



BUILDING RESILIENCE WITH ASHOKA

THE RESILIENCE FRAMEWORK
& PILOT PROJECT IN VALLE DE VAZQUEZ

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Building Resilience with Ashoka

The Resilience Framework & Pilot Project in Valle de Vazquez

SUMA Capstone Team

Whitney L Beaman

Carrie-Ann Bracco

Cecilia Coates

Octavio Arturo Franco

Briana M Garcia

Angie Goenaga

Julie Anne Amelie Pertuiset

Adriana Neumann-Redlin

Riya Suthar

Timothy Wiranata

Faculty Advisor: Lynnette Widder

ABOUT THE AUTHORS

The 2018 Columbia Capstone Team consists of ten students of the Sustainability Management Program of Columbia University's Earth Institute and School of Professional Studies. Team members come from a wide range of professional and academic backgrounds including investment banking, economics, agriculture, engineering, environmental science, political science and health.

Whitney L Beaman, Carrie-Ann Bracco, Cecilia Coates, Octavio Arturo Franco, Briana M Garcia, Angie Goenaga, Julie Anne Amelie Pertuiset, Adriana Neumann-Redlin, Riya Suthar, Timothy Wiranata

Advisor: Lynnette Widder, Lecturer, Masters of Sustainability Management at Columbia University



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The above photo, and all other photos displayed in this report without captions, were taken by the SUMA Capstone Team during the March 2018 site visit.

EXECUTIVE SUMMARY

Objective

The SUMA Capstone Team's objective was to deliver a strategic framework that will enable Ahsoka to help build long term community resilience across rural Mexico in locations such as, but not limited to, Valle de Vazquez. Although Ashoka typically engages individual social organizations to develop innovative social enterprises that leverage the private sector to meet social goals, Ashoka is now embarking on a new venture to improve community resilience by coordinating the efforts of various social organizations to provide joint support within a community. The scope of the SUMA Capstone Team's work does not attempt to recommend specific strategies for Valle de Vazquez to recover directly from the 2017 Central Mexico Earthquake. Rather, the goal is to develop a conceptual framework that defines resilience in a community context and can guide social organizations in assisting the community to withstand, respond to and recover from adverse events in the future. For the pilot project in Valle de Vazquez, the SUMA Capstone Team identified synergies across community systems and across social organizations to illustrate how joint collaboration can provide maximum benefits.

Resilience Framework Components

The proposed Resilience Framework was informed by research on various global resilience organizations and consists of the following components.

The **Resilience Matrix** provides a list of community systems, its subsystems and the chronic vulnerabilities of the system. The main systems are Physical, Economic, Social and Political. An example of a subsystem would be "water" within the Physical system. An example of a vulnerability within the water system would be "poor water quality". The matrix focuses on chronic, long term vulnerabilities in the community rather than specific acute stressors (i.e. an earthquake or economic crisis) because while it is unknown which exact acute event will occur in the future, the chronic vulnerabilities put the community at a disadvantage when trying to respond to the acute event. For example, if a community is chronically poor with no savings, it will be more difficult to rebuild after an earthquake than if the community had more assets. Chronic vulnerabilities are rooted in local physical attributes such as geography, climate and natural resources as well as economic, social and political factors.

The **Community Assessment** provides a comprehensive, reliable and systematic method of assessing overall community needs while also acknowledging the general lack of desired quantitative information and the complex interdependencies between various community risk factors. The community assessment also allows Ashoka to identify system synergies which are connections between vulnerabilities across systems. The independence and interaction can be between vulnerabilities of different levels of priority to the community .

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The **Social Organizations Capabilities Assessment** aims to identify the strengths and skill gaps of the organizations participating in Ashoka's new venture as they relate to building resilience in rural communities. The assessment uses the vulnerabilities established in the Resilience Matrix and evaluates all participating organizations against each vulnerability. It also results in a detailed Resilience Profile for each organization. Further, the assessment provides the basis of the Fit Analysis and Synergies Analysis.

The **Fit Analysis** aligns the community vulnerabilities to the social organization's collective capabilities to identify where Ashoka's partners are well suited to meet community needs. The fit model also identifies critical areas of concern where the participating social organizations may not have the required skills or expertise. The Fit Analysis will improve Ashoka's ability to address specific vulnerabilities for the community, identify any critical gaps in needed skills or expertise within the social organizations and assess the impact of those gaps.

The **Synergy Analysis** identifies connections between systems and social organizations to imagine how multiple organizations working on concert together to address various community vulnerabilities can create an impact that is greater than the sum of the individual organizations simply providing their standard products or services to the community.

Valle de Vazquez Pilot Project

Valle de Vazquez was used as a pilot project for testing The Resilience Framework designed by the SUMA capstone team. As part of the pilot project, a community assessment was done for Valle de Vazquez and a limited number of currently participating social organizations were assessed via the Social Organizations Capabilities Assessment.

The Social Organizations Capabilities Assessment is most useful when applied to a specific community in the Fit Analysis. However, based on the Social Organizations Capabilities assessment performed with a limited number of organizations, it appears that the capabilities of Ashoka's network of organizations are mostly concentrated in the physical and social systems, with less influence in the economic and political systems.

EXECUTIVE SUMMARY

The results of the Community Assessment for Valle de Vazquez showed that the community's highest-rated vulnerabilities include:

- **Physical:** Infrastructure (mostly buildings) vulnerability to earthquakes
- **Economic:** low levels of employment, high cost of basic needs relative to income and low access to savings vehicles
- **Social:** low access to health and education facilities locally as a result of the earthquake
- **Political:** lack of emergency management plan, lack of integrated resilience goals in funding and programs at government level

After conducting the two assessments, The SUMA Capstone team conducted the Fit Analysis for Valle de Vazquez. The SUMA Capstone Team found that Ashoka's network of social organizations have a high joint capacity to address the following high priority areas of need in Valle de Vazquez: poor housing building design and quality, high reliance on fossil fuels, low levels of innovation and low business acumen. Addressing these specific vulnerabilities has the potential for generating significant impact and building resilience in Valle de Vazquez. Ideally, when designing an execution plan, Ashoka's network should focus its resources on these vulnerabilities.

Additionally, to really benefit from the fit analysis and use it to guide decisions on collaborative intervention, it is important to dive deeper into its components and find synergies among them. Identifying synergies across systems and among social organizations leads to potential solutions that can be more impactful than focusing on any one system alone. In the case of Valle de Vazquez, one example of a system synergy can be identified across three systems: 1) solid waste, 2) high reliance on fossil fuels for energy and 3) economic affordability. The vulnerability "Solid waste, high pollution/waste and/or low treatment of waste" is ranked medium/low on the community assessment. Addressing this vulnerability through waste-to-energy initiatives could in turn impact another more important physical vulnerability such as "high reliance on fossil fuels, lack of access during interruptions" by diversifying energy sources. At the same time, the waste-to-energy initiatives would impact the very significant affordability issue of "high cost of basic needs relative to income" by lowering energy costs. In this case, although the lower ranked physical vulnerability may not seem to need an intervention, an initiative in this area can have a positive impact on higher ranked physical and economic vulnerabilities.

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Conclusions

After developing The Resilience Framework and applying it to Valle de Vazquez, the SUMA Capstone Team identified the following key takeaways:

The Collaborative Network is More Than the Sum of Individual Organizations. Social organizations can multiply their individual impact but they be be required to conduct their business “as unusual” and apply their expertise in ways that go beyond their core missions.

Ashoka Needs a Clear, Accepted Definition of Resilience and How that Relates to Intervention Strategies in Order to Improve Collaboration. A common understanding of resilience and what it means for interventions will facilitate goal-setting, prioritization and collaboration.

A Vulnerability in One System Can be Solved by Intervening in Another System. The Fit Analysis and Synergy Analysis identified the interdependencies of systems and how solutions to one system can significantly impact and improve other systems.

Onsite Interviews Are Essential to Data Gathering. Direct conversations with community members proved to be the quickest and most useful way to understand the state of the community.

Iterative Levels of Data Collection Are Needed. Early stage data collection should focus on getting a high level overview of the community systems. Later stages of data collection can be more detailed for areas of high concern.

Ashoka Needs to Determine Whether Political Intervention is Within Their Scope. In many locations, resilience building is driven primarily by local, state and/or national government entities. Ashoka should determine whether it wants to position itself in the future to influence political channels. If Ashoka chooses not to pursue political influence, it should be aware of the potential limitations of a non-political approach.

Early Stage Governance Can Hinder Collective Progress. The governance and organizational structure among Ashoka’s social organizations is still evolving. While Ashoka refines and adapts its governance structure in these early stages, Ashoka may struggle with slow response times to information requests, slow decision-making, conflicting priorities or an inability to hold partners accountable to timelines and key deliverables

DEFINITION OF KEY TERMS

Acute Events are one time or short term conditions that create a negative impact on a community, for example, a natural disaster or the collapse of local currency.

Chronic Stressors are the underlying vulnerabilities in the community that weaken the ability to respond or recover from an acute event.

Community Assessment is the evaluation of a specific community by rating their potential vulnerabilities on the resilience matrix.

Ejido is an area of land in Mexico held in common by the community members and may be farmed cooperatively or via individual allotments.

Fit Analysis evaluates the collective ability of Ashoka's network of social organizations to meet the needs of the community.

Indicators are a set of metrics that help determine the status of a system or community.

Metrics are standards of measurement.

Resilience is a system's ability to handle disruptions and return to a fully functioning and optimal state.

Resilience Framework is the Capstone Team's proposed approach to social organization intervention to build community resilience.

Resilience Matrix is the set of systems (such as Physical, Economic, etc) and the vulnerabilities within those systems that affect community resilience.

Social Organizations Assessment is the evaluation of social organizations by their ability to meet the potential needs of various communities and the corresponding vulnerabilities found on the Resilience Matrix.

Sustainability is commonly defined as meeting "the needs of the present without compromising the ability of future generations to meet their own needs." (UNWCED, 1987)

Synergies are the interactions of factors across various systems to provide solutions that have the potential to be more impactful than focusing on one system alone.

Vulnerability is exposure to harmful events or having a high likelihood of negative outcomes.

