meet the current demand. The Cameroon experience (*Opportunities To Improve Climate Education* in this chapter) suggests that the latent demand for climate education in that country's schools is substantial: every time the *Centre de Documentation pour le Développement Rural* responds to a partnership request from a school for climate education, the materials are adopted beyond the target year group because they are so popular. Once teachers, pupils, and families get their hands on climate information and games, they want to share this with others.

In both Vanuatu and Peru, the idea of growing food in climate-resilient ways for self-sufficiency provides "teachable moments" that are popular among teachers, pupils, and school families. These have expanded steadily from one school to another over time, as families see the food security and climate resilience benefits. In Vanuatu (*The Santo Sunset Environment Network* in Chapter 6), the network presents locally tailored workshops on kitchen gardening with indigenous crops that can weather adverse conditions. In Peru, (*The Afro-Peruvian Community of Zaña* in Chapter 6) outreach workers of the Afro-Peruvian Museum of Zaña motivate schools with similar hands-on methods.

Other stories of resilience describe how young people are organizing extra-curricular teach-ins on climate change outside of the formal education system. This includes via faith groups such as the Methodist Church of Zimbabwe (*Faith Groups Provide Space for Young People's Climate Leadership* in this chapter), where peer-based mobilization has been popular. Oscar Ryan Ouma (*The Eco-Activists of Busia County* in this chapter) and Nelson Chege (*Community Work Supporting Mental Well-being in Meru County* in Chapter 5) both describe their separate leadership efforts in different Kenyan localities to hold climate teach-ins for young people and the wider community.

Intergenerational Collaboration – not Conflict – is the Norm

Collaboration between young people (under 30) and older adults (over 60 years) is a common theme in the stories. We see intentional efforts to marry the skills, knowledge, and assets of the different age groups, across generations, to address adaptation challenges effectively.

A conceptual "meeting place" for young and old is the revival of Indigenous knowledge – as in the Old and Young Clubs re-learning sustainable water management in Rajasthan, India (*Old and Young Join Forces to Protect Precious Water Resources from Climate Stress* in this chapter) and the revival of indigenous drought-tolerant, nutritious vegetables in local family and school gardens (*The Santo Sunset Environment Network* and *The Afro-Peruvian Community of Zaña* in Chapter 6).

However, we also heard from intergenerational groups who are equally delighted to trial new technologies and innovations, such as producing biochar and its derivative products in northern Thailand (See *The Biochar Producers of Chiang Mai* in this chapter.) Intellectual curiosity often attracts older community members to climate innovations – these innovations certainly are not the preserve of the young.

Implications and Recommendations

- **In international media and policy forums, such as the UNFCCC, the optics are around intergenerational conflict over different ambition levels of climate action. However, at local level, cooperation rather than conflict is the theme of the stories of resilience analyzed for this report.** Adaptation champions, young and old, from diverse communities, design and carry out activities across generations and/or via alliances of younger and older people's organizations. In northern Thailand, the clubs mandate a mix of older and younger members. The various youth movements described in Kenya intentionally draw knowledge and inspiration from older people.
- **The preoccupations and anxieties of younger and older generations differ, but the opportunity to fuse old and new knowledge for adaptation action brings the generations onto common ground.** Younger people are anxious about their future and concerned about establishing their economic independence. Sometimes the climate-environment anxiety verges on psychological distress that collective action can help address. (Read more in **Chapter 5**.) Older people have different fears: that they will be blamed for environmental problems or seen as burdens on society, whereas they may be eager to keep learning and trying climate-environment innovations, and giving back to society. A collective desire for climate-related learning and action, including an intellectual curiosity that draws on sources of Indigenous and local knowledge and new scientific knowledge, creates common ground for climate action.

- **The eagerness of youth leaders to instigate climate education, including in faith or other community-based contexts, suggests that current institutions are not meeting climate literacy needs.** The call for stories for this report was open and the stories were not scientifically selected. We should therefore be careful about drawing firm conclusions from the sample. However, it is notable that many stories exhibited young people's direct leadership of climate outreach and education projects. While this is inspiring and illustrative of great progress, it also flags young people's frustration with the "missing climate content" of formal school curricula. These voices suggest that educational authorities may want to push further and faster in integrating climate-related topics into their curricula. Also, critically, one-size-fits-all curricula do not necessarily address the specific situations of the students and need local tailoring. For example, the climate change impacts and solutions will vary widely for residents of urban informal settlements versus pastoralist communities.

> **Older people hold diverse experiences and knowledge about how climate can impact their communities. They are socially connected and hold moral authority within their communities. The global population is aging rapidly. Older people are not only living longer but are also reaching old age in better health and education. Any climate actions would need to have their engagement.**
>
> Javeria Afzal, Climate Change Advisor, HelpAge International

- **The potential of older people's organizations to contribute to multifaceted, locally led, and anchored climate action has been under-tapped and overlooked.** With more time available as they transition from the full-time workforce, diverse lived experiences of climate change, and potential solutions, older people have much to contribute to locally led adaptation.
- **Older people are missing from the Locally Led Adaptation Principles and could be included.** Older people have something distinct to offer to LLA – as such, their contributions could be recognized and valued in the LLA Principles. This would create space for them to be involved as a distinct social group with distinct talents, knowledge, and contributions in locally led adaptation practice.

CHAPTER 5

PSYCHOLOGICAL RESILIENCE TO CONFRONT CLIMATE CHANGE

HIGHLIGHTS

- Climate change-related psychological distress is recognized as a major public health problem. Weather and climate-related disasters can create significant psychological distress for survivors. Even those who have not experienced a major disaster may suffer mental health problems linked to slow-onset and compounding damages they experience from climate change, such as losing their homes, livelihood prospects, or a sense of place.
- The most practical interventions to support those suffering climate-related psychological distress, particularly in countries with limited access to psychological care, are community-based. A range of locally led interventions implemented by community health workers, care workers, teachers, and others can help to create a more virtuous circle, building people's sense of agency, a positive outlook, and overall well-being, while reducing their vulnerability to climate change.
- Locally led adaptation itself is a strategy to address mental health impacts, by fostering people's sense of agency over their lives, giving them control, and helping them make sense of, and cope with, the changing climate.

Devolving decision making

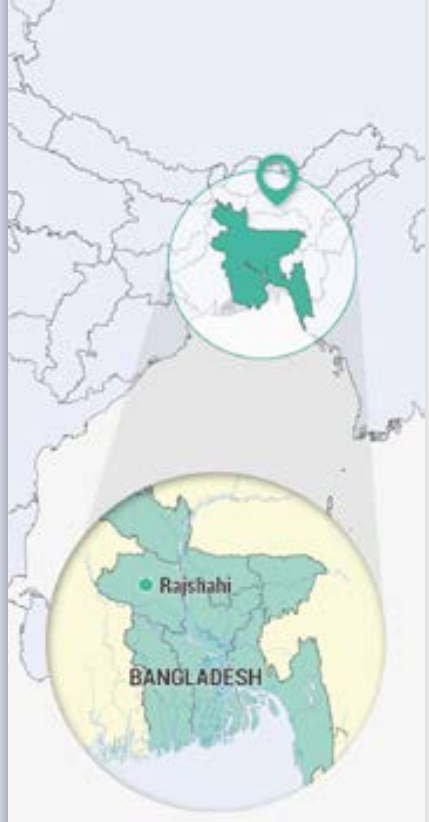
Addressing structural inequalities

Investing in local capacities

Building understanding

Transparency and accountability

IN THIS CHAPTER



LIVING WITH CONSTANT LOSS

Written by Saima Akhtar Afsha and Tabassum Amina
(BRAC Institute of Educational Development, BRAC University)

Asma (full name withheld) lives with her family on a precarious *char* (sandbar) in the Karatoya River in Rajshahi, in north Bangladesh. She has no fixed address: seven times now, she and her husband have rebuilt their home from salvaged bricks, and watched it crumble again into the river during the monsoons. Rather than uprooting themselves entirely from the community and moving to an informal settlement in a city, as thousands do in Bangladesh each day, they have come to accept that this will happen again. They stay on and pay the heavy toll extracted by an increasingly fickle and dangerous monsoon because they know that life will not necessarily be better in the city, where they will be the *"chorua"* (a derogatory word for people living on *chars*). The constant loss of their home and belongings continues to extract a heavy mental toll.

Sheuly (full name withheld) and her family, meanwhile, were forced to migrate to Mongla from another part of Khulna district. Any hope they brought to the city has long since dissipated. Mongla is severely affected by rising levels of salinity, resulting in an acute shortage of drinking water and soil on which to grow food. Employment is hard to come by – for women, but also for men. Children have no incentive to go to school, and child marriage and anti-social activity by young people is rampant. Sheuly finds solace in her friendships with the other women in the settlement, but her stress levels – and those of her family and friends – are constantly high.

> **I had given up on going out to work, to socialize, to give meaning to my life. After receiving support from a paracounselor, I feel as though I have found a new reason to go on living.**
>
> Sumaiya Saima Akhtar Afsha, BRAC

Severe shortage of food and clean water in flood-prone areas.

Counseling session with a mother.

Floods and river erosion are not alien to people in Bangladesh, although the increasing severity and frequency are attributed to climate change. While community cohesion has always been a strong adaptive response to deal with these disasters, acknowledging the mental health impacts of constant loss and sustained stress is often a social taboo.

Groups already affected by social inequalities, such as those with existing mental illness or living in poorer countries, are more likely to be affected by climate change, less likely to have access to support and resources to mitigate against the emotional impacts of climate change, and at higher risk of negative mental health and well-being outcomes. The effects of climate change on mental health are therefore a driver and compounder of health and social inequality.[108]

Recognizing the severe impacts of mental health on physical health, the **Global Center on Adaptation** (GCA) is working with **BRAC**, an international development organization based in Bangladesh, and Columbia University's **Billion Minds Institute** project, to document the psychological impacts of climate change on poor and vulnerable communities in Bangladesh. GCA and BRAC are supporting communities to develop locally led People's Adaptation Plans in secondary cities, to inform investments by international financial institutions. With support from the Billion Minds Institute, communities developing such plans will be encouraged to explore the psychological impacts of climate change on the poor, through the community-led vulnerability profiling and enumeration that takes place during this planning process.

Efforts are also underway to explore potential ways to address these impacts, learning from efforts to deal with mental health impacts in the broader development context. The BRAC Institute of Educational Development (BRAC IED), for example, trains and hires women from within the community to serve as "paracounselors". Women aged between 20–35 years with empathy and motivation, as well as social, communication, and rapport-building skills, are recruited from within the community as field staff. They undergo a five-day basic training program that provides basic knowledge of mental health and psychosocial support. They are taught methods such as rapport-building; observation; interviewing; data and information collection; analysis and assessment; and safety and safeguarding.

People await assistance after losing their belongings and being displaced in a cyclone.

Each trainee is then paired with an experienced psychologist for handholding and supervision. The psychologists provide experiential learning opportunities by sharing their experiences and allowing the trainees to observe sessions. Following a 15-day handholding session, trainees are assessed on their knowledge and skills before they are allowed to attend to the psychosocial well-being of members of their community.

Where BRAC IED has existing programs, the paracounselors identify individuals to support through observation and informal conversations. In areas without programs, they visit individuals based on referrals. The paracounselors are popular in their communities, and their services are sought after. They receive continuous skills development through group supervision and refresher training, as well as psychosocial support when needed.

BRAC IED's paracounselors report high levels of hopelessness, fatalism, fear, anxiety, sleeplessness, and a persistent sense of loss among people living in areas affected by extreme and slow-onset climate impacts. This is borne out by a 2023 study in Bangladesh, which found that individuals experiencing a 1°C higher temperature had a 21% higher probability of reporting an anxiety disorder, with a 24% higher likelihood of experiencing both depression and an anxiety disorder at the same time. The study notes that mental health conditions can have physiological manifestations for individuals, increasing out-of-pocket expenses while negatively impacting quality of life and productivity. At a national level, these effects can lead to an increased financial burden on healthcare, hinder economic growth, and raise levels of poverty.[109]

INDIA'S FARMER SUICIDES LINKED TO CLIMATE CHANGE

Over 650 farmers committed suicide in the central region of Maharashtra, India from January to August 2023. One study attributed these deaths to the impact of climate change on monsoons, indebtedness, the water crisis, technological inaccessibility, unaffordability, unforeseen events such as the COVID-19 pandemic, and agricultural policies.[110]

Another 2023 study concluded that periods of below-average rainfall leading to drought conditions are driving an increase in the number of farmer suicides in rural India. The results were based on an analysis of rainfall patterns between 2014/2015 and 2020/2021 across five Indian states with particularly high suicide rates – Chhattisgarh, Karnataka, Madhya Pradesh, Maharashtra, and Telangana. During periods of lower-than-normal rainfall, the number of farmer suicides was found to have risen. Using regression modeling, the study concluded that for a rainfall deficit of 25%, the number of farmers dying by suicide in a year would increase to 1,188 individuals.[111]

Both studies recognized that in addition to anticipatory and shock-responsive social protection and insurance, mental health programs and counseling services tailored to the needs of farmers and their families are necessary. Raising awareness about mental health issues can reduce the stigma associated with seeking help. In addition, India has Accredited Social Health Activist workers – a large, established healthcare volunteer group – who could act as "mental health first aiders". They already work in the community to raise awareness, identify people experiencing stress or at risk of suicide, offer personal and family counseling, and refer complex cases to specialized psychiatric services. When a climate event hits, these volunteers could organize peer support sessions for anxious farmers and/or arrange professional counseling.[112]

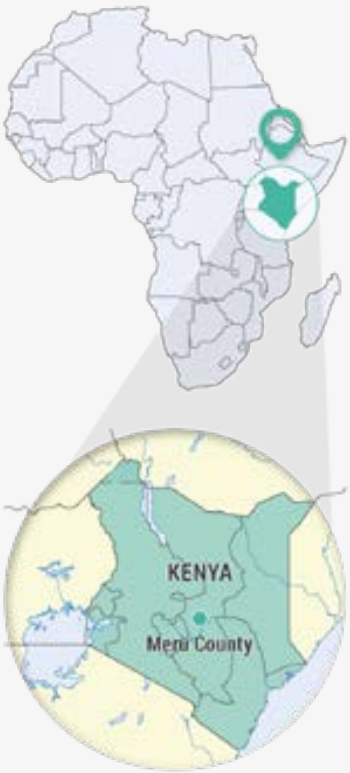
RESILIENCE AND COPING IN PSYCHOLOGY – CONCEPTS

resilience: *n.* the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioral flexibility and adjustment to external and internal demands. A number of factors contribute to how well people adapt to adversities, predominant among them (a) the ways in which individuals view and engage with the world, (b) the availability and quality of social resources, and (c) specific coping strategies. Psychological research demonstrates that the resources and skills associated with more positive adaptation (i.e., greater resilience) can be cultivated and practiced. Also called **psychological resilience**. **resilient** *adj.*[113]

coping strategy: *n.* an action, a series of actions, or a thought process used in meeting a stressful or unpleasant situation or in modifying one's reaction to such a situation. Coping strategies typically involve a conscious and direct approach to problems, in contrast to defense mechanisms.[114]

Source: American Psychological Association, *Dictionary of Psychology*

Nelson Chege.



COMMUNITY WORK SUPPORTING MENTAL WELL-BEING IN MERU COUNTY

As narrated by Nelson Chege, Vice Chair, Central Imenti Environmental Rehabilitation Program

Central Imenti, quite literally in the center of Kenya in Meru County, has always been lush green and covered in a patchwork of farms and forest cover. The larger farms grow cash crops like the lucrative *khat* leaves (sold in neighboring Somalia), coffee, tea, and avocados. Small-scale subsistence farmers grow food crops such as maize, cabbage, and tomatoes for personal use and to sell. This has become more difficult in recent years, however, as climate change has decreased agricultural production and driven down maize yields. Even farmers who were previously unwilling to engage with climate change issues now realize that climate change is "at their doorstep".

The Central Imenti Environmental Rehabilitation Program (CIERP) was established in 2009 by a group of residents seeking income through community farming. The founders, mostly retirees, started tree nurseries and propagated seedlings for sale. The small income they generated from this went a long way. Their efforts initially thrived, but later declined as the founders became older. This prompted the involvement of a fresh cohort of younger members joining the program.

Founding member Emma Njue Introduced her daughter Leah Mature and granddaughter Lynn Nkirote to CIERP. Another founding member, Stella Kinua, brought in her daughter Sharon Gakii who in turn, has brought in Stella's grandson Kelvin Mutuma.

New intergenerational collaboration preparing seedlings.

Watering of seedlings.

CIERP's new young leaders have reoriented CIERP's work towards addressing climate change. In addition to expanding the tree planting and income diversification activities, they have significantly extended the group's activities in support of the psychological wellness of farmers who suffer losses due to the impacts of climate change.

This strategic shift was motivated by a commitment to holistic climate resilience. Anxiety and depression are regarded as issues that need to be addressed in their own right, as part of people's well-being. Mental well-being is also critically important if people are to mobilize effectively to confront the climate crisis.

