Assessing the Impact of Climate Shocks on Low Income Women Workers and their Communities in India
Self-Employed Women's Association (SEWA)

COLUMBIA | SIPA
School of International and Public Affairs

Final Report

5 May 2023

Anjali Nair, Milloni Doshi, Marisa McKasson, Shalini Rao, Spencer Nash, Zoya Dhakam

Acknowledgements

The SIPA team would like to acknowledge Ms. Poonam Shroff, Dr. Rajvi Joshipura, and Dr. Sahil Hebbar, lead members of the climate team at SEWA, for their time and inputs over the course of the 6-month workshop. Additionally, the team also expresses gratitude to Ms. Reema Nanavaty, the Grassroot Trading Network (GTN) team, including Mr. Devesh Shah, Mr. Sagar Junagade, Mr. Vaghela Chirag, and Ms. Prutha Vyas for their time and contributions.

The team thanks Professor Holly Hammonds for her weekly counsel as the faculty advisosr, along with Professor Eugenia McGill and Ms. Ilona Vinklerova for their efforts in coordinating the project.

Lastly, the SIPA team dedicates this work to the SEWA sisters – the community members who graciously shared their time, homes, and stories with the team to make this an enriching and eye-opening learning experience.

Table of Contents

I. Executive Summary

Between November 2022 and May 2023, a team of six MIA and MPA students from Columbia University's School of International and Public Affairs (SIPA team) partnered with the Self-Employed Women's Association (SEWA) to develop analytical products in support of SEWA's climate change programming. SEWA, headquartered in Gujarat, India, works to improve the health and livelihoods of over 2 million informal-sector, low-income women. The project specifically examined the gender-specific impacts of climate shocks on SEWA members.

Climate shocks in India have been increasing in both frequency and duration, resulting in drastic changes to health outcomes and livelihoods. Challenges such as limited access to credit, seasonally-dependent income, lack of physical infrastructure, limited public health resources, and policy inefficacy impede informal worker communities' ability to manage the resulting health and income consequences.

Women in informal labor sectors are especially vulnerable to climate impacts, and SEWA members have been hard hit. In response, SEWA has placed climate action at the center of its strategic mission, focusing on building health and livelihood resilience from the ground up in ways that contribute to a net-zero economy.

At the request of SEWA, the SIPA team has collaborated on a set of deliverables that support SEWA's climate programming and planning. Through a combination of expert interviews, desk research, and field visits, the SIPA team developed two types of products: 1) an actionable framework to assess the impact of climate shocks on different communities and inform needs-based programming, and 2) two comprehensive profiles outlining SEWA's Green Villages energy interventions and urban worker communities' climate challenges.

The Climate Shock Framework integrates quantitative and qualitative data on health impacts, livelihood impacts, and climate data, along with existing action from government policy and SEWA programming, to guide further needs-based programming. The Green Village Profile highlights the benefits of green energy interventions, provides community snapshots, and presents opportunities for future scaling of these interventions. The Urban Profile showcases the unique climate challenges faced by SEWA's urban workers to highlight areas for further policy advocacy and action. Together, these profiles can be used to build partnerships with external stakeholders in support of SEWA's vision of 100 Green Villages by 2030, and climate-resilient lives and livelihoods for its urban and rural informal-sector members.

The following report provides an overview and additional background on the central climate and development challenges facing SEWA workers and communities, on SEWA's climate plan, on the SIPA team's deliverables, and on how these tools support SEWA's critical work to build resilience and green livelihoods. The team's core client products, the Climate Shock Framework (3 components: Community Assessment Worksheet, Decision Matrix, and User Guide), the Green Villages Profile, and the Urban Profile are attached as Appendices.

II. Problem Analysis and Rationale

Heat waves and other climate shocks in India have been increasing in both frequency and duration (Ministry of Earth Sciences Government of India 2020), with 2022 seeing India's hottest temperatures in 120 years (Weitz, Mukhopadhyay, and Das 2022). These extreme events disproportionately affect the already vulnerable women and communities that SEWA serves, with increasing health, livelihood, infrastructure, food security, and education impacts on the over two million members SEWA supports.

Both rural and urban workers are affected. Rural workers have higher exposure to the sun and rely on seasonal incomes, which can mean crop losses from climate shocks affect their economic self-sufficiency throughout the year. Urban workers, such as construction workers, market vendors, and waste recyclers, tend to perform their labor in poorly managed conditions with direct exposure to heat or rain (Saudamini 2015).

Women in India are considered at high-risk of suffering from the effects of climate change and heat waves. Reasons include traditional power dynamics and inequitable sociocultural factors in the region (Nanda et al. 2022), compounded by poverty, class, and caste. These factors result in higher exposure not only to heat waves but also climate change in general and natural disasters (Chanana-Nag and Aggarwal 2020). Vulnerability, defined by exposure, sensitivity, and adaptation capacity (Thomas et al. 2019), is further increased depending on household conditions. Women are more vulnerable when homes lack clean running water, lack sanitation facilities, have limited air circulation, and use unclean fuel sources like coal for indoor cooking (Nanda et al. 2022). Moreover, the growing trend of outmigration of South Asian males for work has placed an increased burden on women in these families, adding to their domestic, agricultural, and other income-generating responsibilities, and further increasing their exposure to the associated climate risks.

Driven by the escalating incidence and impact of heat waves and climate shocks in India over the past decade, SEWA has increasingly prioritized programs and partnerships that promote green livelihoods and help SEWA members and their communities build resilience to climate change. Climate touches every aspect of the work SEWA does, and strategic decision-making regarding resource allocation for responsive, needs-based programming is vital. At the request of SEWA, the SIPA team has developed a set of tools and resources to support SEWA in this work.

III. SEWA's Climate Plan

Recognizing climate change and climate induced shocks as an existential challenge to its members and the planet, at its 50-year mark in 2022, SEWA members adopted climate action as the central organizational focus for the next 50 years.

Central features of SEWA's climate work include:

Prioritizing health and livelihoods
SEWA knows that addressing immediate health and income impacts from shocks, as well as building long-term resilience in direct response to members' needs and priorities, is critical.

Building clean and energy-secure communities
SEWA aims to design village-level, member-led interventions that contribute to a net-zero economy. SEWA has long seen local, decentralized supply chains and member-led initiatives as central to building resilient lives and livelihoods for members. According to SEWA leader Reema Nanavaty, large global supply chains in energy systems and infrastructure fail to reach many of the informal sector communities. To meet member energy needs and foster green and healthy communities, SEWA believes that bottom-up contributions to a net-zero economy are essential.

Swachh Akash
A cornerstone of SEWA's approach, and at the heart of all its current and planned climate initiatives, is "Swachh Akash" or "Clean Skies." The vision of SEWA founder, Ela Bhatt, Swachh Akash encourages community-based responsibility and ownership of local environmental conditions and climate change.

A number of adaptation and mitigation initiatives are currently being planned or implemented in alignment with the Clean Skies vision, including:

- ***Needs-Based Climate Interventions (implemented):*** SEWA currently responds to adverse health and livelihood impacts through immediate-relief health response, food security assistance, grassroots-led early warning systems, and provision of other short-term support activities.
- ***Clean Energy & Environment (pilot phase):*** SEWA is currently piloting 10 green villages through the Hariyali Green Villages program, with the goal of scaling to 100 green villages by 2025 to enhance accessibility and affordability of clean energy technologies and improve livelihood opportunities at the household level in rural India.
- ***Climate Leadership and Entrepreneurship (planned):*** SEWA is planning to create the Climate School— an educational and entrepreneurial program to promote climate change awareness, encourage climate action at the community level, and create green skilling and green livelihood opportunities for the youth of India. The program envisions the development of a cadre of young climate entrepreneurs from SEWA communities.

- ***Financial Resilience - Extreme Heat Income Insurance (planned)***: SEWA is currently planning a heat resilience insurance program in conjunction with the Rockefeller Center. The insurance program will provide cash transfers to replace lost income to workers who are impacted by extreme heat.

SEWA also is actively working to strengthen policy advocacy with local and national government entities and identify areas for collaboration across climate programming. This will ensure the sustainability and scalability of the interventions, while still promoting SEWA's focus on self-reliance and community-led economic empowerment.

IV. Summary of Deliverables

The SIPA team prepared three deliverables for SEWA: **1) a climate decision-making framework, 2) a profile of the Green Villages program, and 3) a profile of SEWA's urban occupations.** This section of the report outlines the purpose, structure, and use cases of these deliverables, all of which are attached as appendices.

#1) Climate Shock Framework

Objective of the Climate Shock Framework: The SIPA team and SEWA have collaborated to create a framework for the ongoing monitoring of climate shock impacts on member communities and an assessment of SEWA's programs and existing policies designed to address climate shocks. Based on consultations with SEWA staff, impacts are aligned to occupations – the primary mode of member categorization for SEWA programming. Furthermore, exposure and vulnerability to climate shocks largely depend on member occupation.

This framework includes three components:

- Community Assessment Worksheet
- Decision Matrix
- User Guide

The **Community Assessment Worksheet** is designed to:

- Integrate and document current information and data from different sources both within SEWA and from outside experts
- Identify new data points relevant for the ongoing monitoring of community interventions and policies
- Facilitate evidence-based assessments of community-specific needs and policy solutions related to climate shocks

After filling out the Community Assessment Worksheet, the **Decision Matrix** will help to:

- Guide SEWA's programming and advocacy activity toward the areas and strategies with the highest impact

Each of these objectives is discussed in more detail below.

1. Integrating and documenting current information

The Community Assessment Worksheet brings together information on two key areas:

a. Current data on the impacts of climate shocks – primarily heat waves, irregular rainfall, and floods – affecting SEWA communities in Gujarat.
b. Current action to address the impacts of these shocks, either implemented by SEWA or the government.

Based on interviews with SEWA staff, the framework is built to track impacts to health and livelihoods, the two key areas of focus of SEWA programming, though it can be further developed in the future to incorporate other impact categories. A desk review of research and policy literature identified additional impact categories including food security, water and sanitation, and access to education. Ongoing impacts were identified through a review of SEWA documentation and interviews with SEWA staff and community leaders.

SEWA interventions and government policies designed to address these climate shock impacts and build community resilience are identified through a similar combination of policy research and interviews with SEWA staff and members.

These lists of ongoing impacts and policies are not intended to be an exhaustive description of the current policy landscape but provide a base of knowledge and a structure for tracking this information that can be expanded and updated over time. Because of the multidisciplinary and constantly evolving nature of the challenges presented by climate shocks, it is important to have an approach to knowledge management that brings together information from different sources within SEWA – including central office staff from different teams, as well as agewan (or grassroots) leaders and members from different communities and different trade groups.

2. Identifying new data points and sources of information

The framework identifies important information about SEWA communities and climate shock policies that may not be available currently but could be collected over time. As a prerequisite for assessing community needs and policies, the Community Assessment Worksheet draws attention to data points that can help to measure community exposure and vulnerability, and existing policy coverage and effectiveness. Users are encouraged to consider whether this information is already available to SEWA decision-makers, and if not, to identify inputs for data collection.