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INTRODUCTION



1 | INTRODUCTION

1.1| SUMA Capstone Team & Ashoka's New Venture

Ashoka Mexico typically engages individual Fellow organizations to develop innovative social enterprises that leverage the private sector to meet social goals. Ashoka is embarking on a new venture to improve community resilience by coordinating the efforts of various social organizations that will provide joint support to communities. Participating social organizations will work collaboratively to leverage their skills and expertise to analyze communities, identify risks and implement practical solutions for achieving resilience in rural communities of Mexico. The SUMA Capstone team was engaged to provide research support specifically in the area of aligning community need with organization capacity and best practices regarding resilience.

1.2| Pilot Project: Valle de Vazquez

On September 19, 2017, a devastating earthquake hit Central Mexico. The earthquake caused significant structural damage to the rural communities near the epicenter. The rural city of Valle de Vazquez, located southeast of Mexico City in the State of Morelos, suffered greatly in the aftermath of the earthquake. At least 70 homes, the grade school and several local businesses were totally destroyed. Electricity was lost for two days, preventing water from being pumped from the municipal well. Many of the 1,100 residents were forced to live in tents after losing their homes. The destruction of the earthquake and the difficulties experienced by rural communities attempting to recover inspired several Ashoka fellows to collaborate in the recovery effort. As part of this effort, Ashoka founded a new program to facilitate this collaboration and build resilience in rural communities. Valle de Vazquez is both the inspiration for Ashoka's new resilience venture and the location of the first pilot project.

1.3| Research Goal

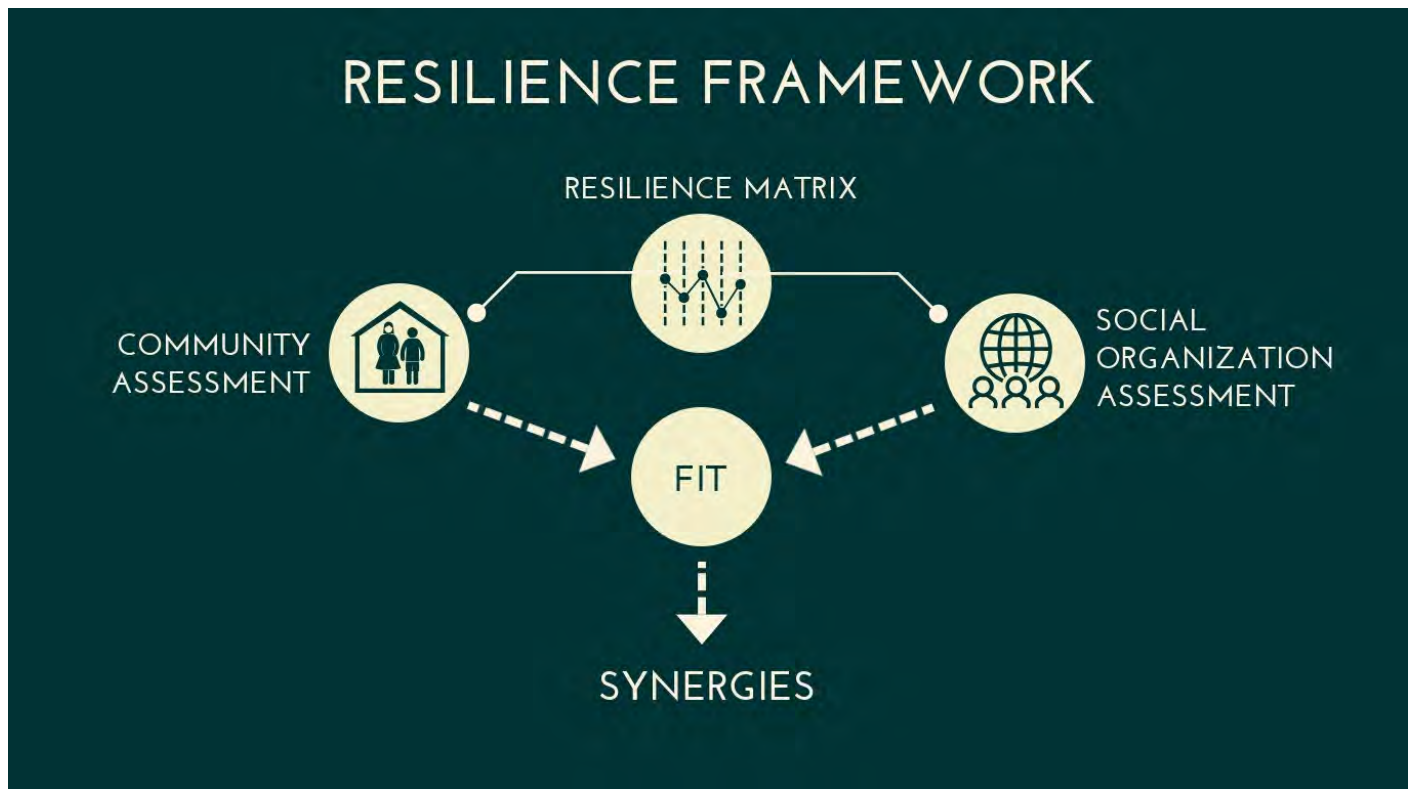
The SUMA Capstone Team's research goal was to develop a managerial tool that Ashoka can use to align the capacities found across their partner organizations with the specific needs of a rural community with regards to building resilience.

1.4| Project Scope & Approach

The aim of the SUMA Capstone Team was to deliver a strategic framework that will enable Ashoka to comprehensively assess community needs and partner capabilities in order to build long term community resilience in rural Mexico in locations such as, but not limited to, Valle de Vazquez. The scope of work does not attempt to recommend specific strategies for Valle de Vazquez to recover directly from the 2017 Central Mexico Earthquake. Rather, the goal was to develop a conceptual approach to resilience that will enable Ashoka and its partner organizations to effectively assist the community to withstand, respond to and recover from adverse events in the future. The conceptual approach will enable Ashoka to identify what community challenges can easily be met by participating social organizations, build the business case for encouraging additional social organizations to participate and highlight the ways in which partner organizations may have to deviate from their typical mission to deliver value in the community.

1 | INTRODUCTION

The proposed Resilience Framework was informed by research on various global resilience organizations and consists of a) a Resilience Matrix which maps systems and related vulnerabilities, b) a Community Assessment to determine a specific community's needs, c) a Social Organization Assessment to evaluate the capabilities of Ashoka's partners that can be applied to the community d) and a "fit" model for determining the degree to which the social organizations can meet a specific community's need and areas that would remain underserved. In addition, for Valle de Vazquez, the SUMA Capstone Team identified synergies across systems to illustrate the ways that joint collaboration could provide maximum intervention.



This diagram illustrates the relationship between the five different components of the Resilience Framework. Source: SUMA Capstone Team

PART 1: THE RESILIENCE FRAMEWORK



2 | RESILIENCE FRAMEWORK OVERVIEW

2.1| The Need for a Resilience Framework

The purpose of the Resilience Framework is to enable Ashoka to holistically align key areas of community need with the skills and capabilities of their partner social organizations. It focuses on assessing the unique needs of a community based on chronic stressors and underlying vulnerabilities rather than specific acute stressors (such as an earthquake or economic crisis) because it is unknown which exact acute event will occur in the future. Chronic stressors and vulnerabilities are entrenched in local physical realities such as geography, climate and natural resources as well as economic, social and political factors. The Community Assessment provides a comprehensive, reliable and systematic method of assessing overall community needs while also acknowledging the general lack of desired quantitative information and the complex interdependencies between various community risk factors. The community needs assessment paired with an evaluation of the capabilities of Ashoka's social organization partners will increase Ashoka's capacity to meet the needs of the community with current partners and also identify critical areas of concern where social organizations are not yet involved. The framework will improve Ashoka's ability to address specific vulnerabilities, identify any critical gaps in support and assess the impact of those gaps.

The Resilience Framework consists of five parts:

- A conceptual understanding of resilience based on the research
- A Resilience Matrix outlining the key systems and related vulnerabilities
- A Community Assessment based on the Resilience Matrix
- A Social Organizations Assessment based on the Resilience Matrix
- A Fit Analysis aligning community needs alongside the social organizations' skills and capabilities

2.2| Resilience & Related Concepts

The Resilience Matrix was developed after extensive literature review and research on current organizations that work to increase resilience at various scales. More information about the Literature Review can be found on the Supplemental Documents Drive in the Background Research folder. A description of organizations actively working on community resilience and shaping conceptual thought regarding resilience can be also found in on the drive in the Background Research folder. Key concepts that informed the Resilience Matrix are described below.

2.2.1| Resilience

Resilience as most commonly defined is the capacity of a community to withstand impact from natural, economic and conflict-related disasters; to respond quickly without substantial outside intervention; to restore basic human needs (i.e. clean water, food, shelter) quickly and to recover fully within a timeframe acceptable to the community.

2| RESILIENCE FRAMEWORK OVERVIEW

Resilience also encompasses the system's ability to handle disruptions and return to a fully functioning and optimal state. Resilience includes both inherent qualities, (i.e. the degree to which it functions well during non-crisis periods); and adaptive qualities, (i.e. the flexibility to respond during disasters. Resilience can be applied to infrastructure, institutions, organizations, social systems, or economic systems.

2.2.2| Sustainability

Sustainability is commonly defined as meeting "the needs of the present without compromising the ability of future generations to meet their own needs." (UNWCED, 1987 Sustainability usually refers to natural assets and means that resources are not used beyond the carrying capacity of the earth's ability to replace those resources. For example, sustainable water use would include only withdrawing the amount of groundwater that can be replaced by rainfall and other precipitation (known as the recharge rate. However, sustainability would also involve maintaining acceptable water quality and can more broadly involve issues of equity and affordability. In this context, sustainability can be thought of as closely correlated with the physical dimension of resilience and as an indirect impact on the other areas of resilience.

The terms resilience and sustainable both refer to the desired or optimal state of a system. An entrenched inequitable social system can consistently produce poor social outcomes over the long term but that would be described that as maladaptive as opposed to resilient. Similarly, unsustainable business-as-usual practices could deplete resources beyond the earth's carrying capacity. Even if a community can easily return to an undesired state after an external shock, that would be deemed insufficient from a resilience perspective.