The transition empowered the organization to actively destigmatize mental health concerns, as well as to foster open dialogues and collaboration with entities such as **The Stronger Project**, to advance community well-being. The Stronger Project is a youth-led community-based organization in Kenya that supports persons with psychosocial disabilities. Its programs include a Lived Experiences Leaders Program for social inclusion of young people with mental illness and psychosocial disabilities; a Walk in the Park Program that provides a safe space for individuals to share their challenges and best practices; and an Art 4 Wellness Program that combines therapy, advocacy, and art, with certified therapists and counselors offering pro bono services, as well as mental health advocates providing mentorship. The program includes live music performances, talks, competitions, theater, and live art, with a focus on personal growth, awareness, and healing.[115] *The Stronger Project Magazine* won the **Ember Mental Health Creative Fellowship Award** in 2022.[116]

Following the collaboration with The Stronger Project, CIERP has adopted an integrated approach for their climate change work that also addresses its psychological impacts on individuals and communities through community-wide initiatives aimed at transforming behaviors, attitudes, and perceptions. This includes encouraging open conversations about mental health led by professionals from The Stronger Project, and youth rehabilitation programs for substance abusers. They have found that youth workers, teachers, pastors, and other community leaders, although lacking advanced clinical training, are well-suited to provide essential support and guidance.

CIERP also found that group activities, such as tree planting and community projects, offer significant benefits for mental well-being. These collective, productive activities foster a sense of belonging, purpose, and accomplishment that can be as effective as other traditional forms of therapy. They also complement CIERP's broader environmental efforts and contribute to community resilience.

CIERP engages the community in planting a diverse variety of trees for ecological, medicinal, and edible purposes, recognizing that the trees can counter the fierce winds and rains experienced in the area, while also providing health, nutrition, income, and well-being benefits. They plant, for example, African wine palm (for stabilizing riverine areas and curbing soil erosion); Elgon teak (drought-resistant, fast-growing, and providing good leaves for livestock fodder); Elgon oak (excellent for preventing erosion); crotons (for fertilizer and cattle fodder); dragon fruit (drought-resistant and with medicinal uses); macadamia nut trees (for income-generation opportunities and cooking oil); and yellow passionfruit, guava, avocado, and pomegranate trees (for nutrition and food security). The organization either leases land for tree cultivation, or community members contribute previously unproductive land.

Indigenous seedlings ready for loading and transportation for a tree planting activity.
© CIERP

A woman farmer at her work.

Community members receive training in a range of skills linked to climate-resilient livelihoods, including:

- Table banking, where members of a local savings group pool – or "put on the table" – their contributions, referred to as shares, and are entitled to a short- or long-term loan at low interest – 97% of table banking members in Kenya are women.[117] This nurtures a savings culture while supporting entrepreneurship, investment, and financial planning and budgeting.
- Agribusiness skills, such as fruit farming and beekeeping.
- Value addition by processing fruit, honey, and bamboo products.
- Green energy solutions, such as installing greenhouses and solar energy in remote areas.
- Ecological restoration activities.

CIERP also creates awareness, and offers training, on diversity, equity, and inclusion of all people regardless of race, gender identity, ethnicity, religion, disability, age, and sexual orientation. An estimated 5,000 people have benefited through economic and social empowerment; food and water security; capacity and skills enhancement; and reduction of gender-based violence.

> **Our initiatives reflect our commitment to a comprehensive climate resilience approach and align with the evolving global discourse on mental health.**
>
> Nelson Chege, Vice-Chair, CIERP

Tree planting activities at a local primary school in Meru County.

How Challenges Are Addressed

CIERP has succeeded in bringing together different generations and community groups to facilitate collaboration, knowledge-sharing, and collective action to address the multifaceted impacts of climate change, including on mental health. The community's receptiveness to new learning has enabled CIERP to disseminate information, implement sustainable practices, and strengthen community-based psychosocial support effectively.

However, while there is a strong thirst for knowledge on climate change and resilience-building among the rural population in Imenti, CIERP has found it difficult to scale up its activities by involving more schools, churches, women, and youth groups because of the lack of funding for inputs such as seeds, and capital assets such as greenhouses and land.

CIERP sustains its activities through the strong motivation and generosity of its members. The members volunteer their time and resources, and the program generates a small income from produce. Almost all members (except the retirees) have other sources of income. Some are teachers and traders in the local market. The young men carry out odd jobs in construction and ferrying people/goods on motorbikes. The women are farmers and homemakers.

While funding has been secured from a multilateral organization, contracting and due diligence processes are taking exceptionally long – a year after receiving the good news, the funding is yet to arrive. More rapid, agile, and responsive funding – proportionate to the local scale and need of their enterprise – would benefit the group.

KEY TAKEAWAYS

There are several ways in which climate change is linked to psychological distress:

- **Psychological trauma arises from climate-related disasters.** More people suffer from psychological trauma after extreme weather and climate events, than from physical harm. These mental health effects are often long-lasting.[118]
- **People suffer anxiety about their future, based on climate change impacts they have experienced.** The stories in this publication, as well as in the *2022 Stories of Resilience*, describe many ways that people in local communities are experiencing psychological distress because of the climate emergency. Mental health echoes through many stories as a persistent theme. Storytellers described this distress as the torment of scorching days and lack of escape from the heat; the anguish of wildfires and landslides; the stress when groundwater aquifers or freshwater lenses are contaminated with saltwater from rising seas; the fear of the coming storm; and the trauma after the storm, when survivors have to rebuild.

  People also experience anxiety in the absence of a disaster event,[119] arising from feelings that bad things are happening outside the sphere of individual control and cannot be influenced by individual behavior change or even advocacy, even within democratically accountable political systems.[120]

> **Climate change further leaves a psychological imprint on young people. Uncertainty and fear surrounding climate change induce stress and anxiety. The destruction of homes and communities from climate-related disasters evokes feelings of displacement, sorrow, and grief. Climate change also exacerbates existing mental health conditions, including depression and anxiety.**[121]
>
> Ian Francis Onyango, Co-founder, Kenge Content Hive (See *The Eco-Activists of Busia County* in Chapter 4)

- **Those already suffering from mental illness are rendered more vulnerable.**[122] Our understanding of people's climate vulnerability to climate change now extends beyond the socioeconomic processes described by the Intergovernmental Panel on Climate Change in its definition of climate vulnerability. People's physiological state, both physical and mental, can also affect their vulnerability. Public health interventions can strengthen people's psychological resilience and reduce this vulnerability.
- **Heatwaves have been correlated with increased suicide rates.** Links between heatwaves, temperature increase, and suicide have been made in countries such as Australia, the United States, Mexico, India, Finland, France, and the United Kingdom. According to a French study, a 1°C rise in temperature increases the number of deaths by suicide by about 6%.[123] A 2021 study that analyzed data from 60 countries between 1979 and 2016 found that temperature alone may not be enough to understand the risks posed by a rapidly changing climate, but that humidity also must be considered. Younger age groups and women seemed to be more significantly affected by incidents of fatal self-harm with changes in heat and humidity in comparison with the rest of the population, raising questions on the unequal socio-economic impact of rising temperatures going forward.[124]

Existing community institutions, and personnel without formal clinical training, can deliver mental health support.

- **Infrastructure damage and institutional disruption (or reallocation of resources)** in the aftermath of a disaster may further disrupt what mental health support previously existed (and which was likely to have been insufficient).[125]
- **Heatwaves disrupt people's ability to exercise with knock-on effects on psychological well-being.** Lack of exercise can have negative impacts on people's mental health. During the past ten years, the number of hours during which people faced heat stress risk while undertaking physical activity has increased, especially in medium Human Development Index countries.[126]

Community-based Psychological Treatment

In low- and middle-income countries, little formal, clinical psychological treatment is available for mental health disorders such as depression, anxiety, and post-traumatic stress.[127] In Zimbabwe, for example, there are only ten psychiatrists for a population of 13 million people.[128] In this context, lay health workers, or health assistants and nurses, as well as other community workers (such as teachers), may be the most appropriate providers of mental health support services in communities – assuming that they are given simple guidance on how to do so.

Where community-based treatment options are being delivered for common mental illnesses, they are showing good results. Psychological treatments by community health workers, care workers, teachers, and other non-clinical specialists in local settings can be given at "low cost, [with a] widely available human resource [and] have moderate to strong effects in reducing the burden of common mental disorders."[129]

Several stories in this report validate the application of general, community-based support measures for mental health to climate-related psychological distress. *Living with Constant Loss* and *Community Work Supporting Mental Well-being in Meru County* in this chapter describe how good general mental health support approaches can be effectively used with people who have suffered physical climate-related harms or are simply anxious about future impacts and the fate of the planet at large.

There are several other initiatives described in this publication that are explicitly addressing people's psychological fragility and distress related to other circumstances in their lives, such as extreme poverty, gender-based or other violence, persecution, crime and conflict, or physical illness. These include *The Women of Kampala's Slums* (Chapter 3) and *The Story of the Songtaaba Association* (Chapter 2), where local adaptation leaders recognize mental health support as having a material bearing on people's vulnerability to climate hazards and their general resilience.

Locally led adaptation itself is a strategy to address and reduce mental health impacts, by fostering people's sense of agency over their lives and giving them control. Communal activities also help people make sense of and cope with the changing climate.

In Kenya, for example, activities of the Kenge Content Hive with Lake Victoria Basin communities (see *The Eco-Activists of Busia County* in Chapter 4) are seen as a way of addressing anxiety by giving young people greater agency over their environment, as voters and political advocates, and as producers and consumers. Group co-founder Ian Francis Onyango recognizes the critical roles of governments in taking decisive action to curtail greenhouse gas emissions and implement effective climate change adaptation policies, but views local action as equally important, from both psychological and material perspectives.

> **Equally important is educating young people about climate change impacts, empowering them to make informed decisions and reduce their carbon footprint. Moreover, involving young individuals in the decision-making process is crucial, ensuring their voices are heard and their concerns addressed.**
>
> Ian Francis Onyango, Co-founder, Kenge Content Hive

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Community health workers not only help people with physical health issues, but can also provide support measures for climate-related psychological distress.

In Kampala, Uganda, the work of women-led LUCOHECO goes beyond economic and environmental activities to make its members more climate-resilient. The way they do the work – with low-income women in charge of the plans and deciding the priorities – is not only economically and environmentally beneficial but strengthens their resolve and their psychological resilience. Intentional, mutual support activities target mental health.

> **LUCOHECO initiated support groups in the community by procuring livelihood supplies such as brick-making materials, backyard or sack gardening, seedlings, and livestock, using education techniques that support these groups to ensure reduced food insecurity, improved dietary intake and also strengthen family and community relationships. Financial literacy training gives them skills in savings and microcredit finance and how to start small-scale income-generating projects for self-sustainability. Mindset change training fosters positive attitudes for improved resilience, while refresher training for community health workers and volunteers prevents burnout.**
>
> **We use these approaches because we know that climate change affects people differently and therefore it is important to approach it holistically. These approaches put women at the forefront – not as beneficiaries of programs but as agents of change, as they are most affected by the effects of climate change.**
>
> Maxensia Nakibuuka Takirambule, Founder and Executive Director, Lungujja Community Health Caring Organization (LUCOHECO)

There are also increasingly rich, community-based strategies for psychological treatment in the literature that are relevant, and transfer across to, the treatment of climate-related traumas, depression, and anxiety. These documented successes are not specific to treating climate anxieties – they pertain to mental health disorders more generally (which could be related to people's physical illnesses, such as HIV/AIDS and post-partum depression; as well as to conflict, bereavement, poverty, or other non-specific causes). However, the lessons are still relevant to climate change, and as discussed above, people who are more psychologically resilient are better prepared for shocks of all kinds, including climate shocks:

- **Goa's Healthy Activity Program.** In Goa, India, patients with moderately severe to severe depression symptoms responded very well to a Healthy Activity Program, through which psychological interventions are delivered by lay counselors in routine primary care settings in communities. The program involves six to eight sessions of psychological treatment, based on "behavioral activation" methods that lay counselors can follow easily, using a manual. Methods involve educating patients about thoughts and feelings, assessing their behaviors, providing structures and schedules for their activities, as well as tracking activities, problem solving, and motivating patients' participation in social networks.[130]

  Patients who followed the Healthy Activity Program were found to have reduced depression symptoms, compared to those outside the program. The excellent results led researchers to conclude that such brief psychological treatments are "acceptable, feasible, and cost-effective for management of moderate to severe depression, even when delivered by non-specialist health workers in routine health-care settings in previously untreated populations. Such treatments should be scaled up as a key strategy to address depressive disorders, the leading mental health disorder worldwide."[131]

Public health workers can provide psychological support to different groups of people.

- **Increasing mental health literacy.** Mental health literacy efforts can increase the social acceptability of talking about mental distress and the likelihood of people seeking help. Also in India, the Vidarbha Stress and Health Program (VISHRAM) combined the Healthy Activity Program method with mental health literacy efforts. The layered intervention worked as follows: community health workers held small group meetings in communities and visited families to increase awareness of mental disorders. They also told people about the availability of mental health services. They identified people with symptoms of depression and provided them with mental health 'first aid'. Those with greater needs were referred to health counselors or health facilities where they could consult a general physician or a psychiatrist.

  Researchers noted the usefulness of mental health literacy activities in boosting people's willingness to talk about their depression and seek help for it.[132] After 18 months, the proportion of people with a mental disorder seeking care was six times greater than at the beginning. Suicide rates were down, although the population size was small, and the statistical significance was difficult to judge.[133]
- **Adapting problem-solving therapy for the community.** In Zimbabwe, lay health workers are trained in the Friendship Bench method to help people to reduce the symptoms of common mental health issues such as depression and anxiety.[134] The method involves six one-to-one "problem-solving psychological therapy" sessions, spread three to four days apart. Problem-solving psychological therapy, an internationally recognized intervention, aims to enable a more positive orientation toward resolving problems and empowering people to have a sense of greater coping and control over their lives.[135]

In Zimbabwe, it was adapted to local, culturally appropriate circumstances, and delivered locally by supervised lay health workers. The lay health workers runs the six sessions on a bench placed discreetly at the primary care clinic. The patient identifies a problem (such as unemployment) rather than a diagnosis or symptom of mental illness. Lay health workers follow a structured script to coach the patient to identify an element of the problem for which there is a practical solution. They talk the patient through how they can resolve it. In the case of non-attendance, they follow up with patients via texts, phone calls, and home visits. Patients are also invited to opt into accompanying peer-to-peer support group meetings.

The Friendship Bench interventions – along with information about mental health conditions – showed better patient outcomes at six months than standard care. (Standard care includes a nurse-led mental health evaluation, brief support counseling, assessment for antidepressant medication, and/or referral to a psychiatric facility if needed, along with information on common mental disorders.) These results were especially promising because administering problem-solving psychological therapy does not require extensive professional training like other interventions, such as cognitive behavioral therapy.[136]

- **Treating people with post-traumatic stress.** Under the Problem Management Plus (PM+) intervention in Peshawar, Pakistan, doctors in primary care referred patients with psychological distress to a brief program delivered by lay workers. The lay workers had 12–16 years of education but no formal training in clinic psychological treatments. Each group of lay workers was supervised by a medic with psychology training.

  Over five weekly sessions, the lay workers employed motivational interviewing techniques to improve engagement, provided information about common reactions to adversity, and taught participants slow breathing as a basic stress management strategy.[137] They then helped the participant to identify a problem in their life and discuss it, applying problem-solving and stress management techniques. As with the other community-based methods discussed above, PM+ also walks the participant through various strategies to strengthen their social networks and reduce social isolation. It is 'transdiagnostic', targeting symptoms across a range of mental health conditions. Participants in the program were found to have considerably lower scores on depression after three months, and significantly less post-traumatic stress, compared to a control group.[138] The PM+ intervention is described in manuals of the World Health Organization's Mental Health Gap Action Program and is readily accessible online.[139]

> **Adapting to or mitigating climate and ecological change, endure its consequences, or turn ambitious policy into equitable and sustained results on the ground, will depend on investment in the "social climate" — that is, community emotional resilience, mental health, and their mutual reinforcement of social ties and collective efficacy.**[140]
>
> Gary Belkin, Director, Billion Minds Project, Columbia University

School teachers can deliver mental health support.

Implications and Recommendations

Climate change is a huge problem that feels overwhelming for any country, let alone at the community or personal level. As the negative impacts of climate change are becoming increasingly severe, these losses and damages are felt acutely at the community and personal level. In other words, climate change has all the aspects of a problem that is likely to make people despair.

We can learn from both LLA initiatives that are designed to address climate anxiety and more general community-based interventions to address depression and anxiety. Both point to common success factors for effective, community-based, low-cost approaches that are relevant for helping people cope psychologically with climate change. These approaches can be achieved without specialist clinical psychological training and delivered by local health care and social workers, teachers, and other trusted community figures.

The success factors point to:

- **Increasing mental health literacy**, to get people to talk and learn about the mental health impacts of climate change and be willing to seek help. This could include recognizing that climate-related anxiety is an issue, it is valid, other people suffer it too, and there are ways to deal with it.
- **Organizing safe spaces for talk therapy** among people with similar concerns and experiences, guided by trusted community figures such as lay counselors.
- **Using counseling techniques** that break down the huge problem of climate change impacts into smaller problems that have actionable solutions by an individual – actions that are meaningful and show visible results, such as removing litter from waterways that exacerbate climate change-related flood risk, or planting trees that anchor soils and so reduce landslide risk and provide shade and natural cooling.

- **Making available mental health support tools and guidance for the use of lay counselors, health workers and other non-specialists** in primary care contexts or simply in the community (including in homes and social spaces) without the need for them to receive long, difficult, or expensive training. These could be tools such as manuals for structuring supportive conversations with people who are experiencing climate-related anxiety.
- **Mobilizing collective action on climate solutions** in communities, so that the visibility of positive action on climate change is amplified through group effort – therefore creating uplifting psychological rewards.