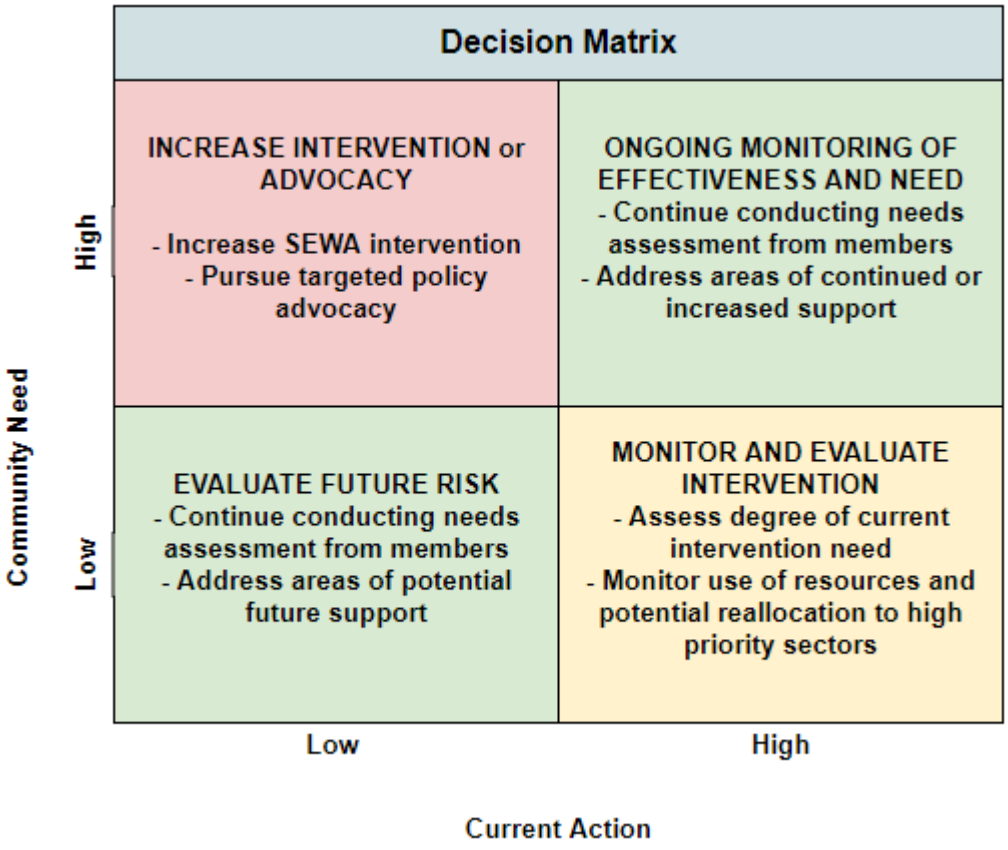
3. Assessing community-specific needs and policy solutions

The Community Assessment Worksheet facilitates the use of documented community and policy information to assess community-specific needs and policy solutions. The worksheet includes documentation that walks users through key considerations for evaluating the magnitude of specific climate shock impacts experienced by a given community, and how well the level of current policy intervention is addressing those impacts. Drawing on climate shock resilience literature and expert recommendations, this method breaks down community needs and current policy into three constituent components. Community Need depends on data inputs of Exposure, Vulnerability, and Priority. The Current Action depends on Coverage, Effectiveness, and Ongoing Advocacy.

Community Needs	**Current Action**
• **Exposure** - indicates how likely it is that members of the community will experience a climate shock and its specific adverse effects. Key considerations for rating exposure include location-based factors such as historical climate patterns and weather projections, and also occupation-based factors including time outdoors in the sun and proximity to hot equipment. • **Vulnerability** - indicates the susceptibility of the member to cope with and/or adapt to the climate shock based on their existing systems and resources and degree of exposure. Socio-economic factors such as income and credit access are important determinants of community vulnerability, as are health factors including access to health facilities and toilets. • **Priority** - Indicates how important this impact is to SEWA or the community (i.e. burns on feet might not be a priority or relevant for market vendors, while sunburn and skin rashes are). This is a subjective input based on member feedback and staff expertise.	• **Intervention/Policy Coverage** - Indicates the number of people or percent of the community that receives coverage from SEWA or government policy for the outlined impact. • **Intervention/Policy Effectiveness** - The degree of effectiveness of the SEWA intervention or government policy. • **Ongoing Advocacy** - The degree of ongoing advocacy for an intervention or policy to address that impact.

1.4 Prioritizing programming and policy advocacy that can have the highest impact

Based on the assessment of community-specific needs and levels of current policy action, SEWA decision-makers will be able to identify areas of high need – based on community exposure and vulnerability– and low current action to better target programming. The Decision Matrix addresses scenarios for each of these Community Need – Current Action combinations and offers guidance on the key next steps for decision-making.



Climate Shock Framework: Use Case

To best illustrate the framework, an occupation-based use case is provided.

Let's consider the example of a **street market vendor** – a common urban occupation in SEWA communities.

The vendor's **exposure** to heat waves will be high given the following:

- Recent heat wave data
- High levels of physical exposure to extreme heat during long, outdoor working hours

The vendor's **vulnerability** to heat waves will be high given the following:

- Health: government restrictions on using shade over market stalls
- Health: no access to water during working hours
- Health: no access to bathrooms during working hours (disproportionately affects women)
- Health: extreme dehydration
- Health: fatigue

- Health: skin damage and burns
- Livelihoods: loss of income due to product damage (i.e. nail polish physically explodes under extreme heat)
- Livelihoods: reduced working hours to avoid peak sun

The vendor will experience a **high priority** to address the health and livelihood effects outlined above.

SEWA staff and grassroots leaders can then **map current interventions** to each of the outlined health and livelihood effects. For example, they can map that current action for dehydration is high, given the prevalence of oral rehydration salt kits, but current action for skin damage and burns is low given government restrictions on shade and a lack of programming on protective clothing and other preventative barriers targeting this issue.

Based on outlining the level of need and current action for a specific impact, SEWA staff can better target interventions to areas of need. This tool provides SEWA with a formalized documentation process to help organize its vast areas of programming for targeted community benefits.

#2) A Profile of SEWA's Hariyali Green Villages

Objective of the Green Villages Profile:
The Green Villages profile accomplishes the project's stated objective of closely examining existing Green Village interventions and opportunities for scale by providing the following:

- A summary of the Green Villages model, with a specific focus on the three critical tenets of energy access: availability, affordability, and assurance (Kwatra 2022).
- An interventions table presenting all current Green Villages that describes what each intervention does, how much it costs, and environmental, financial, and health benefits.
- A community snapshot table showcasing current locations of Green Villages and projected growth plans for each location
- An analysis of the path forward for scaling the Green Villages

During the team's visits to Gujarat, the team learned that: 1) cost remains the central constraint to scaling the Green Villages, as many rural community members cannot afford to adopt the Green Villages interventions despite the clear benefits, and 2) donors require background information on the villages prior to site visits. The Green Villages profile both showcases the benefits of the program and provides background information on the communities the program serves. The current structure and format of the profile will help SEWA and GTN staff use the document to build partnerships for intervention scaling.

To better understand the use case of the Green Villages profile, it is helpful to understand why the Green Villages program is such a key aspect of SEWA's vision for climate resilience.

Green Villages as Part of SEWA's Vision for Climate Resilience

SEWA, in partnership with the Natural Resources Defense Council (NRDC) and the Grassroots Trading Network (GTN), spearheaded the Green Villages program as part of a multi-pronged strategy to promote community-led climate resilience in its member communities. Two-thirds of India's population lives in rural areas, where there has been little adoption and use of clean energy. Through the expansion of clean, modern energy access, SEWA aims to offer its members a chance to

- Generate livelihoods that rely on clean energy and environmentally friendly technologies, and proactively anticipate energy transition needs
- Reduce climate-driven productivity loss
- Reduce energy costs and adverse health consequences from fossil fuels
- Reduce time needed to gather and prepare traditional fuels like wood
- Reduce drudgery and adverse health consequences of traditionally female dominated cooking and domestic activities as well as of agricultural and animal husbandry activities

The Green Villages program is currently being piloted in 10 villages in Gujarat and Rajasthan, with the goal to scale to 100 villages by 2025. Each Green Village incorporates clean energy interventions, the education of members on climate shocks, and green skilling to enable members and communities to adapt to future energy and climate scenarios. Each Green Village also includes a suite of clean energy and environment-friendly technologies, such as biogas, solar precision irrigation, cool roof paint, solar lanterns, off-grid solar panels, and solar fencing or solar pumps, which are integrated into SEWA members' occupations and lifestyles.

The Green Villages program complements SEWA's Clean Skies vision, and SEWA climate and environmental programs such as the Climate School, by promoting economic self-reliance and grassroots-level climate change mitigation and supporting SEWA's ambition to foster a cadre of SEWA climate entrepreneurs.

Green Villages Profile: Use Case

The Green Villages profile can be used for the following purposes:

1. A document SEWA staff, GTN staff, and SEWA's grassroots leaders can use to promote scaling of the Green Villages with new villages or with SEWA members who have not adopted the interventions in existing villages.

   The profile outlines the details, costs, and benefits of each intervention and so can easily be used as a quick reference for staff sharing information about the Green

Villages program with SEWA members in villages with the potential to join the program or those trying to grow program impact in their communities.

2. Materials SEWA and GTN staff can use with potential partners and donors.

   The Green Villages profile both showcases the benefits of the program and provides background information on the communities the program serves, which will support SEWA and GTN staff with essential documentation to build partnerships with new donors and other stakeholders.

Recommendations for future development and use of Green Villages Profile:
To promote the continued use of this deliverable, the SIPA team recommends:

1. Additional data gathering to document monetary and income benefits from the clean energy interventions.

   The information on benefits provided is based on conversations with knowledgeable SEWA staff and members, but may not be inclusive of all benefits. The value of the profile will be further strengthened by the addition of income and monetary benefits from interventions in more specific detail, as well as further documentation of the benefits of reducing the drudgery of work. The SIPA team was not able to collect this type of information from SEWA members, and recommends that SEWA staff and the GTN team continue to do so. Additional specific monetary data will facilitate work internally and with external partners to bring the program to scale.

1. Development of an Excel spreadsheet or other form of documentation, in order to ensure this type of information is easily accessible for future collaborators and to make an update of the profile easier.

   The information about the current number of interventions and future growth plans in the Green Villages profile is subject to change. An Excel or similar format would facilitate the addition of updates as well as additional quantitative data as it becomes available, to keep the profile current and ready for use with members, partners, and colleagues.

#3) A Profile of SEWA's Urban Occupations

Objective of the Urban Profile:
Based on direct conversations and feedback from the SEWA team working on urban issues, it was determined that developing a profile closely examining urban trades and climate shocks would be helpful to the SEWA staff and urban grassroots leaders.

The Urban Profile examines four common urban occupations for SEWA workers: market vendors, construction workers, waste recyclers, and home-based vendors. The profile includes:

- An overview and introduction to the nature of work for each occupation
- An assessment of the effects of climate shocks on these workers and resulting impacts on their health and livelihoods
- Documentation of the policy interventions and advocacy work by SEWA to combat these challenges.

The Urban Profile is a preliminary and crucial step in documenting the climate challenges faced by SEWA's urban members, supporting SEWA's work to identify specific needs and build resilience across all occupations.

Urban Profile: Use Case

Based on discussions with SEWA staff, the SIPA team believes the Urban Profile can be used or adapted for multiple purposes:

1. A document that can be repurposed to create awareness among SEWA members about the overall picture of climate change and its impacts on SEWA's urban members.

2. A case study that can be shared or drawn from for external awareness-building, coalition-building, fundraising or promotional purposes with parties such as media, collaborating organizations, and donors.
    - The statistics listed in the document are a helpful starting point to understand the magnitude of the problem for new partners and collaborators
    - The information on impacts of different climate shocks can be used to showcase the urgency and importance of the situation with donors and funders.

3. A reference point for understanding current policy interventions and areas of increased need and collaboration.

V. Recommendations

SEWA can use the Climate Shock Framework and Profiles to support current needs-based programming and achieve scale for climate resilience initiatives in three ways: expanding knowledge, growing external partnerships and internal community buy-in, and enhancing strategic planning.

1. **Expand Knowledge**

The team's deliverables can be used to expand knowledge collation, data collection, and synthesization across different SEWA teams. The Climate Shock Framework tool in particular has been developed in a buildable way to easily incorporate new data streams to feed outputs and rankings on exposure, vulnerability, and current action. For example, SEWA's future climate school entrepreneurs can use hyper-local climate data and input these data points into the exposure tool, thus generating localized outputs on climate exposure and vulnerability.

Additionally, the tool can be further incorporated into existing monitoring and evaluation (M&E) processes and documentation which can link to the tool's exposure and vulnerability outputs. The tool is highly qualitative, ensuring usability by grassroots leaders and SEWA staff, providing an organized way to validate and store qualitative, community-feedback driven inputs, complementing the organization's existing M&E methodology.

2. **Grow Partnerships and Community Buy-In**

Green Villages

From a multitude of expert interviews with SEWA staff and grassroots leaders, cost and member buy-in presented themselves as recurring challenges to scale the Green Villages model. A high-level document quantifying and displaying costs and benefits to members will be instrumental in addressing these challenges. The comprehensive, concise, and strategic nature of the Green Villages profile can assist SEWA in showcasing benefits to external partners and potential supporters. Likewise, if translated into local languages, this document can provide user-friendly information on benefits to gain member buy-in and promote uptake of interventions from the villagers themselves.