2.2.3| Vulnerabilities

There are two types of vulnerabilities that a community needs to address in order to become resilient. The first type of vulnerability is the risk of a specific outside event which negatively affects the community. Examples can be natural disasters such as earthquakes, but also economic events such as rising food and energy costs. The second type of vulnerability is the chronic stresses experienced daily within the status quo of the community. The status quo might include the unsustainable use of natural resources, high social inequity or a lack of investment in maintenance and infrastructure. These chronic stressors in a community will magnify the impact of the acute events and increase recovery time. For example, although the community may experience a negative event such as an earthquake, it is the underlying state of infrastructure that determines the impact. Infrastructure and housing can be completely destroyed by an earthquake if building design and maintenance was poor prior to the earthquake. On the other hand, a community may have significantly less damage if the infrastructure was built to withstand earthquakes and was properly maintained. Further, a community with a high poverty rate and inadequate funds for infrastructure maintenance will find it difficult to raise funds locally to rebuild after the earthquake.

Both types of vulnerabilities put communities at risk of not achieving their optimal state or not being able to return to an optimal state after a disaster or shock. Although the community might experience an acute event, the aggregate impact of that stressor will be a result of the underlying structural vulnerabilities.

2 | RESILIENCE FRAMEWORK OVERVIEW

2.2.3.1| Acute Events

Acute events can be natural disasters or caused by man. Some examples include:

- Natural disasters
- Wildfire
- Flood
- Earthquake
- Drought
- Social crisis
- War
- Riots
- Economic crisis
- Currency devaluation
- Falling or rising prices
- Government crisis
- Collapse of government or law and order

Resilient communities that face a high likelihood of acute events often perform a risk assessment plan for that specific event to further quantify the impact of the event across various systems and drive decision making, i.e. whether they want to pursue insurance policies, invest in mitigation strategies, etc. Resilient communities will also develop an emergency response plan to prepare for potential natural disasters. More information about risk management methodologies to address the risk of specific acute events can be found in Appendix: 1.3 Risk Assessment Models.

2.2.3.2| Chronic Stressors

Our “Community Assessment” focuses on chronic stressors within each system. While it may not be possible to control or prevent an acute event such as an earthquake, reducing chronic stressors can make it easier for the community to protect itself from the harmful effects of the negative event and return to optimal functioning more quickly. The chronic stressors are grouped into Physical, Economic, Social and Governance areas. They are further subdivided into systems within each high-level category. The categories developed are ones that are likely relevant to a rural Mexican community similar to Valle de Vazquez. When applying this framework to other communities, it may be necessary to add additional systems and vulnerabilities based on the information available about that community. More information about each category, the vulnerability and the potential community responses can be found in the Resilience Matrix section.

2 | RESILIENCE FRAMEWORK OVERVIEW

2.2.4.1| Institutions

Many of the current organizations focused on increasing global resilience (for example, 100 Resilient Cities) make the assumption that government, local or national, will be the primary provider of direction, funds and programs designed to improve resilience. This is a reasonable approach in communities where governments are stable, have a solid tax base, recognize resilience as a core value and have a track record of consistently providing planned support without programs being affected by sudden political movements.

Ashoka's effort in Mexico is unique in that it assumes that the primary driver of resilience in rural communities can be a non-profit network of social entrepreneurs. From the community perspective, whether resilience support and programs come from government or another source is less important than whether the institution will be a reliable long term partner and can assemble the necessary skills and programs to meet community needs.

2.2.4.2| Interventions

There are many types of programs that can be implemented to address community needs. However, not all of them will equally enable community resilience. Various community programs will exist on a spectrum of low to high resilience primarily based on the degree to which the program is self-perpetuating versus continually relies on an outside infusion of funds. Low on the resilience spectrum are capital projects such as buildings, latrines or even solar panel installations that do not take into account the necessary ongoing maintenance during the planning phase. Buildings can fall into disrepair or disuse due to high costs of electricity. Solar installations might be disused if local labor and parts are not available to fix broken parts or replace battery storage. These same projects can deliver increased resilience by having a clear plan upfront for how the community will provide ongoing maintenance for the capital projects, and ensuring the projects will continue to be used over the long term. Non-capital projects such as education can have varying degrees of impact on resilience depending on how tailored the program is to the community's unique needs and whether the community will leverage the new knowledge repeatedly in the future.

Social entrepreneurs perhaps have the greatest potential to enable community resilience due to their business models. While social entrepreneurs may receive donations to start up an engagement within the community, their business model is rooted in using market economics to ensure a feedback loop perpetuates the program without reliance on continuous infusions of funds from outside donors. For example, a program that delivers solar energy to a community as an ongoing business model that accounts for maintenance parts and labor does more than just reduce energy costs for the community. It also provides a funding stream for the solar panel maintenance (i.e. the cost savings over traditional energy, and the skills and access to necessary parts to ensure that the community can continue to use solar energy and reap the cost savings over the long term. Similarly, a program that enables a diversity of employment and relevant job skills will reap more reliable benefits over the long term than a program of food donations that might be subject to the changing priorities of donors that are far removed from the community.

2.3| Framework Components

2| RESILIENCE FRAMEWORK OVERVIEW

2.3.1| Resilience Matrix

The Resilience Matrix divides large systems (Physical, Social, Economic, Political) into smaller subsystems (such as “Water”). It then lists potential vulnerabilities of those systems, the impact of a community having that vulnerability and potential best practices that resilience communities use to counteract that vulnerability. The vulnerabilities from the matrix are used to evaluate communities in the Community Assessment and organizations via the Social Organizations Capabilities Assessment.

2.3.2| Community Assessment

The Community Assessment evaluates various community systems (such as “Water” and the potential vulnerabilities within those systems). The assessment is designed to work with both qualitative and quantitative data. It is also designed to be iterative so that each iteration will lead to additional questions and data that can be gathered to improve the confidence level for each vulnerability assessed. The assessment results in a comprehensive ranking of all vulnerabilities affecting the community.

2.3.3| Social Organizations Capabilities Assessment

The Social Organizations’ Capabilities Assessment contains two parts. The first part is the collective scoring of the organizations’ capacities as a group. First, the scope of operations and network of each organization is coded against the vulnerabilities in the Resilience Matrix. Then the collective group of participating organizations is assigned a score per vulnerability which reflects the group’s ability to mitigate that vulnerability. This first part of the capabilities assessment enables the Fit Analysis. The second part of the capabilities assessment is a set of Resilience Profiles, one for each organization which lays out their specific strengths in building community resilience. This second part enables the Synergies step.

2.3.4| Fit Analysis

The Fit Analysis aligns the Community Assessment from a particular community with the Social Organizations Capabilities Assessment in order to identify which community vulnerabilities can be addressed by Ashoka’s network of organizations and which are not sufficiently met by the existing social organizations.

2.3.5| Synergies

Synergy is typically defined as the interaction of two or more systems that results in a greater impact than each system alone. Within the Resilience Framework, synergies refers to the interpretations that can be derived from the assessments and fit analysis. A user of the Resilience Framework can find synergies across system vulnerabilities in a community (for example, unemployment results in low income, therefore reducing access to health care). A user of the framework can also find synergies across social organization interventions (for example, Sistema Biobolsa not only provides energy but also offsets the cost for fertilizer and safeguards individual water sources from bacterial contamination). Since synergies are highly interpretive, there is no one set formula for determining synergies.

3 | RESILIENCE MATRIX

3.1 | Matrix Overview

The Resilience Matrix organizes potential chronic stressors (i.e. community vulnerabilities) into a set of interacting systems. For each vulnerability, it identifies the main system affected, the impact of the vulnerability and best practices employed by resilient communities.

3.1.1 | Systems

The chronic stressors are grouped into Physical, Economic, Social and Governance areas. They are further subdivided into subsystems within each high level category. Each vulnerability can have a multitude of impacts across many areas of a community with varying degrees of impact from one community to the next. Rather than trying to map each of these impacts and their relative weights, the vulnerabilities are categorized into the systems where they have the most impact and/or the impact is most apparent. However, since these are not mutually exclusive classifications, it is critically important to acknowledge that a vulnerability in one system can have a significant impact on another system. Similarly, a best practice implementation in one system can improve the resilience of other systems as well.

The categories included in the Resilience Matrix are the ones that are most relevant to a rural Mexican community similar to Valle de Vazquez. When applying this framework to other communities, it may be necessary to add additional systems and vulnerabilities.

3.1.2 | Vulnerability

A vulnerability is a chronic stressor that reduces the community's ability to respond quickly to an adverse event. Vulnerabilities were identified through research into nonprofit organizations working to build community resilience.

3.1.3 | Impact

For each vulnerability, the impact or significance of the vulnerability is described. Although the vulnerability may exist in one system, the impact may be in another system. For example, although "water quality" is listed within the "Physical: Water" system, it will impact the larger social system specifically within the health subsystem.

3.1.4 | Best Practices

For each subsystem, such as Water within Physical Systems, there is a description of how practices within that system can help build resilience. Not all of them will be applicable to all communities. However, the best practices can provide a starting point for considering how to increase the resiliency of a community. Best practices will often have impacts beyond just the one subsystem.

3 | RESILIENCE MATRIX

3.1.5| Physical Systems

Physical systems include water, energy, food and the underlying ecosystems that enable the earth to provide our basic needs. It also includes infrastructure and waste management.

Resilience within the physical systems means not just provisioning the basic needs for life but also ensuring that natural environments are not degraded over time and that built infrastructure can withstand natural disasters.