Earlier in the chapter, we discussed how people's exposure to climate hazards, such as extreme heat, is linked with suicidal thoughts and behaviors. To some extent, the community-based mental health interventions shared here can be used to reduce the psychological symptoms of heatwaves and strengthen people's psychological resilience to further shocks of this kind. However, reducing people's exposure to heat stress would be key to avoiding these psychological harms. Locally led strategies can be used to physically cool the environment and in this way, reduce heat stress on people, with its physical and mental manifestations. However, as with all aspects of the climate crisis, constraining the global burden of such illnesses depends ultimately on limiting global warming itself: treating the cause as well as the symptoms.

CONNECTING CLIMATE MINDS

There is still a vast need for evidence about both the mental health impacts of climate change in all its dimensions, and the potential and existing experience of community-based interventions in the Global South. These are early days for understanding the connections and ramping up research agendas to address this critical area of work. A project called Connecting Climate Minds, involving numerous consultations in communities across Africa, Asia, Latin America, and small islands, currently aims to define the gaps in the evidence, as a basis for advancing action research.[141]

Women on the bank of the Narmada River.

CHAPTER 6

INDIGENOUS KNOWLEDGE TO NAVIGATE MODERN COMPLEXITY

HIGHLIGHTS

- Climate change has become an amplifier of multiple stressors on Indigenous communities and their ways of life, including demographic and commercial pressures – often from external actors.
- Indigenous and customary governance systems sit alongside the modern machinery of the state in the stories in this chapter, supporting the reinvigoration of climate-resilient Indigenous knowledge and practice. The compatibility of multiple governance and belief systems can, however, vary from context to context.
- Indigenous communities are adapting their knowledge systems and solutions to the complexities of a climate-compromised world. They are also eager to access modern technologies and scientific methods to accelerate adaptation. Modern scientific methods and financier practices should also draw on Indigenous knowledge to rethink orthodox development practices that undermine local understanding and leadership.

Devolving decision making

Addressing structural inequalities

Investing in local capacities

Building understanding

Flexible programming and learning

Collaborative action

IN THIS CHAPTER

Allan Taman, Chairman, Santo Sunset Environment Network.

THE SANTO SUNSET ENVIRONMENT NETWORK

As narrated by Allan Taman, Chairman, Santo Sunset Environment Network, and George Koran, Coordinator, Climate Action Network

Sunsets are especially spectacular from the western side of Espiritu Santo, the largest island of the archipelago country of Vanuatu in the South Pacific. So much so that they feature in the name of the **Santo Sunset Environment Network** (SSEN), an Indigenous-led network of community champions working for climate-resilient and socially just development on the island.

Espiritu Santo is home to the Santo Mountain Chain Key Biodiversity Area – a spine of mountains that runs down the island's western side – and to endangered and endemic species such as the Santo Mountain Starling, Vanuatu Flying Fox, Santo Kauri, Vanuatu Megapode, Vanuatu Imperial Pigeon, and Voutmele Palm.[142] The Indigenous Peoples of the island consider themselves the guardians of this precious natural resource.

Privileged though they are to live in a unique and extraordinary environment, these Indigenous Peoples have distinct vulnerabilities. Vanuatu is highly vulnerable to climate change and disaster risks. Communities in the lower-lying coastal areas of the islands are at high risk of sea level rise.[143] The country experiences multiple climate hazards including cyclones, storm surges, landslides, flooding, and droughts, which are all expected to become more intense. It is also highly exposed to geophysical threats such as volcanic eruptions, earthquakes, and tsunamis.

Allan and community members receive supplies for disaster recovery projects.

A team from SSEN conduct adaptation awareness with chiefs and community leaders.

Vulnerability to these hazards is compounded by a heavy reliance on subsistence farming and natural resources for livelihoods and food security, as well as a rapidly growing population, both in urban and rural areas. The population is poorly served by development infrastructure: Vanuatu's 83 islands span vast areas of the Pacific Ocean with limited means of transport to connect them. For example, traveling from Luganville, the main town of Santo on the southeast coast, to western Santo, involves a long ride on a small, open boat – and only when the weather permits. Western Santo has no roads, no banks, no hospitals, and very unreliable mobile phone coverage. Many villages in the area have no mobile phone coverage at all.

Santo Island is home to hundreds of Indigenous tribes, clans, and linguistic groups. Western Santo falls under the customary jurisdiction of the Jarai Alo Kolo Council of Chiefs, and this jurisdiction alone has at least seven distinct Indigenous languages.

The people of western Santo recognize that they will need to draw on traditional wisdom to navigate the complexities of the modern age. For them, the transmission of Indigenous knowledge across generations has always been fundamental – not only to protect their identities, but also to ensure the sustainability of their livelihoods, resilience to disasters, and culturally appropriate economic development.

Against this background, SSEN works to nurture greater adaptive capacity and long-term climate resilience of the local population, by forging equitable partnerships between local and marginalized actors and the government, non-governmental organizations, and private sector.

Ecosystem Resilience is Community Resilience

SSEN was created in 2017, following a Critical Ecosystem Partnership Fund (CEPF) workshop that called for the establishment of a local conservation network to develop locally driven biodiversity conservation strategies. From these beginnings, SSEN has grown to a network with over 250 volunteers, representing the interests of 42 communities on the west and northwest coasts of Santo Island.[144] SSEN has supported and empowered individuals, villages, and communities to create six Community Conservation Areas, as well as to design and implement effective, inclusive, resilient, sustainable development strategies in keeping with traditional livelihoods.[145]

The network trains local people to diversify economic production as a strategy for income generation and broader resilience-building; revitalize traditional livelihood skills; reduce reliance on imported goods with volatile prices; and support value addition from the sustainable harvesting and processing of local, natural resources. Drawing on Indigenous knowledge that firmly recognizes ecosystem resilience as community resilience, these activities are focused on biodiversity protection to shore up the resilience of the ecosystem, and on reducing climate vulnerability through improved livelihood and food security.

Women Self-Organize for Environmental Defense and Sustainable Wealth

A key focus for SSEN is to strengthen the leadership, institutional, networking, coordination, and advocacy capacities of women. A Women's Environment Network, which is part of the larger SSEN, the women's initiative has successfully responded to three recently emergent environmental threats in the remote western Santo area:[146]

- Village families are forced to increase the wild harvest of plants and animals, including endemic and endangered species like the Vanuatu Scrub Duck, Hawksbill Sea Turtle, and Vanuatu Flying Fox to meet food security requirements during and after the COVID-19 crisis.
- A Chinese-funded logging company in May 2021 started paying off local chiefs to encourage landowning families to sign timber harvest agreements in primary rainforests.
- A Malaysian-based company in June 2021 started prospecting along the ridges of the mountains of the Santo Mountain Chain Biodiversity Hotspot.

Women rangers assess landslide disaster damage impacts.

SSEN rangers.

This network also trains and provides equipment to women rangers from within the community to map, monitor, and report on environmental degradation, including that caused by logging and mining. As a result, dozens of Indigenous women rangers have been empowered as influential actors to participate in decision-making processes that affect and promote Indigenous women's rights in western Santo.

The women rangers use apps on mobile phones to map their Indigenous land areas and conduct biodiversity assessments that truly show the value of forests and local ecosystems. These tools allow them, and other Indigenous leaders, to make accurate cost-benefit analyses when considering logging and mining offers. When a commercial logging enterprise enters a community, the rangers help chiefs and authorities evaluate the implications of their proposals.

The women used their new data and increased skills, boosted also by their improved self-confidence, to persuade the customary chiefs to adopt a formal logging ban in western Santo.

> **Involving women in climate adaptation work not only elevates social inclusion but indeed, is necessary. Much of the adaptation knowledge lies with women because in the local Indigenous culture, women look for food in the forest and the coral reefs, look after the elderly and children, and are also involved heavily in gardening.**
>
> George Koran, Coordinator, Vanuatu Climate Action Network

Community women's empowerment and leadership roles is a key focus for SSEN when addressing climate change and adaptation activities in western Santo.

The women rangers' successful defense of the environment unfurled quickly from 2020 to 2022. In the wake of a nationwide economic shock caused by the COVID-19 pandemic, the national Forestry Department began to promote extractive logging in western Santo, inviting both local and foreign timber companies. By early 2021, these logging operators had begun intensive campaigns to formalize arrangements for logging along the length of the Cumberland Peninsula in western Santo. Through their agents, they promised local communities that they would build a logging road along the coast. As the communities along the coast are extremely isolated and rely on boats to reach schools, clinics, and markets, this road was promoted as a positive development.

The SSEN feared that, rather than simply building the road, the logging operators would take advantage by logging well beyond the proposed road site. The future repercussions of such an operation would have incurred deeply negative impacts upon the Santo Mountain Chain Key Biodiversity Area – not only through loss of forest cover and biodiversity but also due to the opening up of this pristine environment to the spread of invasive species.

In the village of Hokua, a commercial logging company signed an agreement with one landowner. Although the agreement was only to cut one major tree species, more than 10 species were being felled. Milred Tala, one of the new rangers, began documenting the illegal logging, and organized a group of women who are now actively petitioning local authorities to remove the company from the area; operations were suspended at the time of writing. Tala worked closely with the new woman ranger from the neighboring village of Wunpuko to ensure that the company would not gain any foothold or expand its operations any further there.

In the village of Sauriki, newly trained ranger Femari Weatesusu became an expert in mapping local high biodiversity areas with her tablet and mobile apps. She helped the women in her village to understand visually the extent of a proposed mining operation. After in-depth consultations, the community women banded together to agree to no mining or logging in their area.

In total, trained women rangers visited 23 villages across western Santo to discuss the local impacts of logging and related roadbuilding and mining activities. In November 2022, they held a major Anti-Logging Summit in Wunpuko Village comprising five days of deliberations and sharing of experiences. The 63 delegates released a No Logging Resolution, which formally calls for a ban on future commercial logging anywhere in western Santo as an unsustainable and undesirable activity. The Resolution was signed by Chief David, Chair of the Tarpoe Council of Chiefs, and Chief Lency Rovo of the Jarai Alo Kolo Council of Chiefs, as well as West Santo Women's Representative Donathon Aram Maliu. The women rangers then presented the resolution to the full Council of Chiefs for their further endorsement in early 2023.[147]

Meanwhile, women rangers are also leading deliberative processes in local communities to shift wild harvesting and foraging to more abundant species, to ensure sustainability. In the village of Molpoi, sea turtle nesting is common. Poaching of turtle eggs was a major issue until Estelle Peter was trained as a new Santo Sunset Women's Environment Network ranger. She learned that the over-exploitation of eggs would lead to a local nesting population collapse. She took matters into her own hands to organize women-led beach patrols to observe, investigate, and fine turtle egg poachers in the area. This represents the first time a woman in the village of Molpoi has played such a high-profile and leading role in public natural resource management.

The activities of the Santo Sunset Environment Network, and the women's network within it, have raised the profile and influence of women in collective decision making and as recognized ecosystem stewards. Before customary authorities had not approved travel for women and girls from the villages for training purposes, but they have sufficient trust in SSEN that they now support these activities.

Women are traditionally not chosen as chiefs in the area's customary governance structures. However, the women rangers' initiative to hold the Anti-Logging Summit, and the willingness of the customary chiefs to endorse their resolution, marks a shift in recognition of local women's knowledge and voices. When women organize, it makes a difference.

> **In November 2022, as part of the women-led Anti-Logging Summit, the rangers held multiple discussions with chiefs and traditional authorities about the dangers of logging operations on customs and culture. It became clear that customs do not condone the commercial sale of local timber resources for purely economic gain at the expense of local environmental services, such as water supply, food, medicine, clean air, and building materials.**
>
> **Usually logging discussions only focus on economic and environmental issues, but not spiritual and cultural impacts as well. This focus of dialogue helped local chiefs reconsider their views against logging in their communities and commit to preventing this activity within their tribal boundaries.**
>
> Allan Taman, Chairman, Santo Sunset Environment Network

The Women's Network runs a Gender and Small Business Training Program, providing women with a more secure and reliable income. Jobs are based on value addition activities with low environmental impact. The program targets groups of women with specific needs, such as new mothers and women with disabilities. More than 50 Indigenous women weavers and soap makers have been trained in small business skills. They are supported to organize into artisanal cooperatives. The cooperatives influence handicraft and tourism stakeholders to include the rights and products of the Indigenous women in their business models, processes, and decision making. As a result of these initiatives, many of the trained women have their own small business at home, which meets family needs without having to rely on unsustainable resource extraction.[148] Their products are sold on e-commerce web pages. Women are also trained in food processing and production, strengthening the economic footing of dozens of women and their families.[149]

> **Most women in northwest Santo have been disempowered from a lifetime of inequality, in their families and their villages. The training … brought light on these issues and gave our women the tools they need to succeed in their business goals and their personal lives.**
>
> Julie Tavoa, Chairwoman, Wunpuko Conservation Committee[150]

Generations Collaborate to Celebrate Indigenous Knowledge

The focus of SSEN's activities is also cross-generational. Young people have a Rangers Camp Program, in which they are trained to survey an abundance of different animal and bird species, undertake Indigenous methods of hunting and fishing, and acquire knowledge about Indigenous medicinal products from community elders.

Another program brings Indigenous knowledge into schools to enhance young people's and families' adaptive capacities. Students are taught the importance of revitalizing traditional agricultural practices; not cutting forests which are a valuable source of food and water security; and ways that they can influence their parents not to allow unsustainable logging, mining, or land leasing.[151]

Rather than relying on rice for food, the project has also commenced new school gardens to give access to healthy local and traditional foods. In both secondary schools of western Santo, the garden plots were enhanced by introducing mulching and composting for soil improvement and moisture retention. Nearby villages contributed traditional crops, such as bananas, taro, yams, and local vegetables. The garden plots were fenced and water tanks were purchased to ensure that the students would not be forced to rely on imported foods even during drought.

Adapting to Nature's Disrupted Rhythm

SSEN supports the local community to take Indigenous ways of knowing and acting – which have developed over centuries in tune with nature's rhythms – and to adapt these systems and processes in response to climate change.

Dishes prepared from traditional crops, western Santo.

SSEN has initiated a "syntrophic agriculture" program based on traditional crops. Syntrophic agriculture, first initiated by Ernst Götsch, a Swiss farmer in Brazil, is a form of process-based agriculture as opposed to the modern form of input-based agriculture. Farmers replicate and accelerate natural processes of ecological succession and stratification to give each plant the ideal conditions for its development, placing each one in their "just right" position in space (strata) and in time (succession). Harvests are seen as a side effect of ecosystem regeneration.[152]

With SSEN support, the local practitioners of traditional agriculture have been training villagers on regenerative agriculture and agroforestry of this type, for example:

- They stopped the practice of burning plots to clear weeds and pests. Instead, they started weeding selectively, leaving grass cover, and using leaves as mulch – all of which help to retain moisture, stabilize soils to decrease landslide risk, and increase the soil's organic content. This is especially important during El Niño conditions when the weather is particularly hot and dry, a phenomenon that is becoming more intense under climate change.[153]
- Intercropping of trees with crop species such as taro helps to optimize the retention and cycling of nutrients among the different species, as well as to create a stratification of plants with differential access to sunlight, much as in a natural ecosystem.[154]
- They reinvigorated the use of Indigenous irrigation systems, including a form of drip irrigation.[155]

A major workstream involves taking the learning into secondary schools, to engage students in documenting this traditional knowledge and practicing it on school grounds. The schools are involved in a mini-census of climate-smart regenerative agriculture practices in western Santo, a root crop festival, and taro beetle and worm management plots.[156] The work seeks to mobilize young people, women, men, people living with disabilities, and local customary chiefs as environmental champions that engage fully within Indigenous knowledge and customary governance structures.

The Indigenous Peoples of western Santo have, in effect, been practicing a form of syntropic agriculture for generations and it is being adapted today in response to the changing climate. As a traditional practice, the local method evolved to maximize the continuity of food supply for households. Typically, a family clears a piece of fallow land of around 50 meters by 30 meters to create space for a food garden for the year. They carefully plan a diversified planting scheme of short-ripening and long-ripening staple food crops. They intersperse these, known as "intercropping", to create synergies in nutrient transfer among the plants, and the stratification of vegetation layers that a syntropic system requires. Long-growing staple crops, such as yams, sweet potatoes, manioc, taro, pawpaw, and banana are planted first, then they are intercropped with early-harvest crops, such as beans, tomato, and cabbage.

The result is an abundant, continuous food supply that lasts one or two full years before this plot of land is left for a further fallow period. In terms of climate resilience, the syntropic agriculture practice is suitable, sustainable, and can withstand climate impacts to a certain extent. Most Indigenous staple food crops grown in the gardens are already adaptive to changing climate conditions in western Santo. However, there have been some further adaptations: dwarf manioc is now introduced because its low height makes it less vulnerable to gale-force winds and it is fast-yielding. This makes it particularly suitable for planting in the aftermath of tropical cyclones when it makes up gaps in families' food supplies. Otherwise, growing diverse crop varieties in a garden is inherently climate-resilient, because each crop responds differently to the vagaries of the season's weather, making it more likely that the gardens as a whole will meet families' dietary needs.

Another embrace of Indigenous knowledge and practice is the reinvigoration of the traditional "hurricane house". Made from locally sourced fibers from trees and vines that can be sustainably harvested from the forest, these very low buildings can be erected in locations that are sheltered by the hills. They flex in the wind and rain but are resilient to storms.[157]

Community members outside a low-height traditional hurricane house.

Community members prepare traditional materials for building a hurricane house.