Urban communities

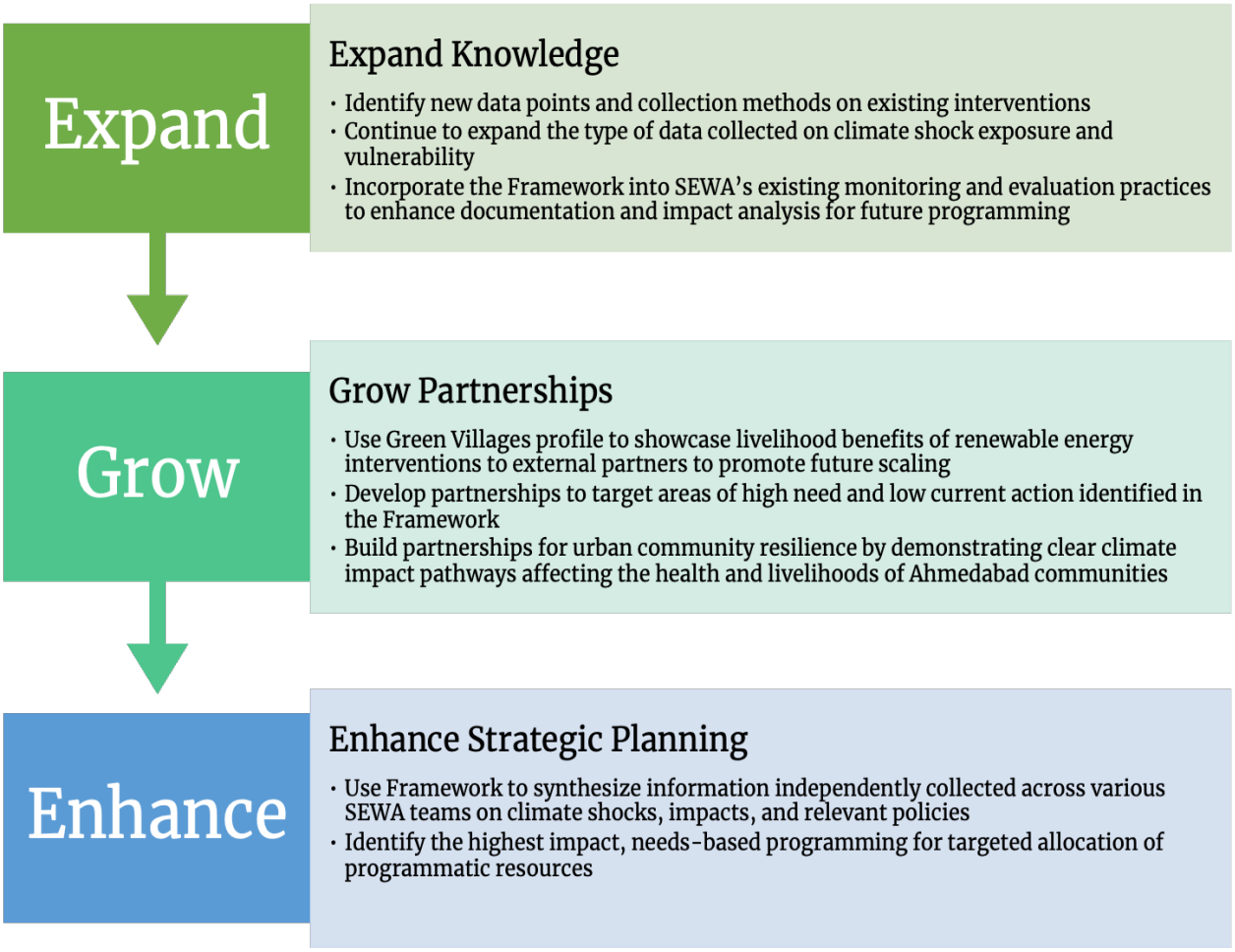
While impacts of climate shocks on urban members are well-understood by SEWA leadership, there does not yet exist a comprehensive document exploring income and health impacts by urban occupation, mapped to existing SEWA or government programming. Based on feedback from SEWA's urban team, the Urban profile fills this gap, outlining clear climate impact pathways affecting the health and livelihoods of SEWA's Ahmedabad communities, and can be used or adapted for external awareness-building, coalition-building and targeted policy and community advocacy.

Climate Shock Framework
The framework tool provides high-level snapshots of areas of high need and low current action, which can be used to gain external stakeholder or project partner buy-in or to build internal awareness across SEWA teams.

3. **Enhance Strategic Planning**

The Climate Shock Framework provides an essential opportunity to synthesize findings on climate shocks across various SEWA teams. Currently, each SEWA team is acutely aware of the impact of climate shocks as related to their specific areas. For example, the agriculture team is clearly aware of and is collecting data on climate shock crop loss impacts and livelihood disruptions, while the health team quantifies health impacts such as dehydration and provides appropriate response interventions. The Community Assessment Worksheet in particular represents a place where all relevant qualitative and quantitative data can come together on the same page at a high-level, providing a critical strategic view, organization and membership-wide.

Additionally, the framework's Decision Matrix will enable targeted identification of the highest impact, needs-based programming, facilitating decision-making on priorities and future action. SEWA teams can visualize current programming to varying levels of need and current action, and use this to make strategic decisions on resource allocation and action going forward.


Expand
Expand Knowledge
• Identify new data points and collection methods on existing interventions
• Continue to expand the type of data collected on climate shock exposure and vulnerability
• Incorporate the Framework into SEWA's existing monitoring and evaluation practices to enhance documentation and impact analysis for future programming
Grow
Grow Partnerships
• Use Green Villages profile to showcase livelihood benefits of renewable energy interventions to external partners to promote future scaling
• Develop partnerships to target areas of high need and low current action identified in the Framework
• Build partnerships for urban community resilience by demonstrating clear climate impact pathways affecting the health and livelihoods of Ahmedabad communities
Enhance
Enhance Strategic Planning
• Use Framework to synthesize information independently collected across various SEWA teams on climate shocks, impacts, and relevant policies
• Identify the highest impact, needs-based programming for targeted allocation of programmatic resources

VII. References

Chanana-Nag, Nitya, and Pramod K. Aggarwal. 2020. "Woman in Agriculture, and Climate Risks: Hotspots for Development." Climatic Change 158(1): 13–27.

Kwatra, Sameer. 2022. "Availability, Affordability, and Assurance: The Three A's of Energy Access." Natural Resources Defense Council. Retrieved May 2, 2023, from https://www.nrdc.org/bio/sameer-kwatra/availability-affordability-and-assurance-energy-access.

Ministry of Earth Sciences Government of India. 2020. Assessment of Climate Change over the Indian Region. Singapore: Springer Singapore.

Nanda, Lipika et al. 2022. "Characteristics of Households' Vulnerability to Extreme Heat: An Analytical Cross-Sectional Study from India." International Journal of Environmental Research and Public Health 19(22): 15334.

Saudamini, Das. 2015. "Effects of Climate Change and Heat Waves on Low Income Urban Workers:: Evidence from India." In , 171–92.

Thomas, Kimberley et al. 2019. "Explaining Differential Vulnerability to Climate Change: A Social Science Review." Wiley Interdisciplinary Reviews: Climate Change 10: e565.

Weitz, Charles A, Barun Mukhopadhyay, and Ketaki Das. 2022. "Individually Experienced Heat Stress among Elderly Residents of an Urban Slum and Rural Village in India." International Journal of Biometeorology 66(6): 1145–62. https://doi.org/10.1007/s00484-022-02264-8.

VIII. Appendices

Appendix A: Methodology

The SIPA team's methodology had three main components: initial secondary research, targeted expert interviews, and site visits in both January and March.

Secondary research: The SIPA team assessed over 20 climate vulnerability frameworks utilized by international organizations and described in the policy literature and conducted a thorough literature review on the gendered impacts of climate shocks in India, the intersection of climate change and health outcomes, and climate shocks and economic outcomes. This helped the team understand how experts categorize the impacts of climate shocks and gain a more detailed understanding of unique economic and health challenges faced by women experiencing climate shocks. The team used this contextual knowledge to develop nuanced interview guides for SEWA staff and external academic and policy experts, and to ensure informed conversations during site visits.

The SIPA team's targeted expert interviews can be broken into two different types of interviews: those with SEWA staff and those with external academic and policy experts. The Data Collection appendix below contains two examples of these interview guides including SEWA Leadership Interview Questions and the SIPA team's Draft Interview Guide for Academic or Subject Matter/Policy Expert.

The SIPA team interviewed and routinely coordinated with more than eight SEWA headquarters staff across health, rural development, urban programming, and Green Villages teams and also interviewed over twenty grassroots leaders to gain a grassroots understanding of the impacts of climate shocks, current member needs, the benefits of current SEWA interventions, and insight into what is needed for scale. To supplement the SEWA team's knowledge, the team also interviewed Dr. Ben Orlove from Columbia University, Dr. Cascade Tuholske from Montana State University, and Lubaina Rangwala from the World Resources Institute India team. These interviews provided a nuanced understanding of key impact categories, which informed climate assessment techniques and the final framework design. The SIPA team also developed a deeper understanding of global trends in climate adaptation interventions and discussed lessons from comparative field research, which informed the team's findings and recommendations for SEWA.

Throughout January and March travel, the SIPA team visited six communities in the State of Gujarat. They visited eight trade communities: salt-pan workers, farmers and those who engage in animal husbandry, artisans, home-based workers, construction workers, waste recyclers, and market vendors. The Data Collection Tools appendix below includes two examples of the type of guides the SIPA team used to collect data from these site visits,

including an Observation Guide from January travel and a SEWA Grassroots Leader Interview Guide from March Travel.

Meeting with grassroots leaders in their communities helped the SIPA team gain on-the-ground insights about the health and livelihood impacts of climate shocks and village-level perspectives on the benefits and technical challenges of implementing and scaling energy interventions. The SIPA team gained additional qualitative insights about urban and rural communities and SEWA's organizational structure and needs-based approach. This provided additional perspective and history about Green Village stakeholders, partnerships with policy actors, challenges to scaling, and the local policy environment.

Appendix B: Data Collection Tools

The following appendix includes a selection of the interview guides we used as data collection tools.

SEWA Leadership Interview Questions

Interviewer: Hello [Name], How are you?
Interviewee:
Interviewer: We wanted to thank you for this incredible opportunity to work alongside SEWA as it advances its climate programming strategy in Gujarat. It's been a great experience for us! Thank you for taking the time to sit down with us today.

- Before introducing ourselves, we also wanted to give our condolences for the loss of Elaben Bhatt.
- We wanted to begin by introducing ourselves *(Spencer, Marisa, and Milloni give 30-second introductions)* and giving you a progress update on where the SIPA team is currently at.

Framework and Big Picture Strategy

As you know, we have been working on a framework to help organize information about the impacts of climate change on SEWA's members and SEWA's broader climate programming, and also to create profiles that showcase the important interventions that SEWA is doing in green villages and urban worker communities. This week we have had the privilege to talk with SEWA staff, agewans, district coordinators, GTN, and SEWA sisters, and we have learned so much about the important work SEWA is doing. We would love to hear more from you about what you see as SEWA's big-picture strategy for building climate resilience in member communities.

- What do you see as SEWA's long-term goals for building resilience in SEWA communities against climate shocks?
    - What do you see as the primary steps that SEWA is taking to achieve these goals?
- How do you characterize the interaction between Green Villages interventions, immediate relief measures (often health-based) for heat waves, and SEWA's broader plan for helping their members with climate shocks?
- At the big-picture level, what do you see as the key resources and strategies that are needed for these programs to succeed?

We also wanted to get some of your thoughts on SEWA's process for getting ongoing feedback and assessing and adapting its work and hear a little bit about upcoming opportunities.

- At the big picture level, how are you thinking about assessing SEWA's impact with respect to climate-resilience initiatives?

- As one of SEWA's long-time leaders, what type of information do you use to evaluate the impact of SEWA programs?
- We have heard from a lot of SEWA members that interventions are need-based and always designed keeping in mind the needs of the members. From a leadership perspective, how does SEWA decide to move forward with interventions once you understand the needs of the members?
- What do you envision as the most important next steps in developing or expanding SEWA's climate-related programming?
- We also recently read about SEWA's decision to partner with Rockefeller and Blue Marble to deploy the extreme heat income insurance initiative. Could you let us know how the partnership will support SEWA's climate strategy and your vision for projects that you would like to implement with this fund?
    - Do you have a sense of the timing and scope?
    - We wanted to understand if this project will impact green villages and/or how we could also integrate in the framework

After our really informative visits this week, we think our team has a lot of value to add in terms of the green villages profile/case study and a potential additional profile of SEWA's urban programming and so we would love to talk about those in more detail.