Valle de Vazquez Lime Orchard, Source: Suma Capstone Team, March 2018 Site Visit

SYSTEM	VULNERABILITY	IMPACT	RESILIENT COMMUNITIES
Ecosystem	Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation	Changed balance of ecosystem, unpredictable natural phenomenon (such as timing of seasonal rainwater) affecting farming	Resilient Communities develop Climate Risk Assessment & Plans
Ecosystem	Industrial growth	Increased built environment, less natural/wild environment	Resilient communities design land use regulations in accordance with likely population growth and industry growth to limit impact on the ecosystem.
Waste Management	Solid Waste High Pollution/Waste and/or low treatment of waste	Decreased air, land and water quality	Resilient communities: -invest in sanitation services -design regulations for air and land quality, -partner with residents and industry to find innovative ways to reduce, reuse and recycle household trash, industry waste and wastewater.
Food & Agriculture	Detrimental agriculture or livestock practices (monocrops, fertilizer use)	Reduced soil quality and long term output	Resilient Communities practice optimal agricultural land management including efficient irrigation, increasing genetic diversity, rotating crops, etc.
Infrastructure (Roads, Communications)	Poor infrastructure (roads, public transportation) quality	Potential road collapse, decreased capacity for basic services and business	Resilient Communities -budget for and fund sufficient maintenance of current infrastructure and ensure that maintenance is sufficiently incorporated in any future proposals for new capital projects. -continue to make capital improvements in physical connectivity such as roads, rail and freight transport
Infrastructure (Roads, Communications)	Poor infrastructure (communication networks: telephone and internet, etc.) quality	Decreased capacity for basic services and business	Resilient communities -invest in communications technology (ex: internet access) -educate community members on how to leverage technologies -promote adoption of technologies and/or provide incentives for adoption
Housing & Buildings	Poor housing/building design, low quality materials or maintenance	Potential collapse in a disaster or degradation over time	Resilient Communities -educate community members about risks -create regulation/building codes to enshrine safe practices -provide incentives to households to improve their residences and reduce risk -regulate industries to ensure they are meeting basic standards
Energy	High reliance on fossil fuels	Lack of access during interruptions in supply due to natural disasters or price increases	Resilient Communities reduce their reliance on fossil fuels by: -pursuing energy efficiency -replacing grid supplied gas and coal based energy with renewable energy -creating off grid renewable energy powered alternatives -identifying backup sources of energy in case of emergencies (generators)
Water	Risk of water scarcity either due to large demand or Inefficient use of water	Contributes to water scarcity and reduced water for agricultural and industrial needs	Resilient Communities -measure water use for various purposes and compare to benchmarks to understand opportunities for efficiency -provide incentives for residents and industry to adopt water saving technologies or practices -educate community on the likelihood of water scarcity and importance of water efficiency -use pricing controls or regulatory caps to discourage

Water	Poor water quality	Increased cost to clean water and/or increased health problems	Resilient Communities: -regularly test water quality for cleanliness and pathogens -treat raw water -ensure water is not contaminated via distribution systems -educate community members on the health impacts of water borne illnesses & importance of proper hygiene and sanitation -promote treatment of local water via filtration systems, chlorine tablets, etc. -encourage sanitation and ensure community assets (schools, workplaces, etc.) have adequate sanitation
Water	Poor treatment and/or use of wastewater	Lower quality of water for drinking and agriculture	Resilient Communities treat wastewater before discharging into streams or groundwater
Water	Poor handling of human waste	Contaminated water, increased disease	Resilient Communities design scaled appropriate sewer systems treat human waste before discharge regulate the need for septic tanks provide best practices for dry toilets and latrines

Resilience Matrix Physical Systems and Vulnerabilities

3 | RESILIENCE MATRIX

3.1.6| Economic Systems

Economic systems encompass how resources are created, used and distributed within the community. The subsystems are employment, affordability, markets, innovation, and financial instruments.

Economics is important to resilience because money enables the community to invest in physical infrastructure and social programs that insulate them from harm. Further, investment in resilience-building programs such as solar energy production can provide opportunities for greater income and/or future savings which further enable future investments in community development.



Dairy Cows in Valle de Vazquez, Source: SUMA Capstone Team, March 2018 site visit

SYSTEM	VULNERABILITY	IMPACT	RESILIENT COMMUNITIES
Affordability	High cost of basic needs relative to income: food, water, energy	Less income for education, health, economic investments	Resilient Communities ensure that basic needs are available and affordable via: -well managed and regulated utilities -market choices allowing consumer to select the level of services they can afford -government or community financial aid for those unable to afford market rates -regulations against price gouging during emergencies -more widely available temporary aid during emergencies -increase local food supply, off grid energy systems etc. to be insulated from external shocks affecting the cost of basic needs
Employment	Risk of downturn in key industries	Increased unemployment. less income for households	Resilient Communities: -provide job training and skills for the unemployed -provide incentives to industry to locate and invest in the community -develop diverse industries -ensure that local education matches needed job skills -provide support for sole owner, small businesses and entrepreneurs
Employment	High unemployment and under-employment	Reduced access for food, health, education and economic investments	
Employment	Low degree of diversity/innovation in current industries (exposure to external economic shocks)	Higher impact/collapse if key industry fails	
Assets & Financing Tools	High Cost of Home Ownership relative to incomes	Risk of future asset deflation	Resilient Communities: -have affordable housing and home ownership strategies -provide access to traditional banks, community savings vehicles and/or microlending organizations -have access to insurance for personal and business assets -have access to insurance for intangibles such as health, employment, weather (i.e. for crop failure)
Assets & Financing Tools	Low access to investment/savings vehicles for households (savings accounts, stocks, bonds)	Inflation erodes assets	
Assets & Financing Tools	Low access to Insurance products (unemployment, homeowners, rental, health, disability)	Assets are destroyed during unfortunate events unforeseen events (natural disaster, health catastrophe)	
Assets & Financing Tools	Low access to financing (loans, investors) for businesses, sole proprietors	Unable to expand economic opportunities	
Economy & Markets	High degree of reliance on imports over locally created goods	Reduced access to necessities or goods for economic production during global supply chain disruptions	Resilient Communities -grow or manufacture a large portion of their most critical needs locally -develop alternate and local supply chains for the items they manufacture -develop a diverse customer base (local, national, global) for their products
Industry & Innovation	Low levels of innovation and business acumen which lead to poor resource efficiency	Cost of production increases as resources become more scarce	Resilient Communities: -have innovation oriented businesses focused on product improvements, resource efficiencies and keeping products current -support innovation via education and skills training

Resilience Matrix Economic Systems and Vulnerabilities

3 | RESILIENCE MATRIX

3.1.7| Social Systems

Social systems enable members of the community to be their own source of wealth via human capital and the ability to problem solve. Social systems include the health and education of community members as well as the social cohesion that enables collaboration.

Social systems are key to resilience because they support self-sufficiency within the community unit, defined as the ability to rely on the local human capital of the community and not be overly dependant on outside sources. The overall education, health and equity levels of the community enable the individual community members to provide for their families and assist their neighbors despite both chronic and acute stressors.



Valle de Vazquez Community Kitchen, Source: SUMA Capstone Team, March 2018 site visit

SYSTEM	VULNERABILITY	IMPACT	RESILIENT COMMUNITIES
Health	Lack of community-level coordinated disease/epidemics control programs	Increased health cost, illness, death, lower quality of life, reduced economic output	Resilient Communities: -provide universal access to affordable health care -promote preventative care -provide access to mental health support -educate community members on proper nutrition and ensure that nutritious food is affordable
Health	Low access to health care & mental health support	Reduced individual capacity to respond productively to chronic stressors and acute events (natural disasters, personal problems)	
Health	High drug abuse/addiction	Reduced individual ability to contribute to household income and manage responsibilities	
Health	High rates of improper nourishment	Increased disease rate (diabetes, heart, obesity), death	
Social Cohesion	Low rates of demographic equity (age, gender, race, religious affiliation, special needs)	Community members cannot fully contribute to social and economic activities	Resilient Communities: -promote equity in education, employment and access to community services -honor cultural histories and seek to reduce interracial conflicts within the community -provide avenues for members to contribute to community needs and form social networks outside of education and employment (ex: religious organizations, community associations, interest groups) -provide incentives for young people and educated adults to stay within the community
Social Cohesion	Existence of demographic conflicts/tensions (class, race, gender, etc.)	Reduced ability for collective, productive community-level problem solving	
Social Cohesion	Existence of social unrest	Reduced ability for community members to participate in regular activities	
Social Cohesion	Weak social institutions (religious organizations, community organizations)	Lack of forums for community members to collectively share ideas and work towards agreed solutions	
Social Cohesion	Low community ability to leverage human potential and assets outside economic sphere (ex: volunteer work, unpaid child care)	Reduced ability to solve community needs	
Social Cohesion	Increasing Urbanization	Decrease in rural population and potential "brain drain" from rural areas to urban areas, i.e. reduced local skills	
Social Cohesion	Migration	Decrease in local population and potential "brain drain" to other countries, i.e. reduced local skills	
Social Cohesion			
Education	Education Quality: Low education levels, low opportunities for higher learning	Reduced local skills for economic value-add employment, reduced capacity to solve local problems	Resilient Communities: -provide free or affordable primary school education for all -reduce barriers to girls' enrollment and/or access to success in school -ensures that education encompasses skills required by future job markets -provides access to the Internet and information (libraries) -provides opportunities for adult learning -ensure appropriate facilities and a safe & healthy environment for learning
Education	Education facilities and environment	Reduced quality of education, undermining future employment potential	
Education	Low access to internet/information	Reduced ability to grow capacity of community and reduced options for problem solving	
Education	Existence of mismatch between education available and jobs available locally	Leads to low return on education investment and/or insufficient community skills to fill required jobs	

3 | RESILIENCE MATRIX

3.1.8| Political Systems

Political Systems include the government as well as those who have power to control decisions regarding resources and the mechanisms used to express that power, for example through providing funding for various initiatives.

Stable and strong political systems can be important for resilience because governments can provide accepted guidelines (i.e. regulations) and issue penalties to ensure the built infrastructure will withstand natural disasters. They can provide investment returns over the long term. Governments can also provide a base of economic or social support for low income households to ensure that current economic conditions do not excessively limit future opportunities. For example, public education is critical in ensuring that low income households have future employment opportunities. Finally, governments can provide disaster response plans which typically require the coordination of many sectors of society and cannot be managed by one sector alone.