Building a traditional hurricane house is an inherited skill, passed on from one generation to the next. "In the past, our ancestors experienced hurricanes and were knowledgeable in building hurricane houses. These days, Western influences and imports of foreign-made building materials has caused some challenges to our communities," reflected Joses Togase, SSEN Coordinator.

The Indigenous communities are now committed to retaining their tradition of sharing their hurricane houses, also known as safe houses, in times of need, such as during extreme weather events. They also bring small livestock, such as chickens, pigs, and pet dogs, into the houses to ensure their safety and welfare. In the event of a tropical cyclone, individual owners take the necessary measures to accommodate their animals in allocated spaces within and/or around the hurricane houses, to ensure families' and animals' safety.[158]

Community members construct a hurricane house.

SSEN rangers discuss community conservation area monitoring aspects.

The women leaders are also involved in disaster response coordination.

Portraits of modern and traditional life in the western Santo communities.

How Challenges Are Addressed

New threats to the integrity of Santo's ecosystems are continually emerging, often due to complex, intersecting, and cascading risks faced by communities. For example, village families were forced to increase the wild harvest of plants and animals (including endemic and endangered species such as the Vanuatu Scrub Duck, Hawksbill Sea Turtle, and Vanuatu Flying Fox) to meet their pressing food needs during the COVID-19 pandemic. Private sector interests in their precious natural resources are constantly knocking at their door. For example, in 2021, a foreign logging company began paying local chiefs to encourage land-owning families to sign timber harvest agreements in primary rainforests in the region. In the same year, a different foreign company began gold prospecting along the ridges of the mountains of the Santo Mountain Chain Biodiversity Hotspot.[159] Retaining capacity is always a concern, as skilled personnel from remote islands such as Santo constantly seek to migrate to the capital Port Vila in Éfaté, Vanuatu's main island.

SSEN's comprehensive suite of activities – to map and monitor local resources, engender community awareness of environmental threats, and convene local political dialogues – were all devised to successfully address these threats. SSEN is continually building the capacity of its members to stave off skills shortages; and to integrate modern scientific principles and technology (such as syntrophic agriculture) with traditional knowledge, to make individuals and communities more resilient to climate shocks and stresses. SSEN has partnered with private corporation 3-Link for internet provision. The arrival of internet services in western Santo in 2022 is seen as a huge leap by residents – the connection will improve people's access to social, environmental, and economic information, and their commercial prospects for sustainable products. Indigenous ways and modern technology are combined to strengthen people's adaptive capacity to climate change.

These activities have been possible due to SSEN's diverse funding portfolio for adaptation projects, including from philanthropies and international agencies. The key to resourcing these comprehensive, locally led initiatives seems to have been funders' respect for LLA Principles, which put western Santo communities in the driving seat. Funders who have supported these initiatives include Nia Tero, a United States-based non-profit organization that works to support Indigenous Peoples' movements worldwide.[160]

Key lessons learned include the importance of local people's visions to define adaptation objectives and lead the work, rather than capitulate to top-down approaches. Climate-smart solutions do already exist in the communities, in the form of traditional knowledge. What is needed is funding to support their initiatives.

THE AFRO-PERUVIAN COMMUNITY OF ZAÑA

As narrated by Rosa Elena Colchado Medina, General Coordinator, Zaña Afro-Peruvian Museum[161]

In the 18th century, the Spanish imported African slaves to work in farms in the valleys of northern Peru. From this dark and terrible history of slavery developed today's distinctive Afro-Peruvian livelihood and cultural practices, particularly in Zaña in Chiclayo Province, where the African descendants are now clustered. Zaña is formally recognized by the Government of Peru and by UNESCO as a live repository of Afro-Peruvian historical, artistic, and cultural memory and heritage.[162] The Zaña Afro-Peruvian Museum seeks to rescue, preserve, document, disseminate, and educate about Afro-descendants' community perspectives, heritage, and culture.

In the past decade, the frequency of damaging natural hazards along the Peruvian coast has increased. They increasingly affect rural areas, biodiversity, and food security. In addition to experiencing the global El Niño phenomenon, Peru is also affected by the "*El Niño Costero*". This is a notable warming of the coastal waters off Peru and Ecuador, associated with especially heavy rains and related flooding.[163] In 2017, it caused the largest disaster in Peru, killing more than 100 people and causing 141,000 people to suffer losses and damages of US$ 3.1 million.[164] Northern Peru is not an area typically affected by cyclones, but in March 2023 Cyclone Yaku followed a prolonged drought and created extensive damage on the coast, resulting in 61 deaths from flooding.

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Activities at the Zaña Afro-Peruvian Museum.

Agroecological activities of the Zaña Afro-Peruvian Museum, tapping into Indigenous and local knowledge.

Increasing average temperatures, including in winter, give rise to more mosquitos, and the diseases they spread, such as dengue fever. Droughts reduce the quality of pastures for sheep and guinea pigs. Climate change is also affecting many Indigenous fruit trees. The *algarrobo* tree (*Prosopis pallida*), for example, requires rainwater or irrigation for reproduction and seed dispersal. It has not fruited now for the past eight years, and – from a mix of climate change and deforestation – 70% of these trees have disappeared. This has had dire consequences for local economies and traditions, which relied on *algarrobo* fruits for sweets, syrup, and flour, as well as on tree materials such as rubber.

Algarrobo trees used to provide ample shade to sheep and goats, and their forage, but without this, local livestock production has suffered. There have been consequences to cultural practices because recipes, such as the *cabrito a la norteña* (goat cooked northern style) are equally at risk of extinction as goats become more expensive due to dwindling pastures. Honeybees and certain bird species have disappeared. These include the Peruvian plantcutter bird *Phytotoma raimondii*,[165] endemic to northern Peru. Traditionally, people call this bird the Inca's clock as it is said that it sings once every hour. It favors the *Prosopis* tree species, such as the vanishing *algarrobo*.[166]

As climate-related damage began to affect the area, the museum's leaders initiated diverse activities to improve local people's understanding of climate change and accelerate climate action. The museum turned out to be ideally placed for this role, as it was already a focal point for Indigenous and local knowledge. Through discussions and practical activities such as school-based food gardens, people identified rich seams of local knowledge that could inform their strategies for protecting crops and livestock from climate change impacts.

Indigenous varieties of vegetables in the local market.

Actions to Limit the Cultural and Economic Damages of Climate Change

In 2017, the Zaña Afro-Peruvian Museum called a meeting to discuss the impacts of climate change. More than 400 people met in the town square to discuss their concerns and hear a group of volunteers from the museum list concerns related to the loss of Indigenous vegetable species and livestock breeds, traditional foods and drinks, and related cultural heritage.

After the assembly, the group of volunteers from the museum came together as the Environment and Culture Committee of Lagunas-Mocupe, led by Rosa Elena Colchado Medina, to undertake a study on plants in danger of extinction in Zaña. Tapping into ancestral knowledge about farming traditions and the memories of older generations, they produced an educational brochure and then a book.

The results of the study were disseminated through the radio and online sessions with school children during the COVID-19 pandemic. An initiative to distribute seedlings from endangered fruit tree species was crucial in maintaining local people's health during the pandemic. Initially focusing on 16 plant species, the study expanded to cover 30 plant species that were traditionally grown in people's fields and are now being re-introduced through food gardens.

The Afro-Peruvian Museum started a program to support the creation of food gardens for healthy, pesticide-free diets, and for food security. It started in schools – designed to help families understand the importance of going back to the tradition of producing their own food in the face of climate change – and then rapidly expanded to families, churches, and municipal grounds. Fifteen schools in Zaña now have organic food gardens, and families have been inspired with new knowledge to deliver nutritious produce while greening the valley. Initial challenges, like perishing gardens in some schools, were overcome through collaboration, and a movement was born. By the end of the first year, the school families had produced so many vegetables that they bartered them among each other, and each family's needs were satisfied. Every family now has its own food garden, saving the money they previously needed to buy food.

Participants in educational activities of the Zaña Afro-Peruvian Museum.

As well as learning by doing, the Afro-Peruvian Museum has also documented traditional practices. With a strong emphasis on demystifying complex language and concepts, they have produced six educational brochures focused on different aspects of climate change, food production, and the role of women farmers. Information on the latest adaptation-related science and technology is constantly sought from the **Instituto Nacional de Investigación Agraria** (INIA, the National Institute for Agricultural Research) to manage the spread of crop and livestock disease, respond to heat stress on guinea pigs, and prepare for new and emerging climate threats.

A women's committee of the Environment and Culture Committee of Lagunas-Mocupe has attended a training of trainers by INIA staff, to enable them to disseminate knowledge to others in the community. The museum also invites technicians and different experts to their workshops with farmers, teachers, students, and families. These activities have empowered women and farming families to access training, seeds, and fertilizers, as well as to share and improve upon their ancestral farming techniques.

A pilot composting activity launched in mid-2023 is the latest addition to the Committee's repertoire. Schools and families will receive training in using the *bokashi* method – an easy composting method that involves sealing kitchen scraps and organic waste in an airtight container with a medium.[167] A greenhouse nursery has been set up to grow 600 *Moringa oleifera* seedlings for distribution, along with a brochure extolling the plant's numerous benefits, including seeds that can purify water.[168] Access to safe fresh water is one of the first resources to disappear when cyclones and floods hit the area.

Families living along the banks of the Zaña River have been engaged in a reforestation campaign to protect surrounding lands from floods and reduce erosion by planting 200 bamboo seedlings (*Guadua angustifolia*). Other species that can prevent flood damage and help maintain the quantity and quality of the water resource are being studied.

Through these diverse activities, the museum has become an important knowledge exchange platform, bringing together individuals and community organizations to share traditional knowledge and link it to locally relevant scientific knowledge. Community members recognize the benefits of this initiative and are motivated to participate, even though participation is voluntary and unpaid.

> **There is so much to learn, more and more learning. We see that every time we discover more things and the learning is continuous, there are always more and more interesting things to discover – there are many voices that tell us about what their grandparents, aunts, or parents did. Although I lived in the fields when I was small, I keep finding out more and more. We try to write their stories so that these memories and testimonies are not lost.**
>
> Rosa Elena Colchado Medina, General Coordinator, Zaña Afro-Peruvian Museum

How Challenges Are Addressed

One of the main challenges faced by the museum has been to recruit, organize, and consolidate a sustainable group of volunteers to undertake the activities. An organization from the United States funded the initial purchase of the first batch of seedlings that were distributed to the schools. Thereafter, the museum, as a non-profit entity, relied mainly on the revenues from the sale of its books and entrance tickets to support the activities of the group. These meager resources have not covered anyone's time.

While climate change activities did not initially attract people's attention, the benefits – manifested in enhanced food security – have become clearer over time. The committee now has six stable members, joined by an additional three regular volunteers and 20 families that step in to support specific activities at different times.

The schools themselves initially struggled to keep the food gardens watered and cared for during holidays, as teachers and pupils were away from December to March, but through increasing ownership in the activities – especially among families – and the volunteers, this issue has been resolved.

At first, many Afro-Peruvian men did not want the women in their families to participate in the museum's activities. This changed when the men saw how women's different adaptation actions brought benefits to the community and the local environment. Now men are recognizing women's crucial leadership roles in the Afro-Peruvian community and are more supportive, overall.

Zapotec people from an Indigenous community in Mexico.

MEXICAN ZAPOTEC COMMUNITIES USE INDIGENOUS KNOWLEDGE TO OVERCOME WATER STRESS

The Zapotec Indigenous communities of Valles Centrales in Oaxaca, Mexico have suffered higher temperatures and water scarcity since the 1980s. In response, 22 Zapotec Indigenous municipalities combined traditional knowledge with modern low-cost Managed Aquifer Recharge (MAR) techniques to shore up groundwater reserves for drinking water and agricultural uses.[169]

Zapotec culture and governance systems are centered around the *Asemblea* – mandatory community meetings in which representatives from each household are consulted about all major decisions, including land management, municipal plans, and legal statutes.[170] They also have strong traditions of *la mano vuelta* – voluntary work based on collaboration, reciprocity, and future exchange, at the familial or community level.[171]

In 2005, supported by Mexican laws that mandate community participation in groundwater management, the municipalities created two community networks to address water scarcity: *Unión de Comunidades y Ejidos Buin Dannis de la Cordillera Central Ocotlán Tlacolula A.C.*, Buin Dannis, in the mid-Rio Verde watersheds; and *Coordinadora de Pueblos Unidos por el Cuidado y la Defensa del Agua A.C.*, COPUDA, in the lower Río Verde and Atoyac watersheds.

The networks implemented MAR, which involves the injection or facilitated reintroduction of groundwater into underground aquifers, using traditional knowledge and modern science to interpret the geomorphology and hydrogeology of micro-watersheds. The techniques used to channel water into aquifers include *barreras de piedra acomodada* (stacked stone walls); *barreras vivas* (planted vegetation); *zanja bordo* (ditches); *zanja trinchera* (trenches); and *retenes* (small dams).[172]

The communities combined their own resources with funds from agricultural agencies, municipalities, state and federal agencies, non-governmental organizations, and foundations to implement these measures. Voluntary labor by the community members kept costs low.

These measures helped to reduce erosion caused by runoff, catch sediment, intercept rain runoff, increase the infiltration of rainwater, and facilitate reforestation by increasing soil humidity.[173] While hydrological monitoring will be necessary to validate improved water availability, communities feel that they experience less water stress since the MAR measures were implemented.

KEY TAKEAWAYS

Indigenous communities around the world have not escaped the negative impacts of economic and environmental globalization. Even in islands as distant from the seats of global economic power as Espiritu Santo in Vanuatu, climate change is impacting lives and undermining ways of living that rely on an understanding and trust of the rhythms of nature. It has become an amplifier of multiple stressors on Indigenous and local communities and their ways of life, including demographic and commercial pressures – often from external actors. (See *The Santo Sunset Environment Network* in this chapter.)

In the face of multiple and intersecting risks, traditional governance systems such as the Zapotec assemblies in Oaxaca, Mexico, and the customary authorities on Espiritu Santo, Vanuatu consolidate collective local sense-making, planning, and action in the face of multiple threats to natural resources. In these cases, community-based governance systems sit comfortably alongside the modern machinery of the state, and this alignment supports the reinvigoration of climate-resilient Indigenous knowledge and practice in the communities. (See *The Santo Sunset Environment Network* and *Mexican Zapotec Communities Use Indigenous Knowledge to Overcome Water Stress* in this chapter.) The compatibility of multiple governance and belief systems, however, varies from context to context – in other cases, conflicts between traditional and modern systems can hinder rather than support local adaptation efforts.[174]

Indigenous local produce from Vanuatu.

In the Foretelling

Indigenous knowledge of the cycles of the natural environment and its multidimensional values for people typically guides Indigenous communities to shape their management of natural resources. This knowledge guides them, over daily and seasonal timescales, in their herding, fishing, harvesting, and other activities involving domestic and wild species. These skill sets and ways of knowing still have relevance. But as our storytellers acknowledge, climate change is disrupting the previously known rhythms of nature far too quickly for them to adapt on their own as they have done in the past. Support from the outside world is necessary.

Now, local communities are trying to adapt Indigenous knowledge systems – and the social organization and livelihood activities in which they are embedded – to new climatic patterns. This is vividly illustrated by the Indigenous farming calendars used by communities on Santo Island, Vanuatu. While local people are eager to access accurate scientific forecast information, *Sand Rivers of the Limpopo* in Chapter 1 shows that they are forced to fall back on local knowledge systems when meteorological forecasts are not available. This story from Zimbabwe tells, in microcosm, of the great gap in service provision. This is why the **World Meteorological Organization** has a 2027 target to extend Early Warnings for All; and the **Global Framework for Climate Services**[175] and related funding streams exist to motivate countries, as well as their development partners, to extend vital forecast information to the "last mile" of service.

Longer-term climate projections over years and decades are necessary, but are in the realm of climate modeling and scenario development and beyond the realm of Indigenous and local knowledge. An important area of inquiry is how local communities are making adaptation decisions with long-term consequences – such as decisions about infrastructure that will last decades – using scientific climate projections. This is at the heart of LLA Principle 5: "Informing adaptation decisions through a combination of local, traditional, Indigenous, generational, and scientific knowledge that can enable resilience under a range of future climate scenarios." The call for stories did not yield examples of using future climate scenarios – suggesting that this is an area for focused action research.

Coastal landing sites are also damaged during tropical cyclone storms and wave surges, causing coastal erosion.

Fruit trees such as mandarin – sweet seasonal delicious fruit that farmers also sell as surplus supplies in the Luganville markets annually are severely destroyed, with fallen fruits, during wind storms and tropical cyclones.

A woman working in a manioc field.

Best of Both Worlds

The stories in this chapter demonstrate how local champions are eager to plumb the wisdom of their communities to identify Indigenous solutions for climate resilience, be it in water management, agriculture, or other forms of natural resource management. However, they are also eager to access modern technologies (such as internet access in western Santo, Vanuatu) and appropriate scientific methods (such as hydrological monitoring in Oaxaca, Mexico), to accelerate their adaptation activities. (See *The Santo Sunset Environment Network* and *Mexican Zapotec Communities Use Indigenous Knowledge to Overcome Water Stress* in this chapter.)