Green Villages

- How do you see the Green Villages' contribution to SEWA's work on climate shocks and climate resilience?
- Guided by our faculty advisor Holly and with inputs from SEWA staff members, we have designed a case study for green village interventions for an external audience such as potential donors or for press briefings. We are also trying to keep it accessible and simple in a way that SEWA members could also benefit from the same. Do you think this approach looks feasible? E.g. a table of all interventions, scope covered, linkages to climate resilience, and so on.
- We have been able to see Aravalli Green village and it was amazing to see the kind of interventions taking place. We wanted to understand a little bit more about how you conceptualized what a green village should look like and how you continue to envision the terms "green village?" and "green livelihoods"? What is your lens when it comes to designating a village as a green village?
- As the Green Villages program is scaled to 100 villages, what are the key interventions that SEWA will continue to scale the green villages program? E.g. biogas
- How do you intend for partners such as NRDC to keep supporting you in this process?

Urban Update

- We were also privileged to have visited the urban centers in Ahmedabad, where we focused on speaking with market vendors, construction workers, and waste recyclers.
    - It has been an extremely fascinating and informative visit for us. We really validated our assumption that the urban poor are some of the hardest hit by climate shocks.

- We see that there is a lot of literature on SEWA's rural interventions on the internet but we see we could be useful if we could create some written materials about the urban poor.
  - Now we are hoping to help with that by creating a 2-3 page urban profile as well.
- Do you have any guidance for us in this regard?

Do you have anything else you would like to share with us?

Thank you for your time and we look forward to delivering our final presentation to you soon!

Draft Interview Guide for Academic or Subject Matter/Policy Expert

Introduction [<5 minutes]

Good morning/afternoon [Name], and thank you for taking the time to meet with us today.

I am [_____] and this is my colleague [____]. We are both student researchers from the Columbia University School of International and Public Affairs in New York and for our final capstone consulting project, we are working with the Self-Employed Women's Association (SEWA).

Our goal is to inform SEWA's future work and program design on heat waves and other climate shocks. To do this, we are 1) developing a framework for SEWA to help them understand the needs of their members and the impact of programming related to extreme climate shocks and 2) conducting a close examination of the Green Village interventions.

Objective: We hope that you can help provide some feedback on our current thoughts regarding the framework.

This research project will be incorporated into a report for SEWA and Columbia University. Please let us know if you do not feel comfortable with us using your name in any aspects of this that make it into this report. If this all sounds good, we can begin our discussion.

Topic Discussion [20-25 minutes]:

As we mentioned about the framework, we have currently broken our framework development into 2 stages. The first stage focuses on the impacts of climate change and the second stage will focus on SEWA's interventions in response to these impacts and community resilience.

Today, we wanted to discuss the first stages of our work. We have currently developed an indicative framework that first identifies the prevalent climate shocks in the region, maps the particular SEWA-supported trades/professions the shock affects, and tries to map out potential impacts on those particular professions. We have also broken down the impact categories into a few thematic areas we believe are crucial. We have created a high-level visual to help show our thought process at a high level. [show visual]

- How does this compare to your knowledge regarding how to best map impacts on community members? At a high level, are we thinking about this correctly?
- Do you think the impact categories [insert current ones], are exhaustive, or if we are missing out on any crucial areas?
- We have also realized that certain impacts are overlapping. For instance, loss of productivity could be health-induced, food security induced, or due to infrastructure changes. Do you have any thoughts on incorporating these overlapping areas?

- Do you recommend any other frameworks or resources (policies/interventions/documents) to ensure that we are not missing any important impact areas?

[If time]

- Our current plan is to map SEWA's current programming (e.g. cool roofs, biogas plants, immediate relief measures such as cool fans, or oral rehydration solutions) to this conceptual framework on member impacts to try to understand opportunities and gaps in SEWA programming. Do you have any thoughts on this approach?

Closing [<5 minutes]

Thank you so much for taking the time to speak with us. Before we wrap up:

- Is there anything else you would like to share with us?
- Do you have any names of potential other experts, academic or otherwise, we should think about consulting?
- Do you mind if we contact you again in case we have a question or need clarification at a later stage?

Thank you very much for speaking with us. We really appreciate your time and your opinions. Your insights have been very helpful for our research.

Observation Guide - January

Who: The SIPA team will be observing the Green Villages and community members within these villages.

What: We anticipate observing what the community members' work conditions, villages, and homes look like in terms of structural elements that either compound or adapt to extreme heat waves and weather-related events. We will qualitatively observe their use of different SEWA interventions (i.e. cool roof paint, clean cookstoves) and different infrastructural elements of their houses (i.e. windows, ventilation, sunlight). These elements have been informed by our research on climate change on informal workers in Gujarat and from SEWA programming.

When: January 5th - January 14th
**Note: The team traveling in March will use a different, more detailed observation guide for their structured participatory methods. The January team will be conducting semi-structured interviews and initial qualitative observation.*

Where: Green Villages outside Ahmedabad, Gujarat

Documenting Data - Best Practices

- Write down from memory as soon as you can. It can be challenging to write things down while participating and observing
- Be careful to differentiate between reporting observations and interpreting what they mean
    - Write down objective observations on one page and subjective interpretations on another
    - Review each other's field notes to help compile what is objective vs subjective
- Identify questions for follow-up

TIPS

Tips for taking field notes

Begin each notebook entry with the date, time, place, and type of data collection event.

Leave space on the page for expanding your notes, or plan to expand them on a separate page. (See the section above on "How do I expand my notes?")

Take notes strategically. It is usually practical to make only brief notes during data collection. Direct quotes can be especially hard to write down accurately. Rather than try to document every detail or quote, write down key words and phrases that will trigger your memory when you expand notes.

Use shorthand. Because you will expand and type your notes soon after you write them, it does not matter if you are the only person who can understand your shorthand system. Use abbreviations and acronyms to quickly note what is happening and being said.

Cover a range of observations. In addition to documenting events and informal conversations, note people's body language, moods, or attitudes; the general environment; interactions among participants; ambiance; and other information that could be relevant.

Guide for Observation Notes

<table>
<tr><td colspan="2">Name:
afternoon
Date:
Time: Morning - late</td></tr>
<tr><td>Purpose
<u>Purpose of meeting:</u> Visit and observe salt pan workers and interventions in Surendranagar district

<u>Type of meeting:</u> site visits with informal Q&A along the way. Questions involved asking about the salt mining process, which elements were specifically impacted by heat waves, and coping mechanisms to heat waves.</td><td>Location
District: Surendranagar Village:

<u>Location Features: a</u> village with greenery followed by vast desert with limited vegetation. Solar panels throughout the desert provide energy for the solar pumps.

<u>Venue Description:</u> huge salt flats, cracked earth, disparate houses scattered miles apart on the desert. Houses were makeshift dwellings (< 400 sqft, put up by wood posts with a tarp covering the sides and roof. Had a small TV and wiring providing electricity to the dwellings. Mobile school vans are provided by gov’t for school children in the area. Weekly or biweekly access to veggies and fresh produce from a mobile vendor. Limited to no food storage capacity. Cooking is done by burning firewood.</td></tr>
<tr><td colspan="2">Participants: Information is redacted below for data privacy.</td></tr>
</table>

#	Role (Name if SEWA)	Organization	Gender	Additional Characteristics	Perspectives
1					–

SEWA Grassroots Leader Interview Guide for March Travel

Introduction:

- Introduce ourselves and explain the project
- Share that we would like to ask them some questions, but they should feel free to not answer anything that makes them uncomfortable
- Get consent for recording, emphasize we will keep anonymous and confidential

Experience with climate shocks and impacts

- Tell us about what you do, and what most people in your community do for work.
- Can you tell us what climate change shocks are you experiencing? E.g. heat waves/floods (ગરમીના મોજા and પૂર)
- Can you tell us how that is affecting you? (તમને કેવી રીતે અસર કરે છે?)
    - What happened to your crops, working hours, etc.? તમારા પાક, કામના કલાકો વગેરેનું શું થયું?
    - What has happened to you and your family healthwise? તમને અને તમારા પરિવારને સ્વાસ્થ્યની દૃષ્ટિએ શું થયું છે?
    - Are you experiencing more heat in your houses or have you experienced any equipment damage with the heat? શું તમે તમારા ઘરોમાં વધુ ગરમી/વધતા તાપમાનનો અનુભવ કરી રહ્યાં છો અથવા તમે ગરમીથી કોઇ સાધનને નુકસાન અનુભવ્યું છે?
- Do these shocks affect other aspects of your life such as your food, water, and children's education?

Experience with interventions and needs for improvement

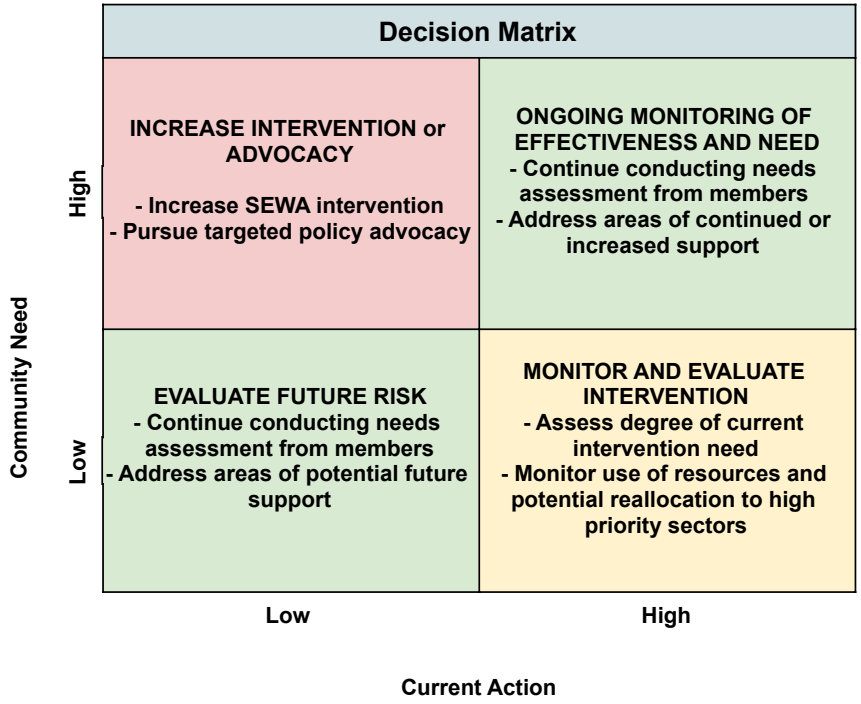
- Have you done anything to counter these climate shocks? (શું તમે આ હવામાનના આંચકાઓનો સામનો કરવા માટે કંઇ કર્યું છે?) For example: using umbrellas, drinking more water etc (ઉદાહરણ તરીકે: છત્રીનો ઉપયોગ, પીવાનું પાણી વગેરે)
- How has SEWA supported you with interventions for the same? (SEWA એ તેના માટે દરમિયાનગીરીઓ સાથે તમને કેવી રીતે સમર્થન આપ્યું છે?)
- Has this support benefited you? What do you think could be done better? (આપેલી મદદથી તમને ફાયદો થયો છે? તમને શું લાગે છે કે વધુ સારું કરી શકાય છે?)
    - After the interventions, have you noticed any recovery of income and/or working hours? Or improvement in health or house conditions?
- Does the government also run programs for these climate change programs?
- Are they helpful? Are you benefiting from them? Are you able to access them easily? શું તેઓ મદદરૂપ છે? શું તમને તેમનાથી ફાયદો થાય છે? શું તમે તેમને સરળતાથી ઍક્સેસ કરી શકશો?
- How do you think government support could be improved?
- Has anyone else been working to support you with this problem?
- What support would be good for you to get immediately to counter your problems as summer approaches?
- Is there anything else you would like to share with us?