Valle de Vazquez Public Forum, Source: SUMA Capstone Team, March 2018 site visit

SYSTEM	VULNERABILITY	IMPACT	RESILIENT COMMUNITIES
Funding	Low political will to fund social and resiliency programs and/or include resiliency factors into budget planning	Funds unavailable for resiliency efforts	Resilient Communities: -allocate sufficient funds for infrastructure maintenance -allocate sufficient funds for disaster mitigation and adaptation as a result of risk assessments
Funding	Weak government institutions with minimal govt services & support	Greater burden on other institutions (religious, nonprofit, community, networks) to provide services & support	-pursues healthy tax or revenue collection policies to provide a base for funding projects -strengthen government and community institutions via recruitment, efficiency and interagency coordination -find innovative ways to fund projects (innovative finance such as green bonds)
Law & Order	Local or National political instability	Disruption of government services and support	Resilient Communities: -ensure political stability
Law & Order	Low maintenance of law/order (policing, court system)	Low adherence to regulations intended to promote resiliency	-have recovery plans for terrorism and other man-made crisis -provides sufficient and equitably applied policing to protect human life and personal assets
Law & Order	High levels of corruption and bribery	Access to services is restricted to those who can pay, services are provided at potentially inefficient prices (i.e. priced higher than they might otherwise cost)	-ensures equitable and meaningful consequences for violations -ensures services are available to all without resorting to social networks, bribes and kickbacks
Governance & Ownership	Low community access to governance for essential needs (food, electricity, water)	Needs of community (ex: affordability) may be overlooked	Resilient Communities: -allow community input into the management of essential needs
Governance & Ownership	Low ownership/control of essential resources (ex: water rights)	Reduced access or affordability as future stressors evolve (ex. water scarcity)	-work to reduce any conflicts in ownership
Governance & Ownership	Existence of conflicting and oversubscribed water rights in the context of water scarcity-	Reduced access or affordability, increased social conflict	
Regulations	Changes in land use or building codes-	Potential reduced protections for ecosystem and infrastructure resiliency	Resilient Communities: -regulate land use, waste, pollution, etc. to reduce the impact on human health and the environment
Regulations	Existence of complex, hard to navigate regulations	Reduced formal economic activity	-ensure that regulations target appropriate goals, are easy for industry to comply and are reviewed and updated as necessary
Leadership & Execution	Low awareness or contingency plans for emergency events across a variety of institutions (police force, hospital, businesses, government, community organizations, households)	Greater injury or loss of life in an emergency, more time needed to recover	Resilient Communities: -assess their risks, create risk adaptation and mitigation plans for their highest risk areas -make incremental improvements to reduce their risk -ensure that disaster response procedures are identified and rehearsed
Leadership & Execution	Low government leadership capacity to respond to structural & acute stressors	Longer turnaround for recovery, minimal support to communities in recovery	-ensure that disaster response has many potential paths and does not depend on specific buildings, technologies, roadways, etc. that may be vulnerable in the event of a disaster

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

The Social Organizations Capabilities Assessment aims to identify the collective strengths and needed skills of all organizations participating in Ashoka's new venture as they relate to building resilience in rural communities. This assessment uses the categories and vulnerabilities established in the Resilience Matrix and evaluates the participating organizations against each of the categories. The total score by vulnerability shows the extent to which Ashoka's new venture, collectively, is positioned to address each specific vulnerability.

In addition to the collective capabilities assessment, the information provided by the social organizations should be compiled into Resilience Profiles, one per organization to demonstrate the potential contributions of each organization

The ultimate goal of both the Resilience Profiles and the Social Organization Capabilities Assessment is twofold: 1) when combined with the Community Assessment, the Social Organizations' Capabilities Assessment will allow Ashoka to identify the fit between the community needs and the sum resilience-related capabilities of the organizations participating in the new venture; 2) it will enable Ashoka to identify potential synergies between organizations, leveraging the organizations' skills and expertise to implement practical solutions as one team for achieving resilience in rural communities of Mexico.

4.1| Ashoka's New Venture and Participating Social Organizations

After the 2017 earthquake in Mexico, Ashoka began a new initiative, the "Collaboration Network of Social Organizations in Favor of Victims of Earthquakes". Not only Ashoka Fellows are involved in this new undertaking; it also includes other social organizations that were not formally affiliated with Ashoka in the past, but were known to them as a result of prior collaborations. For the accuracy of this assessment, it is necessary to differentiate between the various organization types.

4.1.1| Ashoka Fellows

An Ashoka Fellow is a social entrepreneur (person or business) who was evaluated via Ashoka's venture process and elected by Ashoka to be a Fellow. Ashoka Fellows are already within Ashoka's formal network as a result of receiving prior support. The type of support varies by case. Ashoka Fellows, for the most part, have an established and self-sustaining business model.

4.1.2| Core Team

Within the network of social organizations, a "Core Team" of organizations emerged. The "Core Team" is comprised by the organizations that were the first to enter the community selected for the pilot project (Valle de Vazquez), serve as the entry points for other organizations, and decided to remain involved in the community for an extended period of time. Not every organization in the Core Team is an Ashoka Fellow and not every Ashoka Fellow involved in the network is part of the Core Team. The Core Team's composition might vary from project to project.

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

4.1.3| Allied Organizations

The network of social organizations, in addition to the Core Team, includes Allied Organizations. Allied Organizations are defined as organizations that either entered the community later, are not directly involved in governance decisions, or support the new venture intermittently. Allied Organizations can be Ashoka Fellows or non-Ashoka Fellows.

4.2| Data Gathering for the Social Organizations Capabilities Assessment & Resilience Profiles

Before beginning to collect information from the participating social organizations, Ashoka should consider whether any changes should be made to the list of vulnerabilities established in the Resilience Matrix. For example, entering new communities may bring additional challenges that need to be resolved. After confirming that the Resilience Matrix is comprehensive, Ashoka will assess each organization's capabilities against the vulnerabilities that are relevant for the community under question.

4.2.1| Resilience Questionnaire

All the organizations that are participating in the collaboration network should be asked to complete the resilience questionnaire. This questionnaire incorporates all the categories identified in the Resilience Matrix. It does not include each individual vulnerability for practical reasons, but it condenses and summarizes these into key terms that are more detailed than the categories alone. This questionnaire will evaluate the resilience capacity of each organization by looking at the organizations' business model and resilience related experience. The questionnaire can be found in the Supplemental Documents Drive provided with this report.

4.2.1.1| Business Model (Part 1)

The questionnaire asks the organizations to describe their business models by completing a Business Model Canvas. The canvas, which is a common tool for documenting business models, allows businesses to better understand their operational and strategic activities by highlighting key aspects of their business offering. It uses a standard format to describe, design, challenge and uncover the potential for new directions for each company. It can help Ashoka determine whether the organizations have a self-sustaining business model or not based on the type of intervention, and if they have any key activities, partners or resources that, while are directly relevant for the organization's own value proposition, could also be useful when designing collective community interventions. For this study, the business canvas was used to first, understand the social organizations operations and value proposition, and second, to design a collective assessment of the network's collective capabilities in building resilience in communities.

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

4.2.1.2| Resilience Related Experience (Part 2)

The questionnaire prompts the organizations to identify up to five (5) resilience areas in which the organization has the most experience. Within those self-identified areas, the organizations should describe the nature of their past interventions as well as any relevant projects or experiences that the organization believes have prepared them to tackle those areas.

Furthermore, the Resilience Related Experience part of the questionnaire is broken-up into two segments, each directly related to the five self-identified resilience areas. The first aims to identify the scope of the organization's operations (commercialization of products and services, technical assistance, education and training, financing, monitoring and advocacy) and the second asks the organization to identify the reach of its operations (individual, family, community, small and medium enterprise, municipal, state/national). In addition to the Business Model Canvas, in Part 2, organizations are asked again about key resources and key partners they have that they consider strategic for resilience related tasks.

4.2.2| Additional Sources of Information

Ashoka should also include relevant information that it might get from other reliable sources such as conversations with the organizations themselves and public information about the organizations. Ideally, Ashoka should introduce the "Resilience Profile" questionnaire to all the participating organizations at a meeting or a workshop to orient them and explain its purpose. This should be done after the Resilience Matrix categories and vulnerabilities have been finalized.

4.3| Social Organizations Capabilities Assessment Overview

The matrix uses the systems and the vulnerabilities established in the resilience framework, which are listed under the first two columns. The evaluation columns will have two parts: the first part will contain information about each organization's Scope of operations and the second part will contain information about each organization's Network. The last two columns display the combined scores obtained and the count of organizations that are involved in each vulnerability.

SCOPE					NETWORK				
Area	Vulnerability	Org. A	Org. B	Scope - Combined Score	Org. A	Org. B	Combined Network Score	# of Org.	Total Score by Vulnerability
		Core	Allied		Core	Allied			
Water	Scarcity								
Water	Quality								
Water	Wastewater								

Example from Social Organization Capabilities Assessment Spreadsheet

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

4.4| Completing the Social Organizations Capabilities Assessment

For each part of the framework, the SUMA Capstone Team created guided instructions to lead Ashoka staff through the steps to conduct the assessments and analysis. The following is the guide to completing the assessment of social organizations.

To start, you should use the existing assessment compiled by the SUMA Capstone Team as a starting point and create two new columns for each organization that you want to add, one in the Scope Section and one in the Network Section. In addition, you should indicate if the organization is part of the Core Team or if it is an Allied Organization. The assessment can be found on the Supplemental Documents Drive.

First distribute the resilience questionnaire to the social organizations. Read through the entire resilience questionnaire responses thoroughly. Going through each questionnaire response individually, you should identify the key resilience areas that were checked-off by the organization. You will see that the language on the matrix and the language on the questionnaire do not match perfectly, the questionnaire is intended to be a condensed version of the matrix. In order to determine the specific vulnerabilities within a given area, you will need to read both parts of the questionnaire. The business model description will help determine which vulnerability areas are closely related to the organization.

4.4.1| The Scope Section

To assess scope, you will use the first table of Part 2 of the questionnaire

Perfil de Respuesta de Resiliencia

QUESTIONS RESPONSES 14

PARTE 2 - DESARROLLO DE RESILIENCIA

Esta parte analiza específicamente el impacto potencial de su organización en el desarrollo de resiliencia. Se le presentarán dos matrices, cada una con 23 áreas de riesgo (columna izquierda). La primera es para identificar las áreas de riesgo en las que su organización está involucrada y el carácter de sus intervenciones (6 columnas). La segunda considera las mismas áreas de riesgo, pero se le pide que identifique el alcance de sus operaciones (6 columnas).

Por favor, seleccione hasta cinco (5) áreas de riesgo relacionadas con resiliencia en las que su organización tenga o pueda tener el mayor impacto basado en su experiencia, e indique el carácter de sus intervenciones. (Favor desplace el cursor a la derecha para ver todas las categorías!)