In Zaña, the Afro-Peruvian Museum and its volunteer groups integrate modern science – acquired via exchanges and visits of experts from the agricultural institute – and traditional knowledge held by older members of the Afro-Peruvian community. In this way, adaptation responses are piloted that harvest from the best of both worlds. The capacity-strengthening activities share the lessons learned from the pilot activities with young students and adults alike. This broadens the appeal and uptake of these activities. The knowledge is shared through training workshops and talks, as well as educational brochures that consolidate it in an easy-to-understand, practical, and accessible format, highlighting local examples that people easily relate to. (See *The Afro-Peruvian Community of Zaña* in this chapter.)

As well as piloting activities and using the "demonstration effect," local adaptation leaders are also using other more traditional or innovative methods to trial and scale up adaptation actions. Emerging evidence around co-production processes using local arts, cartoons, music, or heritage suggests these methods can be successful in shifting narratives from expert-centric to locally led actions around climate change. Documenting Indigenous and local knowledge through numerous means – pictorial, audiovisual, textual, and the preservation of specimens – is fundamental to capturing knowledge from older generations for the use of climate-resilient management systems among the younger. Most of this is done through people's volunteer time, motivated not only by the urgency of finding solutions to climate change but also by the imperative of capturing and preserving their cultural heritage.

Finally, Indigenous communities also realize the power of revitalizing and joining Indigenous and local knowledge of traditional skills to develop eco-friendly income-generating activities, with the promise of new technologies – such as e-commerce in the case of SSEN. The extension of reliable internet services to western Santo has been a game-changer for women producers to market their traditional handicraft products. This coming together can help preserve traditional skills that are very closely connected to cultural identity, sense of community, heritage, and belonging, and at the same time address practical economic concerns through climate-resilient, ecologically sustainable activities. (See *The Santo Sunset Environment Network* in this chapter.)

Indigenous and local knowledge systems and governance practices are also important for protecting critical ecosystems that deliver flows of ecosystem services, such as forests for regulating water flows, securing stable and fertile flows, and regulating local and regional climates. This is again documented in *The Santo Sunset Environment Network* and *Mexican Zapotec Communities Use Indigenous Knowledge to Overcome Water Stress* in this chapter, as well as in the broader literature. The stories of resilience provide further anecdotal substantiation for the finding in the global assessment of the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services** (IPBES) that Indigenous communities are more effective than others in conserving high-integrity ecosystems.[176]

Community-based monitoring needs its own space to flourish

Measurement of the impacts of adaptation actions is often limited to rigorous "expert-led" quantitative methods, such as impact assessments, GIS, and remote sensing. Without ground-truthing by communities, however, the results will hold little meaning for the communities they are meant to benefit and will contribute little to local learning to develop and fine-tune future responses.

Learning by doing is a primary entry point for communities to reinvigorate Indigenous and local knowledge for climate resilience, along with using pilot projects and demonstration activities to refine their competency and spread skills to others. In this sense, Indigenous and local knowledge is identified and scaled through iterative learning and organic communication processes.

More innovative and democratic methods that engage communities in developing, monitoring, and evaluating adaptation measures can help communities make more informed choices, while ensuring that the processes remain locally led. In addition to co-producing evidence, measuring impacts, recognizing complexity, and testing out multiple plausible future scenarios for making more informed choices, they can also elicit Indigenous and local knowledge, deepen relevant understanding in local communities, foster ownership, and motivate sustained action. Such methods and processes of co-production may be slow, but they are essential to LLA, as demonstrated by their popularity in Indigenous customs.

The global community is already familiar with *talanoa* – the Indigenous method of solving differences in the Pacific by holding a conversation in an inclusive, receptive space. The Fijian presidency of the 2017 UN climate talks proposed this method for governments and civil society to answer three questions on the climate change negotiations: Where are we now? How do we want to go? How do we get there?

An Indigenous woman from western Santo utilizing traditional materials for household goods.

Another such Indigenous process to develop, collect, and transmit knowledge is the *tok stori* method of the Solomon Islands. It is a community-based, holistic method of sense-making and reflecting on how and why activities succeeded or could have been better. This proved to be a deeply rooted and effective evaluative method for a financier-funded literacy program in the Solomon Islands, although it was somewhat mismatched with financier expectations around outcome reporting. (See *Tok Stori: the Holistic Method of Reflecting and Sense-making in the Solomon Islands* in this chapter.) Other such customary forms of talking include *hui*, used by Māori, the Indigenous Peoples of New Zealand – used, for example, to negotiate the traditional management of fisheries resources, including negotiation with the government on the boundaries between Indigenous and "official" concepts of management.[177]

TOK STORI: THE HOLISTIC METHOD OF REFLECTING AND SENSE-MAKING IN THE SOLOMON ISLANDS

In the Solomon Islands, *tok stori* is a form of group communication that can support group decision making and consensus building; facilitate processes of co-construction of knowledge; co-design plans; and perform pedagogical, evaluative and accountability functions. It is described as "a form of discursive group communication which allows people in-context to story their lives, to use a storied approach to change and/or improve themselves; and to story their own futures based on their storied pasts and presents." It provides an environment that is reassuring, uplifting, and comfortable for all participants, and therefore an opportunity for genuine interactions and understandings to emerge, develop, and be co-constructed.[178]

The application of the *tok stori* as an intervention and evaluation strategy in a literary support program in the Solomon Islands found it to be invaluable for supporting learning and change, and for generating shared evaluative knowledge. It was seen as a more powerful strategy for collectively evaluating, and learning from, the intervention, than a written report or table of quantitatively measured result indicators. However, there were challenges in legitimizing this knowledge and process within financier-accepted instruments for monitoring and evaluation. Results-based management tools used by financiers were found to impose limitations on the telling and documenting of the whole "picture and story" of the intervention. This was found to undermine the robustness and vibrancy of *tok stori* data and information, generated through processes of people participating in the identification of problems, co-creating the solutions, and reflecting on the outcomes.

Members of the Santo Sunset Environment Network.

Citizen science, games, and arts-based approaches have been used in other parts of the world. For instance, games have been used to improve local understanding of groundwater interrelationships and stimulate collective governance of groundwater in Andhra Pradesh, India. (see *Games for Better Groundwater Governance* below.)

These locally based forms of storytelling and sense-making show the diverse ways that communities have been evaluating and continue to evaluate LLA. Critically, these Indigenous forms of discussion and participatory games-based methods can foster accountability towards local communities. However, this chapter only begins to open the book on this vast and important topic. Further research, analysis and institutional development is needed to:

- Understand how financiers can be more flexible in enabling and accepting Indigenous and community-based evaluative processes that are accountable to communities.
- Understand how Indigenous and traditional evaluative processes already are socially inclusive and could be even more so, addressing in particular gender equality and women's equal voice, which is highly variable across contexts.
- Know and document more on how communities are doing LLA and evaluating it effectively for themselves in the absence of, or alongside, financier project requirements – recognizing that most of the stories featured in this chapter had successfully attracted external funding, but most LLA in the world is not "projectized".

GAMES FOR BETTER GROUNDWATER GOVERNANCE

Governance and management of precious groundwater resources is a sensitive topic in Andhra Pradesh, India. Here, an initiative used gameplay to structure serious conversations in the community about how to allocate groundwater resources. The games simulated crop choice and consequences for the aquifer. These were followed by a community debriefing, which provided an entry point to discuss the interconnectedness of groundwater use. After the games were played, a significantly higher proportion of communities adopted water registers and rules to govern groundwater compared to other communities. The games contributed to social learning about the role of crop choice and collective action, to motivate behavior change toward more sustainable groundwater extraction. While the experts facilitated the game itself, the rules, norms, and community rights for groundwater use were locally defined.[179]

CHAPTER 7

LINKING LOCAL INITIATIVES FOR SOLIDARITY

Devolving decision making

Addressing structural inequalities

Flexible programming and learning

Transparency and accountability

Collaborative action

HIGHLIGHTS

- For decades, community-based organizations (CBOs) have joined forces across domestic and international borders in solidarity for their common struggles for social and economic well-being and environmental protection, and to fight political marginalization. Today, CBOs old and new are strengthening solidarity movements, with a sharpening focus on climate change and the injustices that make many communities especially climate-vulnerable.
- CBOs are connecting to exchange technical and tactical knowledge and motivate their members through solidarity with other local groups. Working together in this way gives individual groups enhanced confidence and skill to accelerate their pragmatic, locally led solutions.
- Solidarity-building also creates the opportunity for local actors to see the bigger analytic picture and triangulate their local experiences. It enables them to pinpoint the maladaptive behaviors of national and international investors and policymakers more easily, for example, which create negative impacts at the local level. Solidarity movements enable advances in conceptual understanding – of the larger-scale drivers of vulnerability and maladaptation – among local actors. By extension, solidarity strengthens the political messaging and advocacy of CBOs in confronting these drivers. It leverages and amplifies their political voices for change.

IN THIS CHAPTER

Lourivânia Soares Santos.

We want to demand water security, technology for agricultural production appropriate to the semi-arid region, education, and investment in research into the potential of the *caatinga*, cultural policies so that we can continue our work of empowering communities and young people.

Lourivânia Soares Santos,
journalist and activist,
Rede Pintadas

SOLIDARITY MOVEMENT MAKES A MARK ON BAHIA'S POLITICAL LANDSCAPE

As narrated by Lourivânia Soares Santos, Rede Pintadas[180]

In Pintadas, a municipality in the dry and semi-arid *caatinga* (white forest) northeast region of Brazil, solidarity has always been a way of life to learn to live with drought. With little natural wealth and an unfavorable climate, the 10,000 inhabitants of the municipality have had to rely on each other, and on human resourcefulness, to survive. Now, they find that their capacity to cope is stretched further by increasingly persistent droughts, and that solidarity and self-organization is more critical than ever.

Pintadas historically had high rates of social inequality.[181] Women, in particular, bore the brunt of water scarcity in their traditional household roles. They suffered human rights violations in the form of gender-based violence – and still do today. For decades, the women have led a process of struggle by rural communities for access to water, environmental resilience, and political participation.

They started by organizing to develop water reservoirs in the 1980s, with support from international organizations. Realizing that policy support is essential to improve the water infrastructure, community women led meetings, marches, and mobilizations to persuade the municipal administration to invest in water supply projects. From these beginnings, they sustained growing efforts over the following decades to improve rural people's lives and advance adaptation actions.

Neusa Cadore is a leader who rose to prominence as a champion for rural communities and the women of Pintadas. Neusa was born in Santa Catarina in south Brazil, one of the most developed regions of the country where everything was plentiful and abundant. She went to Pintadas in 1984 to work for two years as a nurse and missionary of the Catholic Church. When she arrived, she found a place completely different from her home. Pintadas was in the throes of a severe drought and the population was starving. Neusa observed that formal government was largely absent, but local people were united in their determination to change their lives for the better.[182]

Neusa Cadore

Neusa fell in love with Pintadas and the social movement. She learned to bathe with little water and endure the scorching sun, and became involved in community organizations to improve her circumstances. Local people convinced Neusa to run for mayor in 1998. She won the elections and became the first woman mayor of the Workers' Party in Bahia. She governed for two consecutive terms. Her work transformed the small municipality into a benchmark in Brazil for its actions aimed at social and ecological sustainability.[183]

Rural Communities Define How to Live with the Drought

After Neusa was elected mayor in 1996, she invited residents to determine, through public debates, what local development issues should take priority. Water was identified as the most pressing need, so people in the community focused their efforts on taking the fullest possible advantage of the scarce rainfall. They built rainwater harvesting tanks for every rural household and farm – making Pintadas the first municipality in the northeast to have 100% household water supply in rural areas.

The town built water harvesting tanks to provide an alternative to the salty piped water supply, particularly for cooking and drinking. They built small dams to create ponds for farmers to store water for crop irrigation. This pioneering work inspired similar government water supply programs at state and federal levels in Brazil, winning support from international partners, universities, and public leaders.

Neusa at the Delícias do Sertão restaurant, run by the women of Pintadas, which sells various products from the region's family farms. She is holding a bag of *licuri*.

Women use traditional, climate-resilient crops to make products for food and income.

In 1999, **Rede Pintadas** (Pintadas Network) was formed, with the goal of the social and economic empowerment of women; social inclusion of youth; collaboration and solidarity for the economic, water, and food and nutritional security of vulnerable families; and the sustainability of family farming. Rede Pintadas is composed of 15 non-governmental organizations.[184] Within the network, which was formalized in 2003, the women organized themselves as the Women's Association. In 2019, a Platform of Grassroots Women Practitioners of Resilience was created to consolidate the work the women were already doing as part of the association, as well as to strengthen international partnerships with other women's networks, such as the **Huairou Commission**. (See *The Huairou Commission: A Women-Led Solidarity Movement* later in this chapter.)

In its early days, Rede Pintadas focused on initiating sustainable agroecological methods and environmentally conscious ways of living and working that would be compatible with the climate and ecology of the semi-arid region. Members formed a range of cooperatives, which have created job opportunities and have generated economic value from local raw materials. These include an agroindustry to process pulp from native fruits, as well as cooperatives for goat and sheep, honey, and egg production, among others. All of these activities suit the local climate better than cattle rearing, ensuring resilience in the face of increasingly prevalent droughts. These were augmented with a revolving loan fund.

The money that started the revolving loan fund was donated by the international Huairou Commission to the Platform of Grassroots Women, which in turn made a partnership with the **Public Centre for Solidarity Economy**. The capital available for lending was supplemented by the Bahia State Government's Department of Labor, Employment and Income, which coordinates the State Solidarity Economy Policy. In Bahia, the government has established 15 solidarity economy centers – Pintadas has the oldest one, operating since 2013. Rede Pintadas manages the revolving loan fund that serves solidarity-based economic enterprises in Pintadas and 14 other municipalities of the region.

Rather than trying to combat the drought, economic activities increasingly focused on "living with the drought". These include:

- Processing fruit pulp from *umbu* (*Spondias tuberosa*, also known as the Brazilian plum)[185] and *acerola (Malpighia emarginata DC*)[186] – native fruits that grow well in the region (processing and packaging generate products that store well and can be sold in local markets and to schools, including for school lunches).

- Production and marketing of lamb meat.
- Honey production, using agroecological practices.
- Vegetable production in kitchen gardens.

Activities developed by Rede Pintadas to use water more efficiently, and explicitly, to adapt to climate change include:

- Using underground water tanks, where possible, to collect water and decrease evaporation.
- Using canvases on the arid ground to collect rainwater for fish production and household-level agriculture.

Rede Pintadas members sought to improve the legal and policy environment for their work by supporting the creation of a state law recognizing the legal status of cooperatives, permitting cooperatives to access government funds. This law is now in force.

Women producers also worked with state legislators to create special protected status for the *umbu* fruit. Known as the green gold of the *sertão* (the name for the dry rural northeast), the *umbu* grows in the *caatinga*. The state law now recognizes the *umbu* fruit as part of Bahia's biocultural heritage, protecting the species from indiscriminate cutting and requiring the government to support the development of its processing chain.

The same law protects the *licuri* coconut palm, also a plant indigenous to the *caatinga* region. Women traditionally used the *licuri* coconut for various culinary delicacies, such as sweets and oils, and the fibers for making handicrafts and bags. Today this practice is almost extinct due to over-cutting of the plants, but there are groups of women in the region who still depend on it for their livelihoods. Rede Pintadas provides them with technical assistance, while the law protects the trees. The members of Rede Pintadas consider these "horizontal integrations" between policy and practice to be fundamental – they want to amplify their concerns to the national level in Brazil.

Women's conversation circle.

Production of water tanks to conserve precious fresh water and reduce evaporation in a heavily drought-affected climate.

Neusa became known for the work she did in Pintadas to provide the municipality with water access and to mobilize women's political engagement. She ran for and was subsequently elected to the Bahia state legislature, where she is one of ten women out of 63 parliamentarians. She is now serving a fifth consecutive term in office. Her position has opened a channel into political representation for local community concerns at the state government level.

How Challenges Are Addressed

The more effective participation of young people in the movement remains a need that is slowly being addressed by Rede Pintadas and the community. Young people are being encouraged to participate in agricultural cooperatives and local associations that are involved in strengthening food security in communities, as well as in providing job and income opportunities.

There are no universities nearby and Rede Pintadas loses a lot of human capital when young people leave to join universities elsewhere. The network views empowering the community, especially young people, girls, and women, and valuing their contributions as fundamental steps towards achieving lasting change, as well as building a more just, equitable, and sustainable society.

Combating violence against women and structural *machismo* – strong or aggressive masculine pride that is manifested as discrimination against women – also requires ongoing work. The Platform for Grassroots Women of Rede Pintadas keeps tackling gender-based violence and aiming to shift social norms toward gender equality. The women find strength and solidarity in organizing training and dialogue to shift community mindsets – both around climate-resilient agroecology, and explicitly around gender-based discrimination and violence. The network trains women and youth leaders, highlighting their contribution to local development, as well as fair and sustainable value chains. It has mobilized young people to interview the women and tell their stories, triumphs, and innovations through diverse media (including through this publication).

> **The Platform for Grassroots Women has enabled me to recall the struggle of my community and my matriarchs more consciously, based on an understanding of the possibilities of collective construction for the participation and empowerment of women in a territory marked by disputes over the means of production and the consequences triggered by climate change, which result in a water deficit for human and animal consumption and food production.**
>
> Raniele Lima dos Santos, 20, participant in the Platform for Grassroots Women, third-generation member of the rural settlement of Lameiro, in the municipality of Pintadas

Creating the Platform of Grassroots Women has enabled the women to focus and articulate their demands for women's human rights in the context of adaptation action. Being a part of the Huairou Commission's network also gives these women access to knowledge, moral support, and confidence via solidarity movements worldwide.