Appendix C: Climate Shock Framework Decision Matrix

Summary of Community Needs and Current Policy Action on Building Climate Shock Resilience

Occupation: Market vendor
Location: Ahmedabad
Climate Shock: Heat Wave

Category	Impact	Need	Current Action
Health	Burns on feet	HIGH	LOW
Health	Sunburn and skin rashes	HIGH	HIGH
Health	Dehydration	HIGH	MEDIUM
Health	Vomiting	LOW	LOW
Health	Urinary tract infection	MEDIUM	LOW
Health	Dizziness and lightheadedness	HIGH	HIGH
Health	Fever	MEDIUM	LOW
Health	Mental health issues	MEDIUM	LOW
Health	Malnutrition	MEDIUM	MEDIUM
Health	Food wastage	HIGH	LOW
Health	Food spoilage	HIGH	MEDIUM
Health	Consumption of contaminated water	MEDIUM	LOW
Health	Consumption of hot water	HIGH	MEDIUM
Livelihoods	Disruption to energy access	MEDIUM	HIGH
Livelihoods	Increased energy costs	MEDIUM	MEDIUM
Livelihoods	Destruction of work product	HIGH	MEDIUM
Livelihoods	Loss of income	HIGH	HIGH
Livelihoods	Loss of productivity	HIGH	HIGH



Appendix D: Climate Shock Framework Community Assessment Worksheet

Community Assessment Output

Purpose: The purpose of this tab is to assess needs of specific SEWA communities and trades to identify the highest impact opportunities to support in addressing the impacts of climate shocks.
Qualitative ratings of community exposure vulnerability, and priority are generated based on a review of relevant data sources and SEWA staff input.
Input: Specific community (based on occupation) and location to conduct this exercise for a specific SEWA community.
Outputs:
- Need: Level of community **need for action or advocacy** based on exposure, vulnerability, and priority ratings. [Exposure + Vulnerability + Priority = Need]
- Current Action: Rating of current action based on existing SEWA interventions & gov't policy coverage, SEWA intervention & gov't policy effectiveness, and ongoing advocacy [Coverage + Effectiveness + Advocacy = Current Action]

Definitions:
- Exposure: how physically exposed the community is to the specific impact - more information in "Exposure Assessment Guide" tab
- Vulnerability: the community's ability to cope and adapt to the impacts based on existing systems and resources available to them - more information in "Vulnerability Assessment Guide" tab
- Priority: the degree of importance or necessity of committing action for this impact, as expressed by community members
- Intervention/Policy Coverage: the number of people or % of community that receives coverage from SEWA or government policy for the outlined impact
- Intervention/Policy Effectiveness: the degree of effectiveness of the SEWA intervention or government policy
- Ongoing Advocacy: the degree of ongoing advocacy for an intervention or policy to address that impact

Community/ Occupation	Market vendor
Location:	Ahmedabad

Shock	Impact	Category	Exposure	Vulnerability	Priority	Intervention / Policy Coverage	Intervention / Policy Effectiveness	Ongoing Advocacy	Need	Current Action
Heat Wave	Burns on feet	Health	High	High	Medium	Low	Low	Low	High	Low
Heat Wave	Sunburn and skin rashes	Health	High	High	High	High	High	High	High	High
Heat Wave	Dehydration	Health	High	High	High	Medium	Medium	Medium	High	Medium
Heat Wave	Vomiting	Health	Medium	Medium	Low	Medium	Medium	Medium	Low	Low
Heat Wave	Urinary tract infection	Health	Medium	High	Medium	Low	Low	Medium	Medium	Low
Heat Wave	Dizziness and lightheadedness	Health	Medium	High	High	High	High	High	High	High
Heat Wave	Fever	Health	Medium	High	Low	Low	Low	Low	Medium	Low
Heat Wave	Mental health issues	Health	Medium	High	Medium	Low	Low	Low	Medium	Low
Heat Wave	Malnutrition	Health	Medium	Medium	High	Medium	Medium	Medium	Medium	Medium
Heat Wave	Food wastage	Health	High	High	High	Low	Low	Low	High	Low
Heat Wave	Food spoilage	Health	High	High	High	Medium	Medium	High	High	Medium
Heat Wave	Consumption of contaminated water	Health	Medium	High	Medium	Low	Low	Low	Medium	Low
Heat Wave	Consumption of hot water	Health	High	High	High	Medium	Medium	High	High	Medium
Flooding	Damage to shelter	Livelihoods	Medium	High	Medium	Low	Low	Low	High	Low
Flooding	Damage to housing	Livelihoods	High	High	Medium	Low	Low	Low	High	Low
Heat Wave	Disruption to energy access	Livelihoods	Medium	Medium	Medium	Medium	Medium	High	Medium	High
Flooding	Disruption to energy access	Livelihoods	Low	Low	Low	Low	Low	Low	Low	Low
Heat Wave	Increased energy costs	Livelihoods	Medium	Medium	Medium	Medium	Medium	High	Medium	Medium
Flooding	Destruction of work product	Livelihoods	Medium	Medium	Low	Medium	Medium	High	Medium	Medium
Heat Wave	Destruction of work product	Livelihoods	Medium	High	High	Low	Low	High	High	Medium
Heat Wave	Loss of income	Livelihoods	High	High	High	High	High	High	High	High
Heat Wave	Loss of productivity	Livelihoods	High	High	High	High	High	High	High	High

Assessing Community Exposure

This tab is for assessing the exposure of the given community to each of the climate shocks.
This lists indicators for exposure that will be easily accessible for SEWA to consider while making assessments; NOTE: this list is not exhaustive.

Community/ Occupation	Market vendor
Location:	Ahmedabad

Climate Shock	Exposures	Guide on exposures
Heat Wave	Air Temperature	This is the temperature we measure usually and is reported by weather departments and the media
Heat Wave	Heat Index	The heat index is what the temperature feels like to the human body when relative humidity is combined with the air temperature. This tool is helpful to measure health impacts of a heat wave such as sunstrokes on the body. This index can be considered as similar to the temperature we "feel like" vs the real temperature. The heat index is calculated for areas in shade. The heat index for Ahmedabad can be found online on a number of portals including here.
Heat Wave	Wet Bulb Temperature	The wet bulb temperature is similar to the heat index except that it is calculated for areas in direct sunlight and also takes into account wind speed, sun angle and cloud cover. Wet bulb temperatures are considered dangerous when they hit 35C which is approximately equivalent to an air temperature of 40 C with a relative humidity of 75%.Wet bulb temperatures can be accessed here or calculated here.
Heat Wave	Land Surface Temperature (LST)	LST is a measure of interaction as it indicates the skin temperature of materials above the Earth's surface. It could be vegetation, types of roofs, tar or pavement materials, water, etc., and hence is useful in understanding the urban heat island effect. For example, even with similar air temperatures, areas with higher green cover would have lower surface temperatures during daytime as compared to a concrete or tar road. This measure is not as readily available as Air Temperature.
Heat Wave	Vegetation Cover	Vegetation cover is captured in scientific indices like the Normalized Difference Vegetation Index (NDVI), which can help to show the distribution of vegetation cover across Gujarat. However, feedback from Agewans and members is important for understanding the relative vegetation cover in different communities. Even within the same urban area, vegetation cover can differ between neighborhoods, contributing to variation in the land surface temperature experienced by community members.
Heat Wave	Urban Heat Island Effect	An urban heat island, or UHI, is a metropolitan area that's a lot warmer than the rural areas surrounding it. This indicator is of particular importance for Ahmedabad city. Researchers in 2022 found that Ahmedabad city suffered from this effect and was 3C-4C warmer than adjacent rural areas.
Heat Wave	Previous year heat wave frequency	This is a measure of how many heat waves occur in one year. Tabs of how intense the heat waves are/were can be maintained alongside the frequency. Data of a few years can quickly help establish trends.
Heat Wave	Qualitative feedback from Agewans	This is feedback from the community keeping in mind SEWA's need-based integrated approach. This will form a crucial part in informing further response strategies. The Health Team's Heat Wave survey can help document this.
Heat Wave	Water table level	The water table is an underground boundary between the soil surface and the area where groundwater saturates spaces between sediments and cracks in rock. Low water table indicates depletion of groundwater.The GTN team along with SEWA members can keep track of water table levels in all their areas.
Unseasonal Rain	Qualitative feedback from Agewans	This is feedback from the community keeping in mind SEWA's need based integrated approach and will form a crucial part in informing further response strategies. A survey can help document this.

Flooding	Qualitative feedback from Agewans	This is feedback from the community keeping in mind SEWA's need based integrated approach and will form a crucial part in informing further response strategies. A survey can help document this.
Flooding	Historical rainfall and flood data	This is data on the amount of rainfall received in the past as well as the frequency of annual floods in the past.
Flooding	Topography	The study of the shape of the surface of the land, with all its ups and downs, is known as topography. Important parameters include type of terrain and elevation. Observations of the topography can inform decisions on designing solutions to flooding. For example, Ahmedabad is located on flat alluvial plains of large rivers and is prone to flooding.

Assessing Community Vulnerability

The purpose of this tab is to consider community characteristics that affect the ability of community members to cope with and adapt to the impacts of climate shocks. Many vulnerabilities are tied to specific occupations and locations, and also specific social groups within larger communities.

Community/ Occupation	Market vendor
Location:	Ahmedabad

Category	Vulnerability	Assessment Guide
Health	Access to drinking water	Does the member have access to clean and ample drinking water?
Health	Access to toilets	Does the member have access to toilets and adequate sanitation?
Health	Health insurance	Does the member have access to health insurance to cover costs incurred from health impacts?
Health	Access to a clinic	Does the member have access to a healthcare clinic?
Health	Vulnerable populations	Are there a large number of community members who are elderly or young children?
Infrastructure	Access to shelter	Does the member have access to shelter from the climate shock?
Infrastructure	Housing quality	Does the member live in adequate housing?
Infrastructure	Housing ownership	Does the member own the house where they live?
Infrastructure	Access to ventilation	Does the member's housing have adequate ventilation?
Infrastructure	Access to electricity grid	Is the member's household connected to the grid?
Infrastructure	Access to communication technology	Does the member have access to mobile communication including a cellphone and mobile internet access?
Livelihoods	Single source of income	Does the member's entire livelihood depend on one income source?
Livelihoods	Lack of access to credit	Does the member have access to credit?
Livelihoods	Income level	What is the member's income level relative to the local poverty line?
Livelihoods	Income stability	Is the member's income stable or does it fluctuate seasonally?
Community Resilience	Social cohesion	Do members of the community regularly communicate with each other about community issues?
Community Resilience	Community leadership	Does the member community have trusted leaders to act during adverse situations?
Community Resilience	Knowledge of resilience strategies	Is the member aware of appropriate measures to take during the specific climate shock?
Community Resilience	Social Integration	Are members in the community marginalized due to caste/race/religion? Do members have necessary documentation to receive government benefits?

Assessing Current Interventions and Policies

The purpose of this tab is to map out the existing SEWA interventions and policies active in the community, and assess the ability of these actions to support members experiencing climate shock impacts.

Community/ Occupation	Market vendor
Location:	Ahmedabad

What are the ongoing interventions and policies in this community?			How much of the community is reached by intervention benefits? What is the evidence?	How effective are interventions at countering climate shock impacts? What is the evidence?
Impact Category	**SEWA Interventions**	**Government Policies**	**Intervention / Policy Coverage**	**Intervention / Policy Effectiveness**
Health	Health camps Telehealth medical services Community health workers Education on health during heat waves Community shelter ORS kits Provision of water-intensive fruit Overhead umbrellas Psychological and counseling services Thermocol Ice Boxes	Healthcare system capacity building Distribution of potable water in public places Access to cooling locations in community buildings		
Livelihoods	Extreme Heat Income Insurance (planned)			
Infrastructure	Overhead shelters	Access to cooling locations in community buildings		

Appendix 1: Impacts Repository

The purpose of this tab is to serve as a repository to keep track of identified climate shock impacts that are affecting SEWA communities, and continue to update as new impacts are experienced.

Impact Category	Impact
Health	Burns on feet
Health	Sunburn and skin rashes
Health	Dehydration
Health	Vomiting
Health	Urinary tract infection
Health	Dizziness and lightheadedness
Health	Fever
Health	Mental health issues
Health	Poor ventilation
Health	Malnutrition
Health	Food wastage
Health	Food spoilage
Health	Consumption of contaminated water
Health	Consumption of hot water
Health	Infectious disease
Health	Risk to pregnancy
Health	Limited access to water for sanitation
Health	Chronic kidney disease
Health	Rat and bug infestation
Livelihoods	Damage to shelter
Livelihoods	Damage to housing
Livelihoods	Disruption to energy access
Livelihoods	Increased energy costs
Livelihoods	Destruction of work product
Livelihoods	Loss of income
Livelihoods	Loss of productivity
Livelihoods	Reduced yield
Livelihoods	Childcare strained

Appendix 2: Interventions Repository

The purpose of this tab is to serve as a repository to keep track of identified interventions and policies in SEWA communities, and to continue to update as new policies are implemented and new evidence on existing policies is collected.