	Venta de Productos / Servicios	Asistencia Técnica	Educación / Capacitación	Financiamiento	Monitoreo	Abogacía / Defensa
Desastres Naturales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Agua	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gestión de Residuos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alimentación y Agricultura	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Calidad del Aire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mitigación del Cambio Climático	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Infraestructura	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Viviendas y edificios	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Energía	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asequibilidad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inequidad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Screenshot of the Resilience Questionnaire

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

4.4.1.1| Complete the Scope Section

- Enter the information (from Part 2, Table 1 of the questionnaire) into the Scope Section Based on the everything you know about the organization, use your discretion to determine the specific vulnerability or vulnerabilities aligned to the organization. For example, if an organization checked-off “water”, you do not need to provide feedback for all of the vulnerabilities under water, but only those that make sense based on the organization’s description of its business model and activities.
- Use the following abbreviations to code the services the organization can provide to combat the vulnerability.
 - **P&S:** Commercialization of Products and/or Services
 - **TA:** Technical Assistance
 - **E&T:** Education and Training
 - **F:** Financing
 - **M:** Monitoring
 - **A:** Advocacy
- If you notice that an organization has not checked-off an area that, from the entire description of its business activities, would seem reasonable to include, discuss this with the organization’s contact person or include the categories you feel are missing, but use footnotes to indicate any uncertainties.

4.4.1.2| Tally the “Scope - Combined Score” Column

The Scope Combined Score ranges from 0 to 1. It can be expressed in decimals or as a fraction. It will tell you how many scope categories out of the total six (6) can be addressed collectively by the organizations. Review each row and count the scope categories listed. If on a row (vulnerability) you find all the scope categories listed, the Scope-Combined Score will be 6/6. But, if for instance, you only find TA and E&T listed across the row, you should enter 2/6 or 0.33.

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4.4.2| The Network Section

Information in the Network Section can be entered qualitatively, but there is no need to enter it word for word. The matrix does not need to include the names of the partners that each organization works with; it is more important to list the type of organizations that these are. For example, you can use standardized terms like: foundations, academic institutions, NGOs, suppliers, volunteers, etc.

4.4.2.1| Complete the Network Section

1. To complete this section you should review questionnaire responses for:
 - **‘key partners’ in Part 1** (¿Quiénes son sus socios clave?)
 - **‘additional resources’ in Part 2** (Teniendo la idea de resiliencia en mente, por favor indique si cuenta con recursos adicionales como ser conexiones, socios, redes de voluntarios, etc. que puedan apoyar su intervención.).
2. Since the sections on the questionnaire do not yield vulnerability-specific responses, you should enter the information in the most relevant rows in the matrix. Repeat for every row (vulnerability) that was previously identified in the scope section.
3. For each vulnerability, if the organization has a valid network, give it a score of one (1), if there is no network for that vulnerability, the organization will receive a score of zero (0).

4.4.2.2| Tally the “Network - Combined Score” Column

The “Combined Network Score” takes the maximum value of the network values entered in each row, thus it can be either 0 or 1.

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

4.4.3| Vulnerability Total Score

The total score by vulnerability shows whether Ashoka's new venture, collectively, is well positioned to address each specific vulnerability. The score is obtained by combining the scope and the network scores. The score ranges from 0-5. The combined scope score was given a weight of 80%, the combined network score was weighed at 20%. The higher the score, the better positioned Ashoka's social organizations are to create impact on that particular vulnerability. Note that this is a combined score and does not provide each organization with its own score because the goal of this assessment is to determine the combined capacity for intervention.

The total scores by vulnerability are then coded into three categories which help visualize the overall capacity to counteract the vulnerability.

>3.50	Green	Combined capacity to intervene is strong
2.5 - 3.50	Yellow	Combined capacity to intervene is modest
<2.50	Red	Combined capacity to intervene is lacking

Color Coding for the Social Organizations Capabilities Assessment

The assessment also includes a column to show the total number of organizations that can be potentially active in tackling a particular vulnerability. Although this information has not been used extensively in the current analysis because the distribution of organizations across vulnerabilities was fairly even, it could be a useful indicator of risk. For example, if a certain vulnerability receives a score higher than 3.5 (green), but only one organization is listed under that vulnerability, Ashoka needs to ensure that if an intervention is designed for that vulnerability, the sole organization is fully committed to the project and progress will not be negatively impacted if the organization has to withdraw from the program.

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

4.5| Completing the Resilience Profiles

As mentioned, the Social Organizations Capabilities Assessment will not result in an individual score per organization. It only rates an organization's scope, network and resources as an input to evaluate the total capacity of all participating social organizations. In order to obtain a more comprehensive view of each organization's resilience capabilities, "Resilience Profiles" should be created and regularly updated. The profile is meant to give Ashoka an overview of the organization's status within Ashoka's new resilience venture, the organization's business model, their partners and a description of their capabilities with regards to supporting community resilience. Ashoka should compile all Resilience Profiles for each existing organization, update them regularly and create profiles for all new organizations that decide to become involved in the resilience initiative. A template for creating profiles for new organizations can be found in Appendix 1.4: Resilience Profiles Template.

The input information for compiling the Resilience Profile for each organization can be obtained from the organizations' responses to the Resilience Questionnaire.

4.5.1| Status

The profile should record the status of the organization within the network. In other words, it should differentiate between members of the Core Team and Allied Organizations. It should also highlight whether or not the organization is an Ashoka Fellow. The purpose of making this distinction is for Ashoka and the new entity to clearly acknowledge the entity's role in the governance structure of the project and the degree of involvement from the organization.

4.5.2| Business Model

By describing the organization's value proposition, its customer segments, its key activities and its key partners, Ashoka will be able to determine if the organization has a self-sustaining business model which is less susceptible to external shocks and less dependent on external funding streams than social organizations that are mostly funded through donations.

4.5.3| Key Partners

Under the key partners section, Ashoka should list the identified partners/resources by sector. For example, one can use standardized terms like: foundations, academic institutions, NGOs, suppliers, volunteers, etc.

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

4.5.4| Key Resilience Areas

The questionnaire asks each organization to identify up to five (5) resilience related areas in which they have experience working or they believe they are well equipped to work on. The profile should list these clearly. If the person compiling the profiles identifies that a key resilience area has not been explicitly listed or was listed but may not be realistic based on the description of key activities and the model, then the organization should be consulted and the information validated. As a second option, the key resilience areas in question could be added or removed with any amendments annotated.

4.5.5| Scope & Reach of Operations

Each Resilience Profile contains two charts to depict the various types of intervention or service the organization provides. One of the charts illustrates the organization's Scope of Operations related to the resilience areas. The other depicts the organization's Reach of Operations.

The potential categories under Scope of Operations are the following:

- Commercialization of Product and/or Service
- Technical Assistance
- Education and Training
- Financing
- Monitoring
- Advocacy

The Reach of Operations categories reflect the various levels of intervention within a community including:

- Individual
- Household
- Community
- Small and Medium Enterprises
- Municipal
- State and National

4| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

4.5.6| Relevant Projects

Relevant Projects should summarize the organization's expertise as it relates to resilience building projects. The participating organizations would ideally list projects or past collaborations that concretely demonstrate their resilience building capacity. This section, when completed correctly should not list the core activities of the organization.

4.5.7| Observations

The Observation section clarifies whether any key resilience areas or vulnerabilities were either added to or removed from the information that the organization had self-identified. It also provides the rationale behind any changes. Additionally, the section should list the resilience vulnerabilities that have been deemed relevant to the organization. Remember that the the questionnaire is a condensed version of the resilience matrix. In order to determine specific vulnerabilities, all parts of the questionnaire should be carefully reviewed. The business model description will help determine which specific vulnerability within a system (such as "Water") is most closely related to the organization's operations.

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.1| Data Collection

The SUMA Capstone Team drafted the Social Organizations Capabilities Assessment which consists of the Collective Capabilities Scores and individual organizations' Resilience Profiles for the known social organizations participating in Ashoka's new resilience venture. Only some of the organizations that participated in the assessment are currently committed to the pilot project in Valle de Vazquez. There are also organizations that are committed to the pilot project, but did not provide information to be included in the assessment. Therefore, these results should be regarded as tentative and Ashoka should continue to assess additional social organizations to understand the collective capacity.

The information used to complete the assessment and profiles was derived from the questionnaires that were received from the participating social organizations. Since input information for this assessment was self-reported by the participating organizations, the SUMA Capstone Team recommends that in the future, a clear definition of resilience is discussed and instructions on how to complete the questionnaires are provided to organizations before the assessment.

5.2| Collective Capabilities Scores

The Collective Capabilities Scores serves as input information to conduct the Fit Analysis, which in turn, will provide the background for conducting the Synergies Analysis. The assessment is one of many tools in the framework and although insightful when identifying collective capacity levels, its real value is delivered when using it in the Fit Analysis to align capacities to community needs.

The full assessment showing the total scores by vulnerability, as well as the scores for the combined scope of operations and the scores for the combined network can be found on the second tab of the Social Organizations Assessment spreadsheet in the Supplemental Documents Drive. If some of the scores obtained need further clarification, please refer to the first tab of the assessment spreadsheet and to the individual Resilience Profiles.

5.2.1| Summary

Based on the assessment performed with a limited number of organizations, it appears that the capabilities of Ashoka's network of organizations are mostly concentrated in the physical and the social systems, with less influence in the economic and political systems.

Note that a low number of organizations involved in a particular vulnerability can indicate a potential risk of under-capacity even if the collective score is high. For example, the vulnerability "Economy and Markets: High degree of reliance on imports over locally created goods", received a high capacity score but only one organization is actively involved in that particular vulnerability. This means that even though the collective score for Ashoka's network in that vulnerability is high and there is great potential for intervention, Ashoka should ensure the commitment and availability of the sole organization that is fully capable of addressing "Economy and Markets".

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.2.2| Detailed Results

The table included here ranks the vulnerabilities by highest collective organizational capacity to lowest collective organizational capacity.

While the Collective Capabilities Scores show which areas and which specific vulnerabilities Ashoka’s network can impact, they do not show which specific organization is well prepared to address each particular vulnerability. Also, the collective results only focus on scope and network and don’t consider other important aspects of the organizations’ business models. In order to determine which specific organization is well equipped to address a particular vulnerability, the results from this table should be complemented by the results obtained in the Resilience Profiles.