Resources for agroecological activities are always a challenge. At the moment, Rede Pintadas lacks sufficient agricultural inputs, such as seedlings, to meet its ambitions.

Structural power imbalances and historic forms of political, social, and economic marginalization of certain groups within Bahian society inform Rede Pintadas' work and its aspirations for institutional legacy. The network continues to emphasize the need for historical reparations, involving the recognition of the rights of traditional communities, including Indigenous peoples and *quilombolas* (Afro-Brazilian peoples), documenting their specific experiences and needs (including those related to climate change), and enacting public policies that guarantee access to land, water, education, health, and other rights.

THE HUAIROU COMMISSION: A WOMEN-LED SOLIDARITY MOVEMENT

The Huairou Commission[187] is a women-led social movement of grassroots groups from poor urban, rural, and indigenous communities in 45+ countries who collectively work for transformative change that improves the living conditions, status, and quality of life of women, their families, and municipalities.

Central to its work is establishing partnerships with facilitating NGOs, research, development agencies, local authorities, and other actors committed to accelerating grassroots women's empowerment and inclusive, just, and resilient communities.

The Huairou Commission seeks to:

- Strengthen grassroots women's organizing and leadership.
- Nurture grassroots women's knowledge and good practice.
- Influence and change public policy and processes at local, regional, and international levels.
- Build constituencies and networks.

The Huairou Commission was born as an idea at the Fourth World Women's Conference in Beijing in 1995. It has since united grassroots women's organizations and their allies via thematic networks for advocacy and peer learning. This includes the Huairou Commission's founding role in the Community Practitioners Platform for Resilience, a global platform for communities living in disaster-prone areas to drive greater investment and locally-appropriate action on disaster risk reduction and climate resilience.

SOUTH ASIA GRASSROOTS EXCHANGE HIGHLIGHTS THE POWER OF SOLIDARITY

In August 2023, the Global Center on Adaptation (GCA) and the non-governmental organization BRAC co-convened in Dhaka for the National Consultation on Climate-resilient, Migrant-Friendly Towns in Bangladesh. The event was part of a project implemented jointly by GCA and BRAC, focused on the phenomenon of seasonal and permanent migration from climate-affected Bangladeshi districts, and the ways recipient authorities can support internal migrants effectively through locally led planning processes. It is a topic of national importance, and the consultation was attended by high-level representatives of the Ministry of Environment Forest and Climate Change, mayors, community representatives, and dozens of national stakeholders.

One of the towns in the spotlight was Mongla, the second-largest seaport in Bangladesh and a pioneer for LLA. Mongla is affected by rising sea levels, salination of groundwater, and dwindling freshwater supplies. Here, slum communities are working with the offices of Mayor Sheikh Abdur Rahman to identify locally led solutions, and devise People's Adaptation Plans.

The community leaders received capacity strengthening as part of the GCA and BRAC project, then conducted climate vulnerability assessments in Mongla communities. Based on that, they are developing a People's Adaptation Plan that identifies the most climate-vulnerable sectors, current and potential impacts, and communities' priority solutions. Work has been initiated simultaneously on implementing some community recommendations at ward level, through rainwater harvesting systems and canal excavations in the Narikel Tola and Diganta neighborhoods, identified as being particularly vulnerable to water shortages during early assessments. The new infrastructure is functional and the canal water is now in widespread use. Participants in the National Consultation discussed the roll-out of this planning model to other Bangladeshi towns, where it is informing investments by international financial institutions such as the Asian Development Bank.

Meanwhile, at the National Consultation, something significant was happening: affiliates of Slum Dwellers International (SDI) – the international federation of the urban poor – were meeting to exchange ideas and experiences. Shekhar Mulayan and Sharmila Gimonkar, community organizers from Society for the Promotion of Area Resource Centres (SPARC), the SDI affiliate in Mumbai, India, had come to listen, learn, and share their experiences on how to mobilize resources for climate-resilient slum upgrades with Parvej Khan, Chompa Begum and Mohima Akter, community members from Mongla.

Shekhar and Sharmila shared how the solidarity movement of the urban poor is instrumental in helping them advance their local objectives. Women's federations, especially, have demonstrated their leadership in identifying and designing community-led solutions; negotiating with authorities for the resources; and utilizing their own funds to implement solutions in cases where financial assistance from others was not available. Shekhar and Sharmila urged their counterparts from Mongla to build strong links with slum dwellers in other parts of the country and the world, to discover which strategies had been effective elsewhere. This includes knowing how to devise tailored plans and to target and access local government budgets.

Federations such as SDI, which link many local groups with each other, are particularly effective in supporting local leaders to learn rapidly. They help catapult local issues to national and global attention, with the potential to accelerate enabling policies and investments. SDI has been effective in supporting this linking and learning for its local affiliates, and for propelling their concerns onto the global stage via sustained presence and advocacy at events such as the UNFCCC COP Resilience Hub. It is when slum dwellers unite like this on the global stage that they can press international funders and corporations on how their practices are bolstering or undermining the adaptive capacities of communities – and they can hold them to account.

KEY TAKEAWAYS

Movements for Climate Resilience are the Latest of Many People's Movements

Solidarity movements are composed of networks of individuals and groups who are motivated to organize against injustices and hardships and for rights. Often starting with a local impetus, they grow to find resonance and momentum in the common aims and struggles of local actors across diverse locations.

Movements for political and economic empowerment, cultural preservation, self-determination, and human rights can be said to have their modern roots in the anti-colonial, anti-slavery, and suffragette movements of the 19th century. Environmental movements in the modern sense date back at least to the 1960s and 1970s, when spontaneous local initiatives to protect forests, water, and land from over-exploitation linked with each other to find a political voice, such as the women-led Chipko and eco-feminist movement in India.[188]

An important milestone was the **Rio Agreement in 2002**, which urged everyone to "think globally, act locally" for sustainable stewardship of the planet. Since then, periodic **People's Summits** have elevated nurturing belief systems around nature, and have challenged norms of environmental exploitation.

As people's understanding of climate change and their experience of its negative impacts has grown, there has been a rise in solidarity movements responding to climate change, within and across countries. In this chapter, we discussed how local champions are building solidarity around climate action.

Agricultural production workshop.

A member of the Platform of Grassroots Women in Rede Pintadas in northeast Brazil showcases the abundant output of climate-resilient, agroecological methods used by the women.

How does this relate to LLA? There are two general trends:

- Existing coalitions and networks of locally embedded initiatives have expanded the substance of their work from the development, self-determination, and human rights focus they already had, to incorporate awareness-raising and action on climate change; most of the solidarity movement stories we received were in this category. Their stories are in this chapter, in **Chapter 3**, and covered also in the *2022 Stories of Resilience*.[189]
- New climate action coalitions and networks have emerged with climate as their particular impetus. They are motivated and inspired by existential threats posed by climate change and the search for climate-resilient development solutions; we heard from several newly emergent solidarity movements of this type, started by young people.

Effectiveness of Solidarity Movements in Advancing Climate Resilience

Solidarity movements are effective in advancing climate resilience, in policy and practice. This includes both mobilizing to stop policies and investments that harm or undermine local people's adaptation and resilience interests (defense of human, environmental, economic, and political rights), and advancing policies and investments that enable progress on local people's adaptation priorities. As well as this key political element, solidarity movements are also characterized by their closeness to local needs and capacities, often through service

delivery and/or collective economic activities for livelihood support. Solidarity movements documented in the stories are non-state actors delivering bottom-up development services to fill gaps in public sector provision. These activities are meeting people's acute and chronic everyday needs. (The *2022 Stories of Resilience* unpacked the critical work of local economic cooperatives and there are many connections to that theme.[190])

Advancing climate-resilient, ecologically sustainable practices

Solidarity movements are bolstering food and water security, and reducing the poverty of their members. The many local organizations in Rede Pintadas in northeast Brazil create savings groups and organize labor in cooperatives to advance climate-resilient value chains. *The Osukuru Women's Story* in Uganda (Chapter 3) started from small beginnings as a women-led initiative for climate-resilient kitchen gardens and other small-scale activities for food security in the face of intense and pervasive floods. It has grown to thousands of members. So far, the members of OWN have shown that it pays to pool resources to support each other's income-generating ventures and access to funds in times of crisis. They are also pooling knowledge to learn about climate trends and climate-resilient crop-growing techniques. Although they started small as a CBO, OWN's membership and activities are becoming "viral", as women create multiple new, local autonomous chapters that are federated with each other.

OWN is linking with organizations such as ACTADE to advocate more broadly for the rights of low-income, climate-vulnerable women in the Global South more broadly. *The Women of Kampala's Slums* (Chapter 3) describes how LUCOHECO in Uganda is active in a vast number of social, economic, and environmental movements that work holistically to address low-income families' physical and mental health, and nutritional and livelihood needs, as well as to create political voice.

Profiling the specific climate resilience needs and concerns of major social groups in public policy arenas

Local groups and networks that are forming around climate resilience are identifying adaptation priorities for distinct social groups. Rede Pintadas discussed earlier has a women's platform within it, which works for greater access to productive assets for women and an end to gender-based discrimination and violence. The small but growing cohort of women in *The Santo Sunset Environment Network* in Vanuatu (Chapter 6) is defining and advancing women's priorities within the larger environmental movement.

LUCOHECO, the community-based organization in Kampala, Uganda, is a part of multiple other alliances and solidarity movements that are advancing the interests of low-income women and slum communities in the face of climate impacts.

Vanuatu communities, like the one shown here, have been active in sharing adaptation knowledge and political advocacy strategies with fellow communities in Pacific islands, to advance environmental defense and local people's climate resilience.

Articulating how external actors can act as appropriate partners to local people

Solidarity movements are highlighting when and how external actors are undermining local resilience. We see this in the way that community-based organizations such as *The Santo Sunset Environment Network* (Chapter 6) are linking with the broader Vanuatu Climate Action Network and climate justice networks in the broader Asia Pacific region to:

- Defend their local environments from inappropriate logging, mining, and drilling.
- Interrogate the transparency and accountability of donors, including climate financiers, to local needs.

The Vanuatu Climate Action Network, of which SSEN is a part, has for several years been mobilizing in solidarity with other Indigenous people's groups in the Solomon Islands, New Caledonia, Fiji and elsewhere in the Pacific as part of the "Sky Islands" initiative. The initiative is named after a pledge by the Solomon Islands government to ban commercial logging in forests above 400 meters, 20% of the nation's land area.[191] The groups from different island nations are sharing with each other their successes in defending the natural environment and Indigenous rights, building subregional and national advocacy campaigns, and motivating each other to continue promoting Indigenous forms of sustainable, environmental stewardship.

How Solidarity Movements are Forming and Flexing to Advance LLA

The strength of these networks, federations, and movements of local actors comes from the characteristics outlined below.

Dynamism and fluidity

In the wider literature, we see examples of famous social and environmental movements that pivoted to address the growing menace of climate change. Kenya's **Green Belt Movement** is a well-known example – the movement was founded by Nobel Prize-winner Wangari Maathai in 1977 as a women-led environmental restoration campaign. It was responsible for planting millions of trees in its first two decades. During the 2000s, tree planting continued, but with a climate finance twist, as rural women recognized the climate change adaptation and mitigation benefits of the work. They also recognized the broader local benefits: the Green Belt Movement signed an agreement with the World Bank's Community Development Carbon Fund to replant two mountain areas in Kenya and sell the carbon credits to the Fund.

The dynamism of solidarity movements does not just involve their substantive focus but also the people involved in them – and in individuals' movement between "non-state" and "state" positions. *Solidarity Movement Makes a Mark on Bahia's Political Landscape* in this chapter describes how Rede Pintadas, a local solidarity movement, mobilized for the election of one of its members as mayor, from where she oversaw public investment in a major water infrastructure program that the community needed.

Local organizers connect data and knowledge from multiple localities, to shift policy and investment spaces

The SDI network of affiliates is a good example of how a federation of community-based organizations has identified that members have strength in the data and information that they hold about informal settlements. (See *South Asia Grassroots Exchange Highlights the Power of Solidarity* earlier in this chapter, as well as the story of SDI affiliate CCODE in *The Waste Entrepreneurs of Lilongwe* in Chapter 2.) SDI has identified how this information is a unique and valuable asset that organizational members can use to leverage more horizontal and equitable partnerships with government authorities and other external actors. This ethos now permeates the work of the SDI network.

Sheela Patel, Co-Founder, Slum Dwellers International and Founder Director, Society for the Promotion of Area Resource Centers in India articulated the strategy as follows: "Working with residents of slums to collect and record data about themselves both develops their capabilities and produces better data. We use what we call 'enumerations' – data about slums and their land and amenities status, and data about households. We find that this is a powerful tool. It creates the organizational form of social movements: when everyone answers the same questions about who they are, what they do in the city, where they live, and what their challenges are. It produces an identity, produces solidarity, and forms the basis for developing a consensus on collective priorities. It also forms the basis for dialogue with the city or state, both to legitimize data that the poor collect about themselves and to define what the development issues are and where investments should be made. Because the data can be aggregated and disaggregated, it can also become a benchmark of impact and the value of investments."[192]

Commitment to building the capacity of network members in political advocacy, legal literacy, and climate literacy

Rosa Elena Colchado Medina of the Zaña Afro-Peruvian Museum (*The Afro-Peruvian Community of Zaña* in Chapter 6) is dedicated to a broader mobilization for Afro-Peruvian rights and well-being in a changing climate. She reflected on how crucial it is for people to have knowledge. Combining capacity strengthening and action has been successful. In the Zaña Valley, work by leaders like Rosa to strengthen Afro-Peruvians' financial, legal, and political literacy goes hand in hand with training on climate-resilient gardening.

SDI associate member CCODE in Malawi does a mapping of community assets and climate vulnerabilities.

Enriching community members' climate literacy and advocacy power is at the heart of the youth-led movement started by the Kenge Content Hive on the shores of Lake Victoria, Kenya (See *The Eco-Activists of Busia County* in Chapter 4.) It was created from scratch as a climate action movement and is burgeoning rapidly across Busia County. "Education is the key to transforming societies and creating a better future for all," say the local leaders.[193] "Positive change [comes] through community engagement, education, advocacy, and activism on climate resilience."[194]

Implications and Recommendations

The critical role of solidarity-building in networks and federations of local organizations, for advancing common priorities, is clear. The implications for action are twofold:

For community organizers and LLA champions

It is worth investing time and effort into solidarity movements that can strengthen local groups' knowledge, strategy, and skills to advance their own adaptation efforts. This could unlock the cooperation of external, political actors: whether by creating the enabling policy and legal environment for local adaptation or by halting damaging actions by extra-local actors with local impacts. The evidence suggests that it is strategic for local groups to tap into and form alliances with others working at the local level, within regions, countries, and even internationally, to achieve this kind of influence. It is also a "given" that these solidarity movements are fluid and dynamic, including internal tensions and fluxes that shape their priorities over time.

Social mobilization requires long-term investment in leadership, organizing citizens, and building constituencies. Grassroots organizations do not take coalition-building for granted. It is hard work. They often need to address and overcome differences, including ethnicity, age, and abilities to work effectively for the defense of human, environmental, economic, and political rights that bind them.

For external donors, especially philanthropies without a partisan political agenda, there could be value in funding the autonomous activities of solidarity movements around LLA, as long as it is done in a respectful and non-directive way, with local actors leading the strategy.

CHAPTER 8
FINANCING LLA

HIGHLIGHTS

- The global discourse most often emphasizes the quantity of climate finance. LLA requires a bigger focus on reach and quality: can communities access the finance; and do the communities have the flexibility to use it to address their priorities?
- In a climate-compromised world, meaningful Public-Private-People partnerships are important for more effective use of climate finance, by aligning priorities and ensuring a collaborative vision of shared purpose.
- New bold, creative, and risk-taking approaches that are premised on trust-based relationships, and consider local social and cultural context, are essential to unlock flexible, accessible, and predictable finance for LLA.
- LLA champions are entrepreneurial in accessing, mixing, and matching diverse sources of financial and in-kind assistance. However, the onus is firmly on them. The challenge is for financiers, intermediaries, and support partners to meet them halfway, by showing their willingness to forge equal partnerships where both sides feel that they have been heard.

Devolving decision making

Addressing structural inequalities

Patient, predictable, accessible funding

Investing in local capacities

Building understanding

Flexible programming and learning

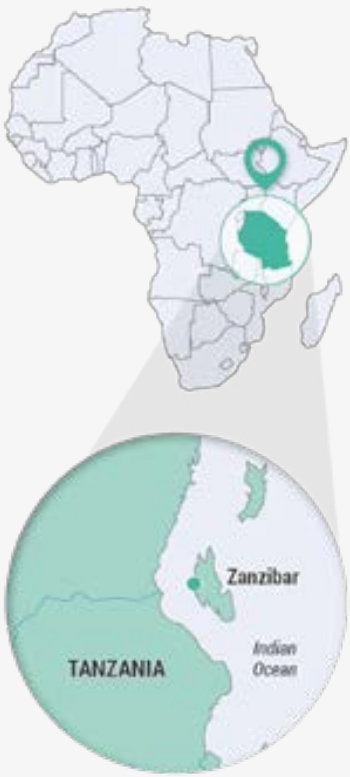
Transparency and accountability

Collaborative action

IN THIS CHAPTER

Jerry Mang'ena.

Nancy Iraba.



THE "SEAWEED WOMEN" OF TANZANIA

Written by Jerry Mang'ena and Nancy Iraba, Aqua-Farms Organization (AFO), Tanzania

On the shores of Zanzibar's azure seas, where the sands sparkle and the coconut palms sway in harmony with the gentle ocean breeze, lies a story of resilience that is a testament to the strength and determination of Tanzania's coastal communities.