Impact Category	SEWA Interventions	Government Policies	Evidence on Scope	Evidence on Effectiveness
Health	Health camps Telehealth medical services Community health workers Education on health during heatwaves Community shelter ORS kits Provision of water-intensive fruit Protective clothing Provision of water and buttermilk during work breaks negotiated by SEWA Psychological and counseling services Community cold storage facility Overhead umbrellas Underground water tanks	Healthcare capacity building Distribution of potable water in public places Access to cooling locations in community buildings Bi-monthly water distribution		
Livelihoods	Construction support Solar and biogas interventions Cool roof paint Negotiation with gov't & contractors New technology for livestock fodder (planned) Extreme Heat Income Insurance (planned)	Below poverty line food provision once per month Access to livestock fodder		
Infrastructure	Cool roof paint Cooling shelters	Cool roofs for residential buildings & gov't buildings Access to cooling locations in community buildings		

SEWA Climate Shock Framework User Guide

How to use the Climate Shock Framework to assess community needs and areas for action

By: Columbia SIPA Graduate Team 2023

Components of the Framework

- Framework Decision Matrix

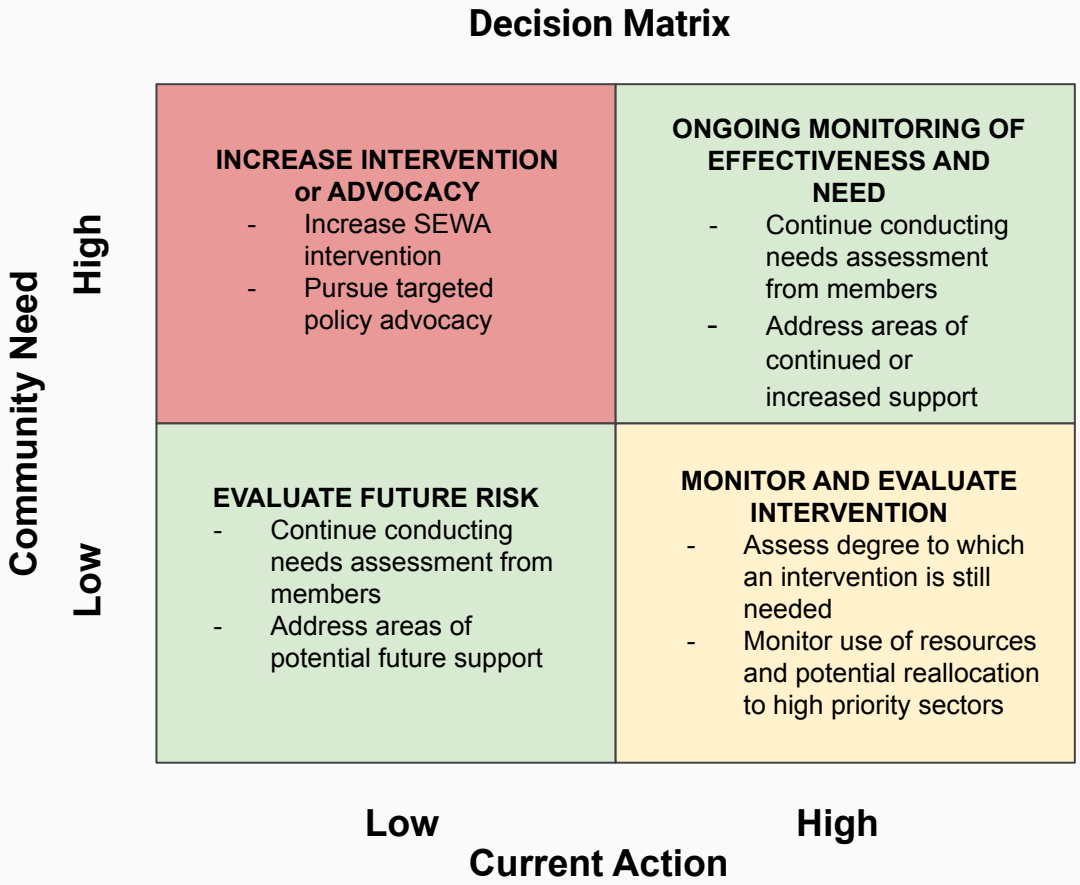
- Framework Community Assessment Worksheet
  - Community Assessment tab
  - Input guides for Exposure, Vulnerability, and Interventions

Framework Decision Matrix

Purpose: use matrix for decision-making based on climate impacts to members

- It is meant to be **Qualitative** to be user friendly and validate and organize existing assumptions
- It can be **further developed** to include more quantitative indicators feeding exposure and vulnerability as deemed useful by the **GTN team** or the future **Climate School** for data collection

Inputs: “Community Assessment” tab of the spreadsheet



Community Assessment: Input for the Decision Matrix

Community/ Occupation	Market vendor		Community Need Inputs			Current Action Inputs				
Location:	Ahmedabad									
Shock	**Impact**	**Category**	**Exposure**	**Vulnerability**	**Priority**	**Intervention / Policy Coverage**	**Intervention / Policy Effectiveness**	**Ongoing Advocacy**	**Need**	**Current Action**
Heat Wave	Burns on feet	Health	High	High	Medium	Low	Low	Low	High	Low
Heat Wave	Sunburn and skin rashes	Health	High	High	High	High	High	High	High	High
Heat Wave	Dehydration	Health	High	High	High	Medium	Medium	Medium	High	Medium

Community Need Axis

- **Exposure:** indicates how exposed the community member is to the climate shock broken down for each impact. An indicative list of what could qualify as exposure is mentioned in the "Exposure Assessment Guide" tab for SEWA to have a few guiding points. For example: an urban vendor would have high exposure to heat waves through their work and thus a high exposure to dehydration. This "high" assessment would then be filled in column D (exposure) in the row that lists "dehydration" as an impact.
- **Vulnerability:** indicates the susceptibility of the member to cope and/or adapt to the climate shock based on their existing systems and resources and degree of exposure. The "Vulnerability Assessment Guide" tab poses questions for SEWA members to map vulnerability. For example, using the guide, you can determine a vendor's vulnerability to dehydration based on their lack of access to drinking water or shelter.
- **Priority:** indicates how important this impact is to SEWA or the community (i.e. burns on feet might not be a priority or relevant for market vendors, while sunburn and skin rashes are). This is a subjective input based on member feedback and staff expertise.

Current Action Axis

- **Intervention/Policy Coverage:** indicates the number of people or % of community that receives coverage from SEWA or government policy for the outlined impact
- **Intervention/Policy Effectiveness:** the degree of effectiveness of the SEWA intervention or government policy.
- **Ongoing Advocacy:** the degree of ongoing advocacy for an intervention or policy to address that impact
- The "Interventions and Policy Mapping Guide" tab is a spreadsheet where users can document evidence on the coverage and effectiveness of relevant policies. In this example, SEWA knows that existing policies for hydration stations for vendors are low or nonexistent, rendering coverage and effectiveness low. However, it does provide ORS and water intensive fruit leading to a medium overall.

Sample Use Case - Market Vendor, Ahmedabad

Problem: Assessing areas for policy advocacy for urban market vendor

Steps

1. Go to “Community Assessment” tab of framework spreadsheet
2. Enter “Market Vendor” in occupation
   a. **Note**: create a new copy for each occupation you want to assess
3. Complete table based on qualitative assessment of 6 inputs:
   a. Exposure
   b. Vulnerability
   c. Priority
   d. Policy/Intervention Coverage
   e. Policy/Intervention Effectiveness
   f. Ongoing Advocacy
4. Derive qualitative inputs for **Need** and **Current Action** based on qualitative assessments of the 6 inputs

Input community info

Community/ Occupation	Market vendor		Community Need Inputs			Current Action Inputs				
Location:	Ahmedabad									
Shock	Impact	Category	Exposure	Vulnerability	Priority	Intervention / Policy Coverage	Intervention / Policy Effectiveness	Ongoing Advocacy	Need	Current Action
Heat Wave	Burns on feet	Health	High	High	Medium	Low	Low	Low	High	Low
Heat Wave	Sunburn and skin rashes	Health	High	High	High	High	High	High	High	High

Fill out qualitative scores for each impact

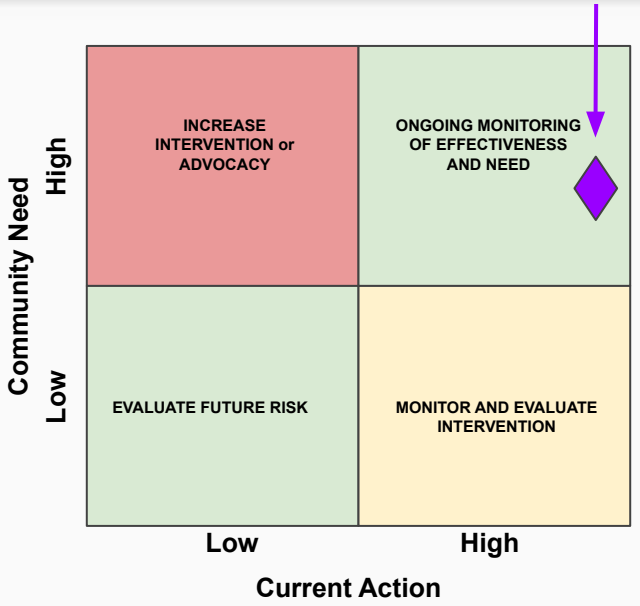
Sample Use Case - Market Vendor, Ahmedabad

YOU ARE HERE

5. Choose an Impact (i.e. “Sunburn and skin rashes”)

6. Look at **NEED** and **CURRENT ACTION** (i.e. **High, High**)

7. Use Decision Matrix to determine course of action
    a. **Monitor ongoing programs for effectiveness**



Community/ Occupation	Market vendor									
Location:	Ahmedabad									
Shock	**Impact**	**Category**	**Exposure**	**Vulnerability**	**Priority**	**Intervention / Policy Coverage**	**Intervention / Policy Effectiveness**	**Ongoing Advocacy**	**Need**	**Current Action**
Heat Wave	Burns on feet	Health	High	High	Medium	Low	Low	Low	High	Low
Heat Wave	Sunburn and skin rashes	Health	High	High	High	High	High	High	High	High

Appendices: Impacts Repository and Intervention Repository

The **Impacts Repository** and **Intervention Repository** are tabs where the list of relevant climate shock impacts and interventions can be documented and kept over time.

- The tabs currently contain many current impacts and ongoing interventions, but they **are not meant to be exhaustive.**
- SEWA users can continue to add impacts and interventions to these repositories if there are necessary additions and as new impacts are identified and new interventions are implemented over time.
- New evidence can also be added to the Intervention Repository as new evidence on coverage and effectiveness of existing interventions is collected and documented.

A PROFILE OF SEWA'S HARIYALI GREEN VILLAGES

April 2023

INTRODUCTION

The Self Employed Women's Association (SEWA), India's single largest organization of poor informal sector women workers from 18 states, enlists a large network of grassroots organizers to solve local challenges and increase the economic resilience of SEWA's 2.1 million members. They have seen that the **increasing incidence of climate shocks,** such as extreme heat waves, floods, cyclones, and droughts, continues to **present new challenges for SEWA's rural and urban members.** Limited household and community infrastructure, combined with high levels of exposure to natural elements based on occupation, impacts the ability of SEWA members to adapt to these challenges and build sustainable livelihoods.

SEWA increasingly prioritizes programs and partnerships that address the impact of climate shocks on its members. **SEWA's approach is to promote locally-led livelihood development and bottom-up contributions to a net-zero economy as the pathway for building economic resilience in the face of climate shocks.**

This profile showcases the Hariyali Green Villages program (hereby referred to as Green Villages). The Green Villages program aims to facilitate renewable energy solutions and economic opportunities for SEWA members in rural villages.

SEWA'S GREEN VILAGES MODEL

The Green Villages program, in partnership with the Natural Resources Defense Council (NRDC), employs decentralized renewable energy solutions to reduce the reliance on fossil fuels, reduce energy costs, and expand livelihood opportunities in rural India by. Each Green Village includes a suite of clean energy and environment-friendly technologies, of which the benefits are detailed in the interventions table below.