The following acronyms were used to identify scope:

- **P&S:** Commercialization of Products and/or Services
- **TA:** Technical Assistance
- **E&T:** Education and Training
- **F:** Financing
- **M:** Monitoring
- **A:** Advocacy

CATEGORY	RISK/VULNERABILITY->IMPACT	SCOPE OF OPERATIONS COMBINED (RANGE 0 TO 1)		COMBINED NETWORK SCORE (0 OR 1)	# OF ORGANIZATIONS	TOTAL SCORE BY VULNERABILITY
Housing & Buildings	Poor housing/building design, low quality materials or maintenance->potential collapse in a disaster or degradation over time	P&S, TA, E&T, F, M, A	1.00	1	4	5.0
Social Cohesion	Low community ability to leverage human potential and assets outside economic sphere (ex: volunteer work, unpaid child care)->reduced ability to solve community needs	P&S, TA, E&T, F, M, A	1.00	1	5	5.0
Education	Quality: low education levels, low opportunities for higher learning->reduced local skills for economic value add employment, reduced capacity to solve local problems	P&S, TA, E&T, F, M, A	1.00	1	6	5.0
Funding	Weak government institutions with minimal govt services & support->greater burden on other institutions (religious, nonprofit, community, networks) to provide services & support	P&S, TA, E&T, F, M, A	1.00	1	3	5.0
Ecosystem	Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation->change balance of ecosystem	P&S, TA, E&T, M, A	0.83	1	8	4.3
Energy	High reliance on fossil fuels->lack of access during interruptions in supply due to natural disasters or price increases	P&S, TA, E&T, F, M	0.83	1	4	4.3
Water	Risk of water scarcity either due to large demand or Inefficient use of water->can contribute to water scarcity and reduced water for agricultural and industrial needs	P&S, TA, E&T, M, A	0.83	1	3	4.3
Water	Poor water quality->increased cost to clean water and/or increased health problems	P&S, TA, E&T, M, A	0.83	1	3	4.3
Water	Poor treatment and/or use of wastewater-> lower quality of water for drinking and agriculture	P&S, TA, E&T, M, A	0.83	1	3	4.3
Water	Poor handling of human waste->contaminated water, increased disease	P&S, TA, E&T, M, A	0.83	1	2	4.3
Employment	High unemployment and underemployment->reduced access for food, health, education and economic investments	P&S, TA, E&T, M, A	0.83	1	6	4.3

Industry & Innovation	Low levels of innovation and business acumen which lead to poor resource efficiency->cost of production increases as resources become more scarce	P&S, TA, E&T, M, A	0.83	1	4	4.3
Health	Lack of coordinated Disease/epidemics control programs->increased health cost, illness, death, lower quality of life, reduced economic output	P&S, TA, E&T, M, A	0.83	1	5	4.3
Health	Low access to health care & mental health support->reduced individual capacity to respond productively to chronic stressors and acute events (natural disasters, personal problems)	P&S, TA, E&T, M, A	0.83	1	3	4.3
Health	High rates of improper nourishment-> increased disease (diabetes, heart, obesity), death	P&S, TA, E&T, M, A	0.83	1	3	4.3
Social Cohesion	Low rates of demographic equity (age, gender, race, religious affiliation, special needs)->community members cannot fully contribute to social and economic activities	P&S, TA, E&T, M, A	0.83	1	5	4.3
Social Cohesion	Existence of demographic conflicts/tensions (class, race, gender, etc.)->reduced ability for collective productive community level problem solving	P&S, TA, E&T, M, A	0.83	1	2	4.3
Education	Education facilities and environment	P&S, TA, E&T, M, A	0.83	1		4.3
Education	Low access to internet/information ->reduced ability to grow capacity of community and reduced options for problem solving	P&S, TA, E&T, F, M	0.83	1	3	4.3
Waste Management	Solid Waste High Pollution/Waste and/or low treatment of waste->decreased air, land and water quality	P&S, TA, E&T, M	0.67	1	3	3.7
Food & Agriculture	Detrimental agriculture or livestock practices (monocrops, fertilizer use)->reduced soil quality and long term output	P&S, TA, E&T, M	0.67	1	3	3.7
Assets & Financing Tools	Low access to financing (loans, investors) for businesses, sole proprietors->unable to expand economic opportunities	P&S, TA, E&T, M	0.67	1	2	3.7
Economy & Markets	High degree of reliance on imports over locally created goods->reduced access to necessities or goods for economic production during global supply chain disruptions	P&S, TA, E&T, M	0.67	1	1	3.7

Assets & Financing Tools	Low access to investment/savings vehicles for households (savings accounts, stocks, bonds)->inflation erodes assets	TA, E&T, M	0.50	1	1	3.0
Infrastructure (Roads, Communications)	Poor infrastructure (roads, public transportation) quality->potential collapse, decreased capacity for basic services and business	P&S, TA, E&T	0.50	1	1	3.0
Affordability	High cost of basic needs relative to income: food, water, energy->less income for education, health, economic investments	TA, E&T, M	0.50	1	3	3.0
Assets & Financing Tools	Low access to Insurance products (unemployment, homeowners, rental, health, disability)->assets are destroyed during unfortunate unforeseen events (natural disaster, health catastrophe)	TA, E&T, M	0.50	1	1	3.0
Health	High drug abuse/addiction and/or alcoholism->reduced individual ability to contribute to household income and manage responsibilities	E&T, M, A	0.50	1	1	3.0
Social Cohesion	Weak social institutions (religious organizations, community organizations)->reduced forums for community members to collectively share ideas and work towards agreed solutions	P&S, TA, E&T	0.50	1	3	3.0
Law and Order	Local or National political instability->disruption of government services and support	TA, E&T, M	0.50	1	1	3.0
Law and order	High levels of corruption and bribery->access to services is restricted to those who can pay, services are provided at potentially inefficient prices (i.e. priced higher than they otherwise might be)	TA, E&T, M	0.50	1	1	3.0
Governance & Ownership	Low community access to governance for essential needs (food, electricity, water)->needs of community (ex: affordability) may be overlooked	TA, E&T, M	0.50	1	1	3.0
Governance & Ownership	Low ownership/control of essential resources (ex: water rights)-> reduced access or affordability as future stressors evolve (ex. water scarcity)	TA, E&T, M	0.50	1	1	3.0
Regulations	Existence of complex, hard to navigate regulations->reduced formal economic activity	TA, E&T, M	0.50	1	1	3.0

Leadership & Execution	Low awareness or contingency plans for emergency events across a variety of institutions (police force, hospital, businesses, government, community organizations, households)->greater injury or loss of life in an emergency, longer time to recovery	TA, E&T, M	0.50	1	1	3.0
Leadership & Execution	Low government leadership capacity to respond to structural & acute stressors->long turnaround for recovery, minimal support to communities in recovery	TA, E&T, M	0.50	1	1	3.0
Employment	Low degree of diversity/innovation in current industries (exposure to external economic shocks)->higher impact/collapse if key industry fails	E&T, M	0.33	1	2	2.3
Assets & Financing Tools	High Cost of Home Ownership relative to incomes->risk of future asset deflation	P&S	0.17	1	1	1.7
Social Cohesion	Existence of social unrest ->reduced ability for community members to participate in regular activities	E&T,	0.17	1	1	1.7
Social Cohesion	Migration-<decrease in local population and potential "brain drain" to other countries, i.e. reduced local skills	E&T	0.17	1	1	1.7
Education	Existence of mismatch between education available and jobs available locally->leads to low return on education investment and/or insufficient community skills to fill required jobs			1	1	1.0
Employment	Risk of downturn in key industries->increased unemployment. less income for households	-		0	0	0.0
Infrastructure (Roads, Communications)	Poor infrastructure (communication networks: telephone and internet, etc.) quality->decreased capacity for basic services and business		0.00	0	0	0.0
Social Cohesion	Increasing Urbanization ->decrease in rural population and potential "brain drain" from rural areas to urban areas, i.e. reduced local skills			0	0	0.0
Funding	Low political will to fund social and resiliency programs and/or include resiliency factors into budget planning->funds unavailable for resiliency efforts			0	0	0.0
Law and order	Low maintenance of law/order (policing, court system)->low adherence to regulations intended to promote resiliency			0	0	0.0

Governance & Ownership	Existence of conflicting and oversubscribed water rights in the context of water scarcity->reduced access or affordability, increased social conflict			0	0	0.0
Regulations	Changes in land use or building codes->potential reduced protections for ecosystem and infrastructure resiliency			0	0	0.0

Results of the Social Organizations Collective Capabilities

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3| Social Organization Resilience Profiles

The SUMA Capstone Team received 14 questionnaire responses from 12 organizations. If an organization self-identified specific skills, the team accepted that information as stated but also included comments if it appeared that further additions or amendments to what was reported should be made. All profiles should be validated by Ashoka and updated periodically.


Under the Nature of Intervention section of the Resilience Profiles, the Scope of Operations and Reach of Operations are mapped on spider graphs. These graphs have multiple axes radiating from a central point. Each axis is a different activity in Scope of Operations (such as Advocacy) or level in Reach of Operations (such as Individual). Colored dots are used to indicate the level of capacity for a specific area such as “energy”, by marking the chart near the center to indicate low capacity and closer to the perimeter to indicate higher capacity.



Echale a tu Casa Compressed Earth Block House, Source: SUMA Capstone Team, March 2018 site visit

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.1| Conciencia Quetzal

	<p>CORE TEAM</p> <p>Non-Ashoka Fellow</p> <p>Organization: ConCiencia Quetzal</p> <p>Contact Person: Sara Cárdenas A.</p> <p>Title: Founder</p> <p>Email: conciencia.et.ciencia@gmail.com</p> <p>Link: https://www.facebook.com/ConCienciaQueTzal/</p>
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VALUE PROPOSITION

ConCiencia Quetzal maps the objectives of each client organization to develop strategies and projects to promote the balance of scientific, technological, social and artistic know-how. ConCiencia Quetzal's strategies & proposed solutions focus on topics relating to corporate and community Social Responsibility using a sustainable perspective in a creative and playful way.