Each morning, as the golden sun rises over the Indian Ocean, Fatuma Makame begins her day much like her parents did in the 1980s, venturing into the shallows to harvest precious seaweed. Fatuma has been a seaweed farmer throughout her life, learning from her parents and their peers. Seaweed is a part of her identity. She is now a matriarch in seaweed farming, guiding the next generation in a livelihood that holds the key to their survival. Of the seaweed farmers in Zanzibar, 88% are women, making this an important activity to elevate their economic status and role in the community.[196]

Sometimes described as a "hidden champion", seaweed has a range of applications, from food for humans and livestock to pharmaceuticals and nutraceuticals, additives, bio-packaging, cosmetics, biostimulants, and biofuels. The use of seaweed, and subsequently the market for it, has grown rapidly over the past 50 years and continues to be the most rapidly expanding sector in aquaculture production. It currently accounts for a whopping 50% of total global marine production, with the global industry's total value estimated at US$ 14.7 billion in 2019. Globally, the industry supports approximately six million small-scale farmers and producers, mostly in low- and middle-income countries.[197]

Seaweed trading began in Tanzania in the 1930s. It was originally harvested from the wild for export to Europe and the United States, but the trade collapsed in the late 1970s when wild stocks depleted. Experimentation with commercial cultivation in Tanzania followed, with commercial cultivation of cottonii (*Kappaphycus alvarezii*) and spinosum (*Eucheuma denticulatum*) seaweed that started in 1989 on the east coast of Zanzibar. With a market in the US, France, Denmark, Spain, China, and Chile, seaweed farming is now the third largest source of income in Zanzibar and contributes significantly to the economy of the Island – particularly benefiting women like Fatuma.[198]

Fatuma Makame, a deepwater seaweed farming pioneer from Tanzania.

The social impacts of this industry have also been far-reaching for women, not only enabling them to purchase food and essentials but also to improve housing and pay for the education of their children. This has given them recognition and power within the family and society as equal breadwinners. Men who were initially skeptical of the idea of women farming seaweed became more supportive when they saw the results.[199] The global markets, however, have not been as supportive. The women farmers are disadvantaged by the instability of the global markets, combined with their very limited negotiating power in this billion-dollar industry.[200]

Now, a new threat has crept in. The capriciousness of climate change is especially impacting shallow-water seaweed farming, which is the predominant method of farming for women. Rising sea temperatures, varying salinity, and unpredictable weather patterns have thrown the industry into turmoil. There has been a ten-fold reduction in the production of cottonii seaweed. The crops succumb to "ice-ice" disease – caused when changes in salinity, ocean temperature, and light intensity cause stress to the seaweed, inducing the characteristic "whitening" and hardening of tissues. Harvests have become uncertain, making it harder for families like Fatuma's to make ends meet or to plan for the future. Without access to traditional credit or external support, the lifeblood of their community has become a precarious endeavor.

Traditionally, seaweed in Zanzibar is grown in shallow water, less than 10 cm deep during low tides, using what is called the "peg and line off-bottom method". In these shallow waters, however, the seaweed is more exposed to sunlight and warming conditions, making it more vulnerable to ice-ice disease and epiphyte infestation. Exposure to these threats, as well as storms, is reduced in deeper water. A 2007 study found that the so-called "deep-water floating line method" is economically superior because it reduced die-off that occurs using the off-bottom method; created a seed bank that minimizes the amount of time needed to produce seed; and acted as a fish-aggregating device, allowing seaweed farmers to harvest a substantial number of fish.[201] Other deepwater seaweed aquaculture techniques, such as deepwater tubular nets, have also proven effective in improving harvests and responding to increasing climate risks.

Some of the "Seaweed Women" of Tanzania.

An Appropriate and Contextualized Financial Solution

In 2016, a group of 13 scientists and researchers[202] came together to form an NGO dedicated to supporting development and food security in Tanzania through sustainable aquaculture and fisheries. The founders of **Aqua-Farms Organization** (AFO) recognized the critical need to transform indigenous "wooden peg" tools and methods of aquaculture farming that came down through generations. These tools and methods were extremely laborious and unsuitable for a changing climate with higher temperatures and more storms. Monetary and technical support was necessary, but insufficient on its own to address the multifaceted challenges faced by the Zanzibar seaweed farming community. Subsequently, AFO joined forces with three women scientists working on seaweed – Dr. Flower Msuya, Dr. Nariman Jidawwi and Dr. Cecile Brugere – to create an "innovation cum empowerment model".

Islam is the predominant religion in Zanzibar, where AFO first began work, with more than 90% of the population identifying as Muslim.[203] Finance, investment, and banking practices in day-to-day life are therefore guided by Islamic Sharia laws, which prohibit all forms of exploitation and charging of interest while actively seeking fairness, equality, and justice. These were critical considerations when AFO sought a way to support the seaweed farmers through a socio-culturally appropriate financial solution.

AFO therefore designed a rent-to-own microcredit model with support from the **Ocean Risk and Resilience Action Alliance**. Under this model, groups of up to 15 farmers (80% women and 20% men) from Kilwa in mainland Tanzania and Pemba in Zanzibar have formed cooperatives to rent deepwater seaweed farming equipment up to the value of US$ 15,000. The equipment loan covers a fiber boat, 15 horsepower engine, buoys, ropes, and cash for seeds and fuel. The terms and duration of the loan are based on the financial standing of the seaweed farmers in the cooperative, and the equipment is owned by the cooperative at the end of the loan period. In effect, this constitutes a 0% interest loan where only the cost of the equipment and administrative costs are recovered. Any additional costs incurred by AFO (such as inflation and transaction costs) are transparently communicated to the cooperative members and built into the monthly repayments. The cooperatives are supported to form "village community banks" to access financial services, such as a bank account for the security of their collective funds, and to pay back the microcredit equipment loan.

Cooperative members are also provided technical support, including training to use the new technology, evaluation of sites where the technology will be used, and training on best farming practices (including financial management and goal setting). This mix of finance, technology, and training has allowed the seaweed farmers to operate farms at scale, increase yield per unit area, and improve incomes and financial security. Improved and stable harvests have increased their ability to negotiate prices with buyers.

Women are also trained on how to add value to the seaweed by producing seaweed-derived products such as soap, shampoo, lotions, juice, jam, salads, and cakes. AFO has recently opened a local retail store to buy and sell these products, which also serves to boost local awareness and demand for seaweed products in addition to generating further income for the seaweed farmers.

As a result of the intervention, the average monthly income of each farmer like Fatuma has risen from US$ 30 to US$ 80. The communities aim to increase this to US$ 140 by 2026 with AFO's support, by increasing annual yields from seven tons per group to 28 tons. AFO also plans to expand this model to other farmers in Zanzibar over the next two years, from two groups to ten with 150 farmers, and from the current coverage of eight hectares to 23 hectares. This is expected to result in generating more than US$ 150,000 annually for the communities.

Seaweed farmers from Pemba at a financial and goal-setting training session.

A group of seaweed farmers from Kilwa heading out for a site expansion assessment with the AFO team.

Seaweed harvesting by the cooperative.

AFO is currently exploring a revolving-fund model, where the loans paid back into the fund can be made available to other cooperatives on a rolling basis. Currently, the farming cooperatives that are part of the pilot use the collected funds to continuously build the capacity of existing cooperatives. With the revolving fund model, AFO will be able to sustainably scale up the number of loans the organization can provide in the future. The aim is to mobilize both public and private finance, through a blended finance approach, to capitalize the revolving fund. In the next few months, AFO in collaboration with **Mawimbi Ocean Initiative** and with support from **Convergence** – a blended finance facility – will conduct a feasibility study for establishing an Africa Seaweed Finance Facility to house the revolving fund.

> **Women seaweed farmers that receive support are not viewed as simply beneficiaries, but as agents of change in their own lives and communities. They are critical partners for locally led adaptation and at the center of why we exist.**
>
> Jerry Mang'ena, AFO Executive Director

Fatuma Makame, who is part of one of the cooperatives and benefited from the increase in income, has become a pioneer deepwater seaweed farmer in Zanzibar. Her story, like many others, reflects the resilience of women in the face of adversity. As the coastal communities of Tanzania grapple with the challenges posed by climate change and the shifting tides of the seaweed farming industry, the importance of locally led adaptation cannot be overstated. The community's intimate knowledge of their environment, its intricacies, and its history are invaluable assets in devising more sustainable livelihoods in the face of climate change. They need tailored financial and technical support to converge the wisdom of tradition with the innovation of necessity.

> **The deepwater seaweed farming has been significant to our lives as we have seen first-hand the increase of our harvests compared to the previous method, the availability of seeds is now more certain rather than seasonal dependent, we have indeed ventured into more profitable and reliable seaweed farming.**
>
> Fatuma Makame, pioneer seaweed farmer

PUTTING THE PEOPLE IN PUBLIC-PRIVATE PARTNERSHIPS

Written by Ron Vincent de los Angeles, Amaryll Juris Banzuela, and Sly Barrameda of the National Resilience Council, the Philippines

When Super Typhoon Yolanda – one of the most powerful tropical cyclones ever recorded in history – hit the Philippines in the early hours of 8 November 2013, it killed over 6,000 people, caused US$ 12.9 billion in damage, and pushed approximately 2.3 million people into poverty.[204]

As a country made up of over 7,500 islands in the Pacific Ring of Fire, the Philippines is hit by an average of 20 typhoons every year, as well as other natural disasters. Eight of the ten cities in the world that are most exposed to natural hazards are in the Philippines.[205] Rising sea temperatures have caused the intensity of these typhoons to increase massively, with five of the deadliest typhoons recorded in history having taken place since 2006.

The government of the Philippines has launched several efforts to increase the country's resilience to these natural hazards, including risk insurance schemes to provide local governments with emergency liquidity, private property catastrophe risk insurance for homeowners and small- and medium-sized businesses, and immediate emergency funds to protect the poorest and vulnerable. Non-government entities have also stepped in, recognizing that a whole-of-society approach is necessary to deal with the country's extreme vulnerability to the impacts of climate change and other natural disasters.

Informal settlement next to a Manila canal.

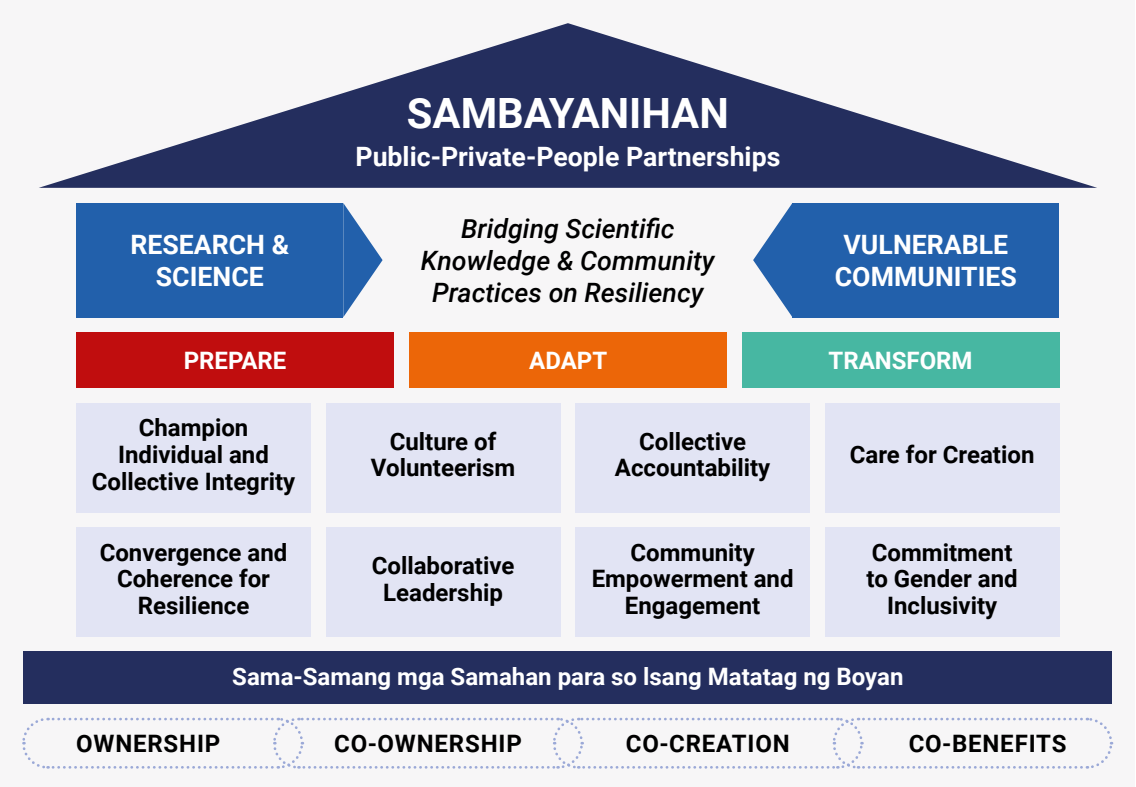
The National Resilience Council (NRC) is one such initiative, driven by the private sector to provide a platform for meaningful engagement and cooperation between local governments, the private sector, and climate-affected communities.

The NRC was formed in 2017 by Ambassador Roberto Romulo and Hans Sy. The two founders, both from the private sector, sought to bring together different sections of society to support national resilience-building efforts that translate the goals of international agreements such as the Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals, Paris Climate Agreement, and New Urban Agenda into action at the national, local, and community level.

The NRC emphasizes partnerships between multiple stakeholders for climate and disaster resilience, in particular for vulnerable communities. Its *Sama-Samang mga Samahan para sa Isang Matatag na Bayan* (SAMBAYANIHAN) methodology seeks to bridge the gap between the private and public sectors and people; as well as between science and technology and efforts by government, private sector, and climate-affected communities.[206]

SAMBAYANIHAN promotes a whole-of-society approach emphasizing shared values of co-ownership and co-creation to demand-driven resilience challenges that lead to more empowered communities. Through this, not only are technical needs addressed but a deeper understanding of the needs of the vulnerable sectors in local communities is formed. The NRC believes that its prevention-focused approach, along with SAMBAYANIHAN, will bring about sustainability and a paradigm shift of its partners.

FIGURE 8.1 NRC's SAMBAYANIHAN methodology



Informal settlement by a canal, Manila.

Adopt a City Initiative for Public-Private-People Partnerships

In the Philippines, local government is divided into different levels: provinces and independent cities that include component cities and municipalities, which in turn include *barangays*, the most local level of government. All of these are collectively known as local government units (LGUs). Traditionally, resilience-building programs are designed and implemented by the national government and the LGUs, and the role of the public sector is limited to providing donations for disaster relief in the aftermath of crises. Opportunities to coordinate corporate social responsibility (CSR) and resilience investments through a direct partnership with LGUs have been limited.

NRC sought an approach that would include civil society, including the private sector and communities, particularly the most vulnerable, in the design and implementation of programs. The Adopt-A-City Initiative was launched in 2019 with this objective as part of the NRC's **Resilient LGUs Program**.

The ten LGUs that have joined this three-yeavr Initiative so far have each formed a Resilience Council of their own through an Executive Order or Ordinance.[207] The LGU-specific Resilience Councils are comprised of members of various local institutions and agencies, including City/Provincial Disaster Risk Reduction and Management Offices; civil society and grassroots organizations; and academia and scientific institutions. Corporate partners have provided nearly US$ 2 million to support LGU-specific actions that were identified through collaborative planning with local stakeholders. The NRC plays the role of facilitator and liaison between the private sector partner, the LGU, academia, and civil society.

The "adopter" private sector company and "adoptee" LGU, along with other pertinent local stakeholders in civil society, collaborate to formulate, implement, and monitor programs; co-develop integrated risk-sensitive urban plans; and ensure active participation of city personnel and key officials in the activities. Critically, the NRC works with LGUs to ensure that lesser heard and under-represented constituencies, including the urban poor, are included in the process, and that this engagement is systematized in the operations of the LGUs.

Prepare, Adapt, and Transform

The NRC approach to resilience building is defined through three thematic areas: Prepare, Adapt, and Transform – each of which seeks to answer a question, as described below.

Prepare

How can the loss of lives and assets be minimized? Under this, LGUs conduct Climate and Disaster Risk Assessments to evaluate risks by identifying hazards, exposure, and social and geophysical vulnerabilities. The NRC works with LGUs to conduct participatory risk assessments that emphasize inputs from the most climate-affected communities in the city. A Management Information System is established, along with a core resilience team that includes community and private sector representatives, and "pillar" and " sub-pillar" champions.

In Manila, the capital, NRC partners have engaged at the community level to create a social vulnerability index to better allow the realities on the ground to inform resilience decision-making. The technical partners of the NRC are the Ateneo de Manila University Department of Sociology and Anthropology Coastal Cities at Risk (ADMU-DSA-CCARPH), who are in charge of:

- The GIS of *barangay* principal component analysis.
- *Barangay* density zoning and proximity analysis by infrastructure modeling.
- The Manila Observatory for the coordination of applications engineering, preparation of the base map, and consolidation of existing and newly generated thematic layers for the city.

The main outputs of the indexing are the physical and socio-economic drivers of risk in the form of indices and maps, which are useful in determining investment in climate change adaptation and disaster risk reduction. The NRC is also working with several LGUs to embed a more systematic approach of engaging communities, including developing policy mechanisms at the city or municipal level and relevant metrics; informed and co-created by local partners in each city.