The Green Village program also emphasizes incorporating SEWA members as green entrepreneurs that drive future expansion of these interventions in their communities.

The pilot projects emphasize three critical tenets of energy access: **availability, affordability, and assurance**.

Availability: India has largely improved last-mile connectivity, but technological and financial limitations remain. SEWA and NRDC work with policymakers and technology suppliers to find locally beneficial renewable energy solutions that support SEWA members in accessing electricity and clean technologies for farms and households.

Affordability: Ability and willingness to pay are consumer-centric. Therefore, household incentives to embrace clean energy solutions are crucial to proving that long-term savings will cover energy-efficient appliances' high upfront costs. Once consumers were convinced of affordability, more than 300 families chose energy-efficient equipment given at cheap costs by Energy Efficiency Services Ltd (EESL) and supported by flexible financing choices and capacity-building activities by SEWA and NRDC.

Assurance: Rural adoption of localized renewable energy solutions has increased, but quality assurance and after-sales support have been major barriers to scaling up the technology. The Green Village model facilitates on-the-ground experiences to show the importance of end-to-end value chains to repair and maintain assets quickly. Quality-assured clean energy solutions could boost local livelihoods. Training and capacity building can equip rural youth to repair and maintain clean energy assets.

GREEN VILLAGES INTERVENTIONS

The Green Villages are currently being piloted in 10 villages in Gujarat and Rajasthan, with the goal to s**cale up to 100 villages by 2025. The following table includes the existing interventions, their costs, and their benefits.**

Biogas
 	
The biogas turns livestock manure into cooking fuel. One round of biogas generates 1.5L of gas which provides two meals a day for a family of seven for two weeks.
	50,000 INR (≈ 610 USD)
	
	9,000 INR (≈ 110 USD) with cost offsetting using carbon credits
		Benefits if household previously cooked with propane gas:
		• Cost savings of 1360 INR per cylinder (average members use 6 to 10 cylinders a year)
		  ◦ Members spend this on children's education, livelihood improvements, and farm improvements
		• Time savings of 2-3 hours for purchasing process
		• Reduced safety concerns arising from traveling to and from centers with gas
		
		Benefits if household previously cooked with wood:
		• Cost savings of 80-100 INR per 20 kg of firewood
		• Time savings of 4-6 hours for an average SEWA member
		  ◦ Members spend more time with their family members, more time on their farms, or can engage in other activities which help them earn extra income such as embroidery
		
		• Health benefits that come from no indoor air pollution
		
		Additional benefits for all households:
		• Additional cost savings, improved soil quality, and carbon sequestration from using biogas slurry as fertilizer

Solar drip irrigation
 	
A solar panel is hooked up to a tank of water that waters fields in a regulated manner.
	110,000 INR (≈ 1,340 USD)
	
	Storage capacity and cost change depending on the size and materials the tank is created with
		Benefits:
		• Higher yields provide higher income than flood irrigation
		  ◦ One farmer at made 71,350 INR ($867) with precision irrigation compared to 21,728 INR ($264) with flood irrigation on the same plot
		• Less water needed than flood irrigation
		  ◦ Vendor claims 80% water savings
		• Less labor than flood irrigation
		  ◦ No manual irrigation
		  ◦ Weeding not necessary
		  ◦ On average, saves 144 hours per month
		  ▪ With this time, SEWA members can do paid labor on other farms and make up 3,000 - 4,000 INR ($36-$48) per month
		• Members do not have to manually flood irrigate during the 8 hours a day (on a rotation) that the government provides flood electricity, which saves sleep

Cool roof paint White, chemical paint that reflects the heat of the sun. This paint can be used on metal or any other type of roof.	**400 INR** (≈ 5 USD) For 1L of paint, which can cover 25 square feet Note: Can only buy in 5 or 20L buckets	**Benefits:** • Decreases temperature in a building by 3-4 degrees C for 10-15 years ◦ Allows home-based workers to work in the afternoons • Provides better protection from monsoon rains • Increases the useful life of the material it is painted on
Solar lanterns Lanterns that charge using sunlight.	**Small size: 895 INR** (≈ 11 USD) **Large size: 2,200 INR** (≈ 27 USD)	**Benefits:** • Increases safety of using the bathroom or other necessities at night • Can be used for general household activities such as children doing homework in the event of electricity outages or cooking at night • The lanterns help farmers irrigate in the mornings or at night if they do not have solar precision irrigation

Solar panels (off-grid)
 	
Solar panels that generate electricity for an individual dwelling and are not connected to the grid.
	40,000 to 150,000 INR (≈ 480 - 1,830 USD)
	
	Cost depends on capacity, and 40,000 INR will cover 1 fan and 3 tube lights.
		Benefits:
		• Supplement government-provided electricity by providing an additional 7 hours of electricity
		  ◦ Children can study or work at night
		  ◦ SEWA members can work in the home at nighttime

Solar fencing Solar panel that power an electric fence that hits animals with a mild current.	**35,000 INR (≈ 125 USD)** per 2-3 acres of fencing on average	**Benefits:** • Keeps animals such as boars and cows out of the field ◦ If one animal goes through a farm, as much as 30 to 40% of the crop can be destroyed and this can happen once or twice a season • Farmers get more sleep because they do not have to wake up to check the fields

Solar trap light A small solar panel that charges a light that turns on for 4 hours off for 3 hours and then on for 4 hours to kill pests.	**5,800 INR** (≈ 70 USD)	**Benefits:** • No pesticides needed ◦ Saves 4,000-5,000 INR ($48-$61) per season
Solar pump An electrical water pumping system that uses solar to reduce dependence on diesel or grid electricity, which varies from 3.5 - 7.5 horse power.	**250,000 - 300,000 INR** (≈ 3,000 - 3,650 USD) for 3.5 horse power Often shared between 5-7 members	**Benefits:** • Farmers who were previously reliant on diesel machines for irrigation of their farms now save 8000 INR ($97) - 12000 INR ($146) every season • Salt pan workers in Surendranagar also use solar pumps for environmental and cost-saving benefits ◦ Using solar instead of diesel saves up to 70% of their income • Reduced working hours because diesel pumps require more labor • Environmental benefits of using solar instead of diesel

COMMUNITY SNAPSHOTS

The following table provides a snapshot of the central places in Gujarat state where the Green Villages are being implemented and current growth plans. Green Villages is also now being scaled to Maharashtra and Rajasthan states.

Aravalli district	**Occupation:** Farmers and animal husbandry **Total SEWA members:** 110,000 **Number of Green Villages in pilot phase:** 5 **Climate shocks:** Heat waves, unseasonal rains **Climate shock impacts:** • Climate shocks make crops fail or livestock produce less, which significantly decreases income and food security • Ground water table level is decreasing, and drinking water in the summer is limited • Health impacts such as skin diseases when it gets very hot • Heat causes food spoilage without refrigeration • Unseasonal rain causes health impacts such as cold/flu	**Current interventions** *(Number of households with intervention as of April 2023):* Biogas: 165 Cool roof paint: 33 Solar precision irrigation: 14 Solar fencing: 2 Solar lanterns: ≈2300 - 2500 Solar panels (off-grid): 3 Solar trap light: 17 Solar pump: 4	**Growth plans** *(Additional number of households expected by March 2024):* Biogas: 500 Cool roof paint: 50 Solar precision irrigation: 20 Solar fencing: 5 Solar lanterns: 500 Solar panels (off-grid): 5 Solar trap light: 20 Solar pump: 5
Anand district	**Occupation:** Farmers and animal husbandry **Total SEWA members:** 165,000 **Number of Green Villages in pilot phase:** 5 **Climate shocks:** Heat waves, unseasonal rain, and floods **Climate shock impacts:** • Climate shocks make crops fail or livestock produce less, which significantly decreases income and food security • Infrastructure damage • Heat causes food spoilage without refrigeration • Health consequences mainly due to water-borne diseases, food spoilage, and skin conditions • Floods create menstrual hygiene problems	**Current interventions** *(Number of households with intervention as of April 2023):* Biogas: 126 Cool roof paint: 6 Solar precision irrigation: 8 Solar fencing: 1 Solar lanterns: ≈3000 - 3500 Solar panels (off-grid): 7 Solar trap light: 9 Solar pump: 9	**Growth plans** *(Additional number of households expected by March 2024):* Biogas: 250 Cool roof paint: 20 Solar precision irrigation: 5 Solar fencing: 5 Solar lanterns: 700 Solar panels (off-grid): 5 Solar trap light: 5 Solar pump: 3
Surendranagar, Patan, and Kutch districts also have 1301, 396, and 55 solar pumps respectively. In these districts, the solar pumps help the salt-pan workers.			

PATH FORWARD: SCALING OF THE GREEN VILLAGES

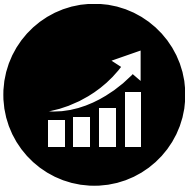
SEWA is already exploring opportunities to scale its current programs to achieve its bold vision of creating 100 Green Villages by 2025, with the eventual goal of continuing to scale this model across India. The organization implements and scales Green Villages interventions exclusively based on member needs. For example, the impressive goal of implementing 1500+ new biogas plants in one year is driven by member requests. SEWA also plans to increase the number of interventions offered to Green Villages residents to respond to member needs and wants. In addition to the above interventions, they are currently piloting a solar hydroponic fodder system to supplement livestock feed during the hot summer months, cold storage boxes to help with food storage, and electric vehicles.

No. 01 — Information Sharing

Current information sharing method to promote scaling:

To share information with potential villages and households, SEWA staff and members currently utilize a variety of member-based information-sharing methods. The most common form of information sharing is the creation of pilot households that receive interventions for free and then host visitors from neighboring villages to see the interventions in action. For example, in Anand, 2000 farmers visited a single farm to learn about solar drip irrigation. Often villagers will invite neighbors over to sit in their homes and show how the cool roof paint reduces temperatures instead.

In addition to visits, SEWA members also use demonstration videos and put up posters with the intervention's benefits. SEWA wants its members to adopt at their own pace, with the community leading. This member-based scaling method leads to very high adoption rates. In the first pilot village, Nagano Math village in Aravalli district– one pilot roof with cool roof paint led 25 out of 40 houses in the cluster to purchase cold roof paint on their own.



No. 02 — Limitations to Scale

With large benefits and successful information sharing, what are the limits to large-scale growth of the Green Villages model?

The member-based scaling method has proven successful in grassroots ownership and involvement, though costs remain prohibitive for more expensive interventions. While cool roof paint and other low-cost interventions remain accessible and widely used, transformational interventions such as solar drip irrigation see limited uptake due to high initial capital costs. The SEWA team is actively looking for creative partnerships to subsidize high-cost interventions and scale Green Villages, while still placing member ownership at the core of any financing model. SEWA envisions these clean energy interventions ultimately enabling community participation in carbon markets, with members as owners of carbon credits, contributing to grassroots-led energy transition for long-term systems change in energy usage.

CONCLUSION

As SEWA continues to realize its vision of green villages across its member states, it will benefit from the support of collaborators with a similar vision. It is evident that the adoption of Green Villages interventions at a large scale will contribute to resilient livelihoods at the household level and to the larger national goal of a zero-carbon economy.

To ensure the widespread adoption of Green Villages, it is necessary to alleviate the cost constraints that farmers face. Support for this could include:

- A low-cost financing mechanism to help SEWA members purchase and realize the benefits of these interventions themselves

- Discounts, long-term repayment plans, and other relevant credit support by companies who are designing and selling green energy solutions costs to make these products affordable for SEWA members

- Partnerships with government bodies, philanthropies, multilaterals, and other partners to generate blended financing options and de-risking capital support

A PROFILE OF SEWA'S URBAN COMMUNITIES AND CLIMATE SHOCKS

April 2023

INTRODUCTION

The Self Employed Women's Association (SEWA), India's single largest organization of poor informal sector women workers from 18 states, enlists a large network of grassroots organizers to solve local challenges and increase the economic resilience of SEWA's 2.1 million members. They have seen that the **increasing incidence of climate shocks,** such as extreme heat waves, floods, cyclones, and droughts, continues to **present new challenges for SEWA's rural and urban members.** Limited household and community infrastructure, combined with high levels of exposure to natural elements based on occupation, impacts the ability of SEWA members to adapt to these challenges and build sustainable livelihoods.

SEWA increasingly prioritizes programs and partnerships that address the impact of climate shocks on its members. **SEWA's approach is to promote locally-led livelihood development and bottom-up, communitiy-driven adaptation measures to climate shocks.** Urban workers often perform labor in poorly managed work conditions during extreme weather events. These communities face limited access to credit, physical infrastructure, and public health resources to manage the resulting health and income shocks.

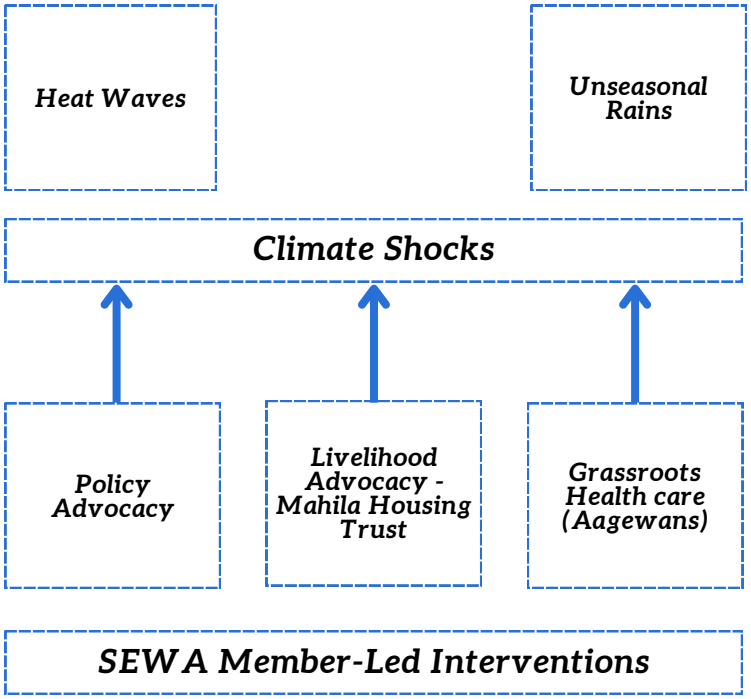
SEWA'S WORK IN AHMEDABAD

SEWA's work with urban communities largely focuses on building community resilience to external shocks, including heat waves and Covid-19. The organization follows a needs-based approach centering member empowerment and member-led initiatives for all its programming and interventions.

Heat waves: Heat waves increasingly affect the work, income, livelihoods, food security, and living conditions of SEWA's urban members.

Infrastructure Response: Heat waves often exacerbate problems with existing infrastructure and can further degrade the materials SEWA's urban members use to build. The Mahila Housing Trust (MHT), a non-profit that grew out of SEWA, works to advance constructive dialogue and action on improving the housing, living, and working environments of the urban informal sector. MHT's climate resilience work won awards from multiple United Nations agencies in 2019.

Grassroots Healthcare: SEWA staff and SEWA agewans (grassroots leaders) work to help bring together government services, private healthcare facilities, and the communities they serve in India. In response to the Covid-19 pandemic, SEWA has utilized aid from Direct Relief to link physicians with pop-up clinics, provide point-of-care testing, and engage trainers. Direct Relief's funding also supports SEWA's first responders and agewans who distribute water, food, and supplies during and after climate shocks.



SPOTLIGHT:
Migrant Worker Heat Wave Vulnerability

Migrant workers in makeshift housing face infrastructural challenges with limited access to water and sanitation.

Children experience long-term diarrhea and other water-borne illnesses.

URBAN COMMUNITIES OVERVIEW

SEWA's urban membership consists of many occupations, each of which faces unique operational, infrastructure, and policy challenges that hinder their ability to cope with climate shocks. Key SEWA urban occupations include waste recyclers, construction and mason workers, outdoor street vendors, and home-based workers.

Waste Recyclers

In India, waste recycling involves the collection, segregation, processing, and sale of recyclable materials such as plastic, paper, glass, metal, and electronic waste. The waste is usually **collected by informal waste collectors** that go door-to-door collecting materials for recycling. The collected waste is then sorted and separated into different categories based on the type of material, quality, and value in the market.

> 50,000 waste recyclers in Ahmedabad

> 52% SEWA members

> Recycle 10.6 KG of waste per day

Occupational Challenges

Systemic Challenges:
- Discrimination
- Lack of proper equipment
- Poor working conditions

Economic Challenges:
- Low wages
- No guarantee of work during certain seasons
- Average daily wages of 50 INR ($0.60)
- Limited job security, usually under ten working days per month

Social Challenges:
- Start as early as 4 am to collect waste, which comes with safety risks for women

Health & Environmental Challenges:
- Waste sorting done with bare hands even with harsh and harmful electronics
- Must attempt to separate materials like copper from plastic by burning the item, leading to inhalation of toxic fumes
- Inhalation and contact with toxins result in respiratory illnesses and skin damage

Climate Impacts Faced by Waste Recyclers

Unseasonal rains and flooding:

- Ruined waste material reduces earnings
- Limited working hours due to heavy rainfall

Heat waves:

- Physical exertion on hotter days
- Exposure of bare hands to unsafe hot waste due to lack of gloves and probe sticks
- Inadequate plastic footwear offering minimal protection from hot surfaces
- No carrying of water bottles or umbrellas due to the need to hold waste collected to prevent theft
- Health consequences of dehydration, skin disease, and burning from electronic waste explosions

SEWA Member-Led Interventions

Immediate Relief Measures

- Provision of socks to be used as gloves for waste recyclers
- Frequent health camps
- Trainings on using protective equipment
- Training on the making and distribution of Oral Rehydration Salts (ORS) for hydration

Policy and Advocacy

SEWA has been working with the Ahmedabad Municipal Corporation since 2004 to create better working conditions through fixed contracts and monthly salary systems to ensure regular income streams.

Photo credit: WRI India Urban Transformations Report

Needs-Based Way Forward

Waste recyclers have expressed the need for protection from extreme heat. Some options include protective socks for the hands, probe sticks to sift through waste, and insulated bottles for cold water storage.

Construction & Mason Workers

Construction and mason workers form the **second-largest population of workers** after agriculture and are an essential part of India's rapidly growing construction industry. Their work involves building and repairing infrastructure, including roads, buildings, bridges, and other structures. In India, construction work is **often done manually**, with workers using basic tools such as hammers, chisels, and trowels. Mason workers are responsible for laying bricks, blocks, and other building materials to create walls and other structures. This involves carrying heavy loads, climbing heights, and working in confined spaces. Workers either belong to a cooperative or work as independent daily wage workers.

> 500,000 construction workers in Gujarat total

> 40,000 SEWA members

Occupational Challenges

Systemic Challenges:

- Limited bargaining power with large construction firms
- Long working hours

Economic Challenges:

- Wage instability and job insecurity (paid on a daily basis and need to seek new work daily)
- No benefits or social safety nets such as sick leave or insurance

Physical Challenges:

- No access to shade
- Poor ventilation
- Hot rods on their hands and shoulders
- Heavy loads and unsafe climbing structures

Health & Environmental Challenges:

- Exposure to hazardous working conditions
- Economic challenges lead workers to work in all weather conditions with inadequate protective gear

Climate Impacts

Unseasonal rains:

- Rains ruin construction mixes and compounds stick to skin, damage hands, and harm legs

Heavy rains cause sewage systems to overflow

Heat Waves:

- Exposure results in skin diseases, diarrhea, excessive sweating, fever, general sickness, increased frequency of urination, watering of eyes, and damage to feet
- Increased anxiety and low motivation due to prolonged and unprotected heat exposure
- Limited power during summer due to electricity cuts
- Increased indoor temperatures due to tin roofs

SEWA Member-Led Interventions

Community Organizing Measures

- SEWA cooperative with 700 construction workers, including 400 skilled workers
  - Small subset of trade union which has 40,000 construction workers
- Coordination with construction companies for better working conditions

Health Interventions

- Training for home-made ORS preparation and member-led distribution

Advocacy Initiatives:

- Partnerships with the government for surveys on health, education, and other household data
- Health camps for laborers in association with hospitals
- Canteens at major labor squares to provide food
- Compensation for fatal work accidents on a case-by-case basis
- Advocacy with construction companies for better working conditions such as provision of drinking water and buttermilk to combat dehydration

Livelihood Initiatives:

- Upskilling trainings and workshop sessions on machinery usage
- Bank account opening for workers
- Liaising with construction companies to facilitate increased frequency of wage disbursement through SEWA cooperatives

Needs-Based Way Forward

SEWA hopes to build and expand existing partnerships with construction companies and government actors to advocate for construction and mason workers needs in heat wave adaptation.

Photo credit: SEWA Website

Outdoor Street Vendors

Street vending is a prevalent occupation in India, with millions of people selling goods and services on the streets of cities and towns. These vendors offer a wide variety of products, including fruits, vegetables, snacks, clothing, toys, and household items. The occupation is particularly popular among those who lack formal education and skills training or face other economic challenges.

> 500 street-vendors are SEWA members in Ahmedabad

Workers either are attached to cooperatives or are independent daily wage workers. Local authorities often view street vending as illegal or a nuisance, so vendors must be vigilant to avoid eviction or harassment. However, efforts have been made to legalize street vending and provide designated areas for vendors to work. Despite the workers lobbying and organizing to address their challenges with heat waves and other climate shocks with the government, little has changed.

Occupational Challenges

Systemic Challenges:

- Long working hours
- Frequent risk of eviction and/or harassment from local government
- Vulnerable to street harassment, particularly women

Economic Challenges:

- Lack of insurance and access to credit
- Financial challenges from having to pay to move cart in the evenings
- Ad-hoc installation of stalls or carts on busy streets, footpaths, and markets based on foot traffic changes earnings

Needs-Based Way Forward

SEWA is working with Ahmedabad Municipal Corporation (AMC) to streamline cart designs with shades to enhance heat wave resilience. Infrastructure advocacy has involved requesting permission from AMC to install solar fans and other equipment, but they have not yet been granted approval.

Climate Impacts Faced by Outdoor Street Vendors

Unseasonal rains:

- Unique damage to products sold by fireworks vendors and color powder vendors due to rain-induced product damage, resulting in loss of income
- High incidence of coughs and colds due to exposure to dust and outdoor elements

Heat Waves:

- Product damage (e.g. jewelry oxidation, spoilage or reduced shelf-life of fruits and vegetables)
- Restrictive government regulations preventing extension of product life
- Reduced demand for products due to lack of foot traffic during extreme heat
- Decline in seasonal income of fresh worship articles (i.e. flowers and religious food items)
- Stress on the electric grid during summer can impact working conditions for vendors
- Mini heat strokes and skin diseases such as itches and boils due to extreme heat exposure
- Burns to feet in indoor locations due to overheated surface temperatures in historical sites

Vendors of fresh flowers report up to a 55% decline in incomes during heat waves compared to the winter season

SEWA Member-Led Interventions

Immediate Relief Measures

- Umbrella shades and tarpaulins to reduce sun exposure

Policy and Advocacy

- Strengthening relationships with local government to streamline and co-design policies
- Member-led community organization to advocate for rights and provide mutual support and training

Economic Interventions

- SEWA-provided loans from INR Rs. 10,000 to Rs. 50,000 to 60 to 70 sellers to offset income loss
- Recurring, no-interest payments over 10 months with daily 30 INR payments to ensure compliance

Home-Based Workers

Home-based work is a prevalent form of employment, especially among women who may face societal or cultural barriers to working outside the home. Home-based workers perform a wide variety of tasks, including stitching garments, assembling handicrafts, packaging goods, and providing information technology (IT) services.

Occupational Challenges

Economic Challenges:

- Low and inconsistent wages
- Limited job security
- Physical overheating of work equipment prevents use and causes burns (i.e. overheating sewing machines)

Environmental Challenges:

- Limited ventilation during heat waves
- Limited sunlight and daylight hours seasonally

Photo credit: SEWA Website

SEWA Member-Led Interventions

Community Organization Initiatives:

- Training and awareness workshops through SEWA Cooperative Federation on opportunities on income generation from home-based work
- Computers skilling for families of homee-based workers

Policy Advocacy Initiatives

- Joint partnership with HomeNet South Asia (HNSA) for advocacy on regional and national plans for home-based workers

Needs-Based Way Forward

SEWA hopes to strengthen member-led organizing initiatives, awareness, and training for home-based workers. Externally, SEWA aims to continue partnerships both regionally and nationally to advocate for better policies for home-based workers.