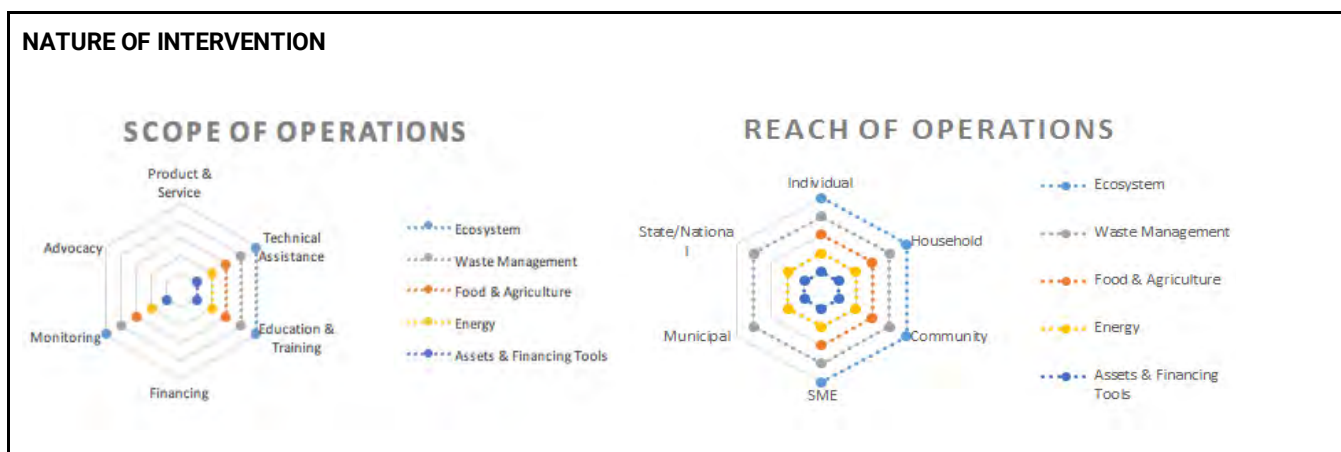
CUSTOMER SEGMENT

Customer segments include Companies, Individuals, Groups, NGOs, Government. ConCiencia QueTzal is in an initial stage. There will be future improvements in the management processes, an increase in the portfolio of clients and suppliers, and improved alignment with international standards. The current most important clients include: 100% Natural, Circo Volador Center for Art and Culture, Vecordia Producciones, RENAPRED.

ACTIVITIES

Activities include: sustainability strategies for business and Corporate Social Responsibility (CSR) aligned to business objectives, training, workshops, artistic and cultural presentations, production of CSR events, networking, & conferences.

KEY PARTNERS	KEY RESILIENCE AREAS
<ul style="list-style-type: none"> - Foundations - Cultural and Arts Centers - Media Outlets - Filming and Production - Transport - NGOs - Volunteers - SMEs 	<ol style="list-style-type: none"> 1. Ecosystem 2. Waste Management 3. Food & Agriculture 4. Energy 5. Assets and Financing Tools 6. Health 7. Social Cohesion 8. Education 9. Funding* 10. Law and Order 11. Governance & Ownership 12. Regulations 13. Leadership and Execution



RELEVANT PROJECTS

Relevant projects cover areas such as crisis management, risk management, quality control, environmental, safety and health best practices. ConCiencia Quetzal has generated governance plans and policies for transnational companies. Their team has an expert in renewable energies.

OBSERVATIONS

Infrastructure was marked-off as an capabilities area on the questionnaire, but because of the specifics of the infrastructure-related vulnerabilities and an analysis of ConCiencia Quetzal's model, infrastructure was removed from the matrix.


(*) Funding was added to the analysis as it seems that this organization can have an impact on this area. Note that this organization does not have a self-sufficient business model in that it requires outside funders for its programs.

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- Climate Change: Increased likelihood of natural disasters, temperature increases, etc.
- High unemployment and underemployment
- Solid Waste High, Pollution/Waste and/or low treatment of waste
- Detrimental agriculture or livestock practices (monocrops, fertilizer use)
- High reliance on fossil fuels->lack of access during interruptions in supply
- Low access to investment/savings vehicles for households (savings accounts, stocks, bonds)
- Low access to Insurance products (unemployment, homeowners, rental, health, disability)
- Low access to financing (loans, investors) for businesses, sole proprietors
- Low access to health care & mental health support
- High rates of improper nourishment
- Low rates of demographic equity (age, gender, race, religious affiliation, special needs)
- Weak social institutions (religious organizations, community organizations)
- Low community ability to leverage human potential and assets outside economic sphere
- Quality: low education levels, low opportunities for higher learning
- Education facilities and environment
- Low access to internet/information
- Weak government institutions with minimal govt services & support
- Local or National political instability
- High levels of corruption and bribery
- Low community access to governance for essential needs (food, electricity, water)
- Low ownership/control of essential resources (ex: water rights)
- Existence of complex, hard to navigate regulations
- Low awareness or contingency plans for emergency events across a variety of institutions
- Low government leadership capacity to respond to structural & acute stressors

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.2| Echale

	<p>CORE TEAM</p> <p>Ashoka Fellow</p> <p>Organization: Echale a tu Casa</p> <p>Contact Person: Gretel Uribe Campos</p> <p>Title: Director of Operations</p> <p>Email: gretel@echale.com.mx</p> <p>Link: www.echale.com.mx</p>
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VALUE PROPOSITION

Housing: Echale offers a quality product guaranteed by the Registro Unico de Vivienda. They use an ecological, resistant and thermoacoustic material, build with a shorter execution timeline than traditional construction, and at a comparatively low cost.

Financing: Echale works with government agencies, to offer the best financing rates enabling low income households to access to loans for housing construction.

CUSTOMER SEGMENT

Middle and low income families of rural communities.

ACTIVITIES

Development of housing projects.

Construction of rural social housing.

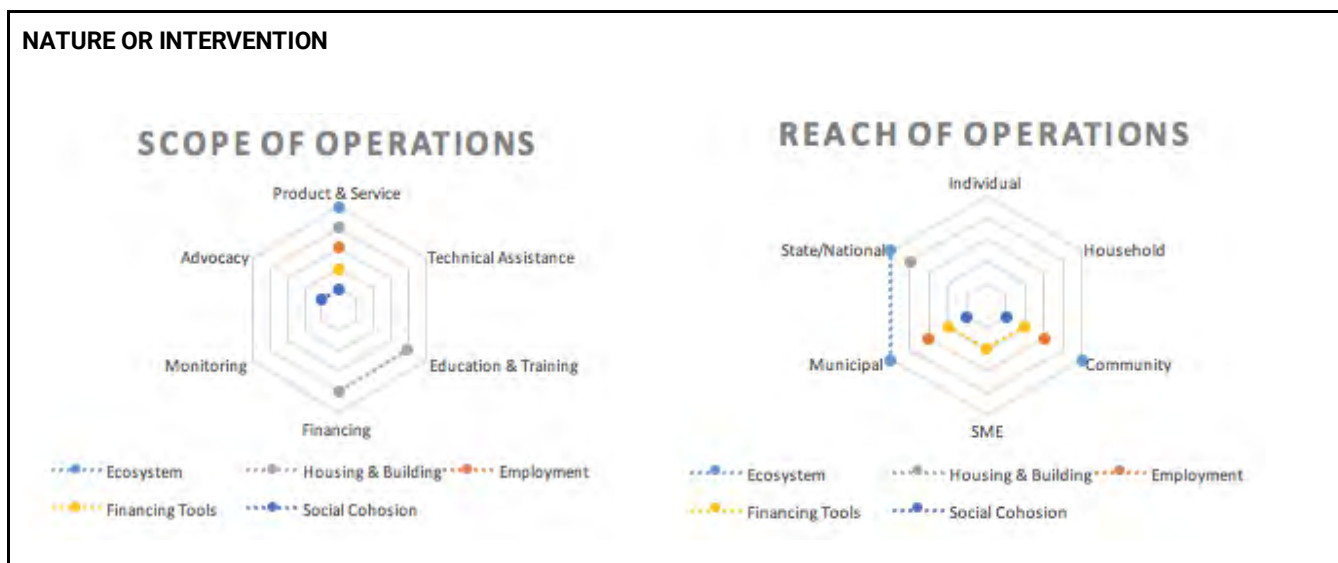
Supervision and administration of work.

Management of government resources for housing.

Monetary management and credit promotion.

Procuring funds on donations.

KEY PARTNERS <ul style="list-style-type: none"> - Volunteers - Suppliers - Foundations - State Level Institutions - Financing Institutions 	KEY RESILIENCY AREAS <ol style="list-style-type: none"> 1. Ecosystem 2. Housing & Building 3. Employment 4. Social Cohesion 5. Asset & Financing Tools
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<p>RELEVANT PROJECTS</p> <p>Climate change mitigation: Through the use of green technology Echale produces Adoblock, a technology-improved adobe block, made up of 90% responsibly mined inert earth (with certification from the Secretaria de Medio Ambiente Recursos Naturales). The block is cold-pressed avoiding combustion contamination. In addition, it is 100% recyclable. Likewise, Echale encourages the use of eco-technologies in homes.</p> <p>Housing and buildings: Their main objective is to foster development through the self-production of housing for the most marginalized communities, offering a product at a fair cost and a holistic solution to a critical problem.</p> <p>Employment: Echale trains the people of the community in materials production and construction and then offers them formal employment in these two areas during the execution of the project.</p> <p>Financial Services: Echale Mejoramiento seeks to provide access to loans at a rate accessible to the sector served by Echale.</p> <p>Social vulnerability: Echale promotes community development via housing.</p>

OBSERVATIONS

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation
- Poor housing/building design, low quality materials or maintenance
- High unemployment and underemployment
- High Cost of Home Ownership relative to incomes
- Low access to financing (loans, investors) for businesses, sole proprietors
- Weak social institutions (religious organizations, community organizations)
- Low community ability to leverage human potential and assets outside economic sphere (ex: volunteer work, unpaid child care)

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.3| Fundacion Eva de Camou

	<p>ALLIED TEAM</p> <p>Non-Ashoka Fellow</p> <p>Organization: Fundacion Eva de Camou</p> <p>Contact Person: Marisela Melgar and Zulima Garcia Hernández</p> <p>Title: Unknown</p> <p>Email: mmelgar@isa.com.mx and zulimag@hotmail.com</p> <p>Link: www.fundacionevadecamou.org</p>
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VALUE PROPOSITION

1. Skill development for student beneficiaries; support via economic scholarships so that high-performance students continue with their academic training and do not drop out due to a lack of economic resources.
2. Promotion and dissemination of cultural programs for the community in general to support development and growth.
3. Support to vulnerable students with limited access to education. Improves the social fabric and seeks to create a larger base of educated young professionals in the country.

CUSTOMER SEGMENT

The young students of preparatory and higher education levels, with scarce resources and academic excellence, who have a vision of personal development and community improvement