Adapt

How can existing systems be improved to reduce risks and vulnerability to hazardous events? To address this question, LGU is beginning to institutionalize new arrangements for disaster preparedness and response. Risks are minimized by identifying and addressing the vulnerabilities of people, environment, infrastructure, and systems to hazardous events. Coordination and trust amongst different partners are critical to ensure co-ownership of these measures.

Transform

How can existing systems be changed to achieve resilience? To answer this question, new science-based partnerships between the public and private sectors are formed, and responsive policies are enacted both at the national and local levels. Communities are empowered by participating in the decision-making process with the LGU leaders. All stakeholders are encouraged to co-own the vision of resilience and work together to co-create solutions to the challenges they face.

Capacity support for LGUs

The NRC initiative has developed a robust training program for LGUs on understanding risk and resilience, conducting participatory climate and disaster risk assessments, action research, and resilience planning. Coaching and mentoring are offered to LGU personnel to nurture resilience leadership. The training includes lectures, demonstrations, and hands-on exercises, and covers both physical and social risks. This training offers a valuable opportunity for partners from the private sector, civil society, and academia to share their knowledge, skills, and resources for technically and scientifically robust resilience planning at the local level.

Training conducted by the Manila Observatory on climate and disaster risk assessment.

Monitoring Progress

LGUs measure progress on preparedness, adaptation, and transformation through Resilience Scorecards, which are developed down to *barangay* level. The Scorecards help LGUs to collaboratively chart inclusive and measurable resilience roadmaps for each of the three thematic areas. The indicators, minimum requirements, means of verification, and references reflect local government systems and are based on national instruments, department orders, memoranda, manuals, and protocols of key government line agencies (notably, the Philippine Development Plan and the Department of Interior and Local Government's Seal of Good Local Governance).

The *barangay*-level Resilience Scorecard's indicators and minimum requirements focus on specific outcomes, following the mandates and priorities of *barangays*. These are related to Resilience Pillars that the NRC uses to advocate for effective and inclusive resilience building:

- The **Human Development Pillar** focuses on facilitating access to social safety nets and universal healthcare through risk-based planning and partnerships.
- The **Local Economy Pillar** aims to assess and support *barangays* in terms of facilitating access to sustainable and resilient livelihoods.
- The **Infrastructure Pillar** aims to support *barangays* in minimizing hazard exposure through early warning, evacuation, and urban planning.
- The **Environment Pillar** focuses on enhancing waste and ecosystem management, as well as co-management of *barangays* through collaborative action and nature-based solutions.
- The **Human Security Pillar** focuses on supporting *barangays* in preventing violence and conflict as a result of migration and displacement.

The use of the *barangay*-level scorecards follows a three-year time frame, in accordance with NRC's Resilience Thematic Areas of Prepare, Adapt, and Transform. *Barangays* can measure their own progress and performance against established targets through a set of minimum requirements and rating guidelines. Results of this self-assessment tool are then externally validated by city/municipal level local government units, and academic partners.

Assessment results will help identify opportunities for capacity building interventions for the *barangay*, which include technical assistance through training sessions on specific gaps, and coaching and mentoring sessions on the operationalization of identified interventions in action plans. The scorecard acknowledges the dynamic contexts of *barangays*, and the tool may be contextualized based on local contexts and pillar priorities. The scorecard is a progressive tool subject to continual updating, ensuring its relevance and effectiveness.

Coordinating Corporate Social Responsibility

The Philippines enacted a Corporate Social Responsibility Act in early 2023, to encourage the active participation of the private sector "in fostering sustainable economic development and environment protection". The Act offers several benefits to private-sector companies for providing CSR, including allowing stock corporations to keep their profits over 100% of paid-in capital stock to be used for expansion and CSR projects or programs.[208]

The Adopt a City Initiative provides an avenue for the private sector to align their CSR contributions with legitimate needs identified by LGUs and local communities, instead of supporting fragmented actions that are decided on an ad hoc basis. It also helps to ensure that the private sector can contribute to disaster preparedness, not just disaster response.

Investments supported so far by the Initiative include the Iloilo City Action Response (ICARE) center, to serve as a centralized facility for emergency responders such as the City Disaster Risk Reduction Management Office and Iloilo City Emergency Responders. In Ormoc City, a mobile water filtration system capable of purifying 3,000 liters of water per hour has been donated to the LGU.

In other cities, investments have been made in disaster and climate resilient infrastructure, early warning systems, social and environmental protection programs, social innovation and entrepreneurship, and training in financial literacy for informal workers and micro, small and medium-sized enterprises.

The work of the NRC, which is still unfolding, provides a positive story of how the private sector can coordinate their efforts with the public sector and with people, to contribute to the resilience of communities and cities.

The mobile water treatment facility in Ormoc.

A RATIONAL APPROACH TO THE CLIMATE RATIONALE

Written by Victoria Matusevich, Program Coordinator for BASE, AVINA

Local communities face many barriers to accessing climate finance. One, but by no means the only, obstacle has been the requirement to present a "climate rationale" – proof that a project submitted for funding intends to either reduce greenhouse gas emissions, address climate change impacts, or contribute to climate resilient development.

For a proposal to the Green Climate Fund, for example, applicants are required to describe the climate change problem; mitigation (greenhouse gas emissions profile) and/or adaptation needs (climate hazards and associates risks based on impacts, exposure, and vulnerabilities); the most likely scenario (prevailing conditions or other alternative) that would remain or continue in the absence of the proposed interventions; baseline information; and the methodologies used to derive the climate rationale.

A consultative process undertaken by **Building Approaches to fund local Solutions with climate Evidence** (BASE) and Adaptation Research Alliance (ARA) in 2022 found that local actors in developing countries face multiple technical, social, and capacity challenges in developing a climate rationale.[209] These include:

- Gaps in data and information, particularly at the localized scale. This is due to the lack of availability of decentralized and historic data, but also because of the lack of access to data in some cases, and difficulties in communicating data in different languages and local dialects.
- The complexity of climate modelling and developing scenarios.
- The varying level of capacity and resources across countries or institutions to generate and use climate information.
- Limited understanding on how climate drivers and associated risks impact community livelihoods.
- The lack of public and private investments in climate information and high-quality data systems and infrastructure.

Victoria Matusevich.

> **In the context of mangroves, where communities draw direct livelihoods, any definition of climate rationale that doesn't factor in community livelihoods stands to become unsustainable. Communities will only support climate resilience building if it connects to sustaining local livelihoods; then the environmental and climate change advantages become an additional benefit.**
>
> Jonathan Gokah, Coordinator, Kasa Initiative, Ghana and a BASE grantee

BASE, coordinated by **Fundación Avina**, was launched as a collaborative initiative by multiple partners[210] to develop, through grant making schemes, a simpler methodology to develop the climate rationale at the community level. BASE follows a three-pillared strategy:

- Fund locally led projects, to unlock the potential of communities to drive impactful initiatives and promote effective climate action at the grassroots level.
- Learn-by-doing, to test ways of developing the climate rationale that are efficient, simple, resonate with communities, and combine local and traditional knowledge with scientific data.
- Share lessons with institutions and individuals involved in accessing and delivering climate finance, for change towards making climate finance more accessible to local communities.

The first call for applications to the grants was launched in February 2023, offering a one-year grant of US$ 40,000 to eight climate solutions led by local communities or organizations, focused on tropical forest management. Three of these will be implemented in Latin America (Costa Rica, Ecuador, and Brazil), three in Africa (Ghana, Democratic Republic of Congo, and Cameroon), and two in Asia (both in Indonesia).[211]

For this inaugural call, an innovative approach was designed to expedite and simplify the development of the climate rationale for the proposal, while enhancing the engagement of both the grantee and the local communities. To ensure that diverse voices and creative expressions were accommodated, candidates were given the freedom to choose from three options to explain the climate rationale: video, essay, or template. Applicants were also requested to provide information on their understanding of existing climate-related risks, impacts, vulnerabilities, and coping strategies. This information helped to infer the climate rationale behind their proposals.

Once grantees were selected, a dedicated researcher was hired by BASE to work closely with them to refine the climate rationale, in a way that struck a balance between scientific climate data (from sources like the IPCC) and Indigenous and local knowledge (first-hand information gathered directly from the communities). The researcher was selected in close collaboration with the grantee, to ensure that the chosen candidate possessed both a robust academic background and a deep familiarity with the local context. Combining climate science and traditional knowledge is key to focusing not only on physical impacts, but also on the social, economic and cultural consequences of climate change, and to understand how local communities relate climate risks to their own priorities.

Through the grants, BASE also aims to:

- Simplify the proposal process through simpler and more flexible formats, language options, and clear guidance on how to complete them.
- Share progress and learning on novel and fit-for-purpose approaches to developing climate rationales, and promote the acceptance of flexible ways for providing evidence of implementation by focusing on trust.
- Offer support to grantees every step of the way, addressing language barriers and lack of familiarity with technical terms, promptly responding to enquiries, and providing multiple rounds of feedback to prevent discouraging the grantees.

BASE aims to develop methodologies that can influence bigger grant providers and funds in the future to facilitate access to climate finance by local actors and to pilot sector and thematic tracks, such as developing rationales to access funding for loss and damage.

KEY TAKEAWAYS

Year on year, the mobilization of adequate finance remains a top priority for climate action. The ongoing negotiations and global discourse most often emphasize quantity. LLA requires a focus on reach and quality: Can communities access the finance and do they have the flexibility to use the finance to address their priorities?

Throughout this publication, stories highlight the progress that local actors are making in self-organizing, mobilizing and utilizing their own resources, and taking active and significant steps to address their priorities and challenges. Inevitably, limited access to finance emerges as a bottleneck. Unblocking this bottleneck is critical to achieve the ambition, scale, and effectiveness that is currently called for, in the face of climate change. Innovation is necessary, as demonstrated by *The "Seaweed Women" of Tanzania* in this chapter), as is the need to make existing (public and private sector) finance work better to target the needs of the most vulnerable, as demonstrated by the NRC in *Putting the People in Public-Private Partnerships*.

Scaling Deep

"Scaling up" and "scaling out", terms frequently borrowed from the private sector lexicon, often miss the point when it comes to LLA. They run the risk of falling into the age-old trap of replicability and scaling as the goal, sometimes at the expense of effectiveness. Long-term, financially sustainable approaches need to be deeply embedded in context and purpose. Another entrepreneurship term, "scaling deep", seems more appropriate, as it emphasizes a priority in building impact, multidimensional value and crucially speaks to the idea of purpose.

Harvesting of seaweed farmed with the "peg and line off-bottom method".

Small boats used for deepwater seaweed farming.

Shallow-water seaweed farming in Zanzibar, an increasingly precarious endeavor.

The "Seaweed Women" of Tanzania in this chapter embodies the idea of "scaling deep". It shows how an organization, driven by purpose and deeply embedded in the local context, is working to transform a local industry through a gender transformative approach. AFO designed its approach based on socio-cultural, economic, and local governance context, and works with the seaweed farmers not simply as beneficiaries or customers, but as critical partners and an integral part of the long-term vision of the organization. Critically, this story shows that it is not just about finance, but a more holistic approach that enhances necessary capabilities for a longer-term view of transformation. A lot can be learned from this story:

- Developing locally contextualized financial solutions not only requires a deep consideration of local socio-cultural, socio-economic, and governance circumstances, but a deeper consideration of how access to finance catalyzes transformation. Parachuting in with finance and resources alone will not necessarily result in long-term transformation.
- Close attention should be paid to the additional support local actors need to meaningfully utilize the provision of finance and resources, such as financial literacy training; goal setting and planning; and financial inclusion and access to financial services.
- Building long-term, sustainable, and locally contextualized financial solutions for LLA is a process. It requires an openness to pivoting and learning with local actors to ensure that the financial solution is fit-for-purpose and appropriate in the local context.

Building Common Purpose and the Role of the Private Sector in LLA

The term "private sector" has come to mostly imply large national and multinational corporations. However, the private sector is not homogenous. In addition to the conglomerates that fund the Adopt a City Initiative in the Philippines, it also includes entrepreneurs like Fatuma Makame in *The "Seaweed Women" of Tanzania*. Private businesses are also run by local entrepreneurs who need to be included in a narrative of shared purpose – inclusive and transformative adaptation and resilience action at the local level. Fatuma's story, as well as the NRC story in *Putting the People in Public-Private Partnerships*, highlight the important role of the private sector in driving change, and the urgent need for alignment and coordination.

The NRC story shows how building a shared narrative of resilience is bringing together cities and municipalities, the private sector, academia, civil society, and communities. By recognizing the roles, challenges, and priorities of diverse stakeholders at the local level, the climate crisis is being viewed as an opportunity to address the root causes of risk and power relations in a way that can lead to social change and transformation. This story touches on several LLA Principles, such as investing in local capabilities to leave an institutional legacy (Principle 4), building a robust understanding of climate risk and uncertainty (Principle 5), and highlighting collaborative action and investment (Principle 8). It also highlights how coordination and complementarity of humanitarian response and disaster risk reduction with climate change adaptation and resilience building can lead to impactful action, while avoiding duplication and short-term approaches. The NRC story illustrates several important lessons on engaging the private sector in LLA and forming Public-Private-People Partnerships:

- **The role of the private sector goes beyond responding in times of crises and donating financial support.** It is important to design ways for the private sector to become more strategically engaged in investing in resilience, not just for 'business continuity', but for a whole-of-society benefit.
- **Beyond providing finance and investing, the private sector is also a good source of knowledge, data, frameworks, tools, and capacities.** Engaging the private sector requires strategic and equitable partnerships, and an alignment of understanding and goals.
- **The NRC works with existing local governance structures** to strengthen their understanding and capacities to engage vulnerable communities in decision-making, long-term planning, and investment at the local level.
- **Organizations such as the NRC have an important role** as knowledge brokers, partnership builders, and coordinators to bring together multiple stakeholders.

Manila city hall, with public transport in foreground.

Locally Led Adaptation Rationales

The challenges associated with developing impactful climate rationales for accessing climate finance are longstanding and not specific to local level actors and communities. Accredited entities[212] to the climate funds receive project preparation grants and technical assistance support to develop their project proposals and refine respective technical aspects, including climate rationales. This support is not currently available to local governments and communities. It is not surprising that the climate rationales have become one – not only – bottleneck for them to access climate finance.

Instead of viewing climate finance only from a top-down fiduciary risk and financier/recipient perspective, BASE starts from a point of acknowledging that local actors and communities have valuable Indigenous and local knowledge that is crucial for informing climate action. It works to bring in the necessary scientific and technical knowledge without subverting other forms of valuable local knowledge. BASE acknowledges that there are multiple solutions that should be explored through learning by doing, and a willingness for providers of finance to take on more of the risks, in order to reduce the risks faced by recipients who have far less risk capacity.

Implications and Recommendations

During the application stage and the initial months of implementation, BASE has learned several noteworthy lessons that should be considered by those seeking to finance LLA:

- Communities face challenges in establishing a clear link between their needs and respective climate drivers while drafting proposals and articulating activities.
- Financiers need to find bolder ways that are more creative and flexible, and which acknowledge their key role in catalyzing transformation in the climate arena. This also includes finding appropriate ways to share some of the burden that they often impose on their grantees through their policies, processes, requirements, and access modalities.
- To change business-as-usual, risks must be taken. These risks should be carefully distributed, so that those with greater capacity take the larger risks.
- To target climate finance better and get it to where it is urgently needed, innovation is necessary, with flexibility to make mistakes and learn-by-doing.

There are numerous stories throughout this publication indicating that "adaptation rationale" requirements for accessing climate finance are too narrowly defined when it comes to local adaptation efforts. The sources of finance for helping the most climate-affected communities should respond to local climate priorities and agendas, not the other way around. Although the local champions who wrote to us are highly motivated, they urgently need external support.

One of the towering themes of the report is how local adaptation champions are working holistically to create resilience and adaptive capacity across multiple facets of people's economic, social, and psychological well-being. They incorporate further values and freedoms that are paramount to them, such as cultural heritage and freedom from gender-based violence. Addressing these concerns is poorly – if ever – recognized and supported by funders of "adaptation finance" projects. The LLA champions who are most effective in advancing community objectives are entrepreneurial in accessing, mixing, and matching diverse sources of financial and in-kind assistance. However, the onus is firmly on them. The challenge is for financiers, intermediaries, and support partners to at least meet them halfway, by showing their willingness to transform historical financier-recipient relationships into equal partnerships, where both sides feel that they have been heard.

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201. The 13 co-founders of AFO were students of Marine Sciences at University of Dar es Salaam, who were intrigued by the potential of Tanzania's blue economy, but that communities along the coast struggled to sustainably maximize its potential. They agreed to start AFO with the desire of building more resilient communities and those that create a sustainable living from the ocean.

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205. Sambaynihan in Filipino is a combination of "samba" (serving others); "bayan" and "anihan" (community activities).

206. Adopt-a-City Initiative. Details of LGUs that have joined: *Resilience Council Partners*

207. *Bill encouraging corporate social responsibility passed in the House*.

208. *Summary findings from consultative process*

209. Partners: Avina, Brainforest, Forest Trends, Grupo de Financiamiento de América Latina (GFLAC), Hivos, Pawanka Fund, Reos Partners, United Nations University – ViE and the generous support of Skoll Foundation. Aligned initiatives: Adaptation Research Alliance, Voices for Climate Action (VCA) and Impulsouth.

210. More information on the projects: *Fundación Avina*

211. Information on entity accreditation: *Green Climate Fund Entity Accreditation*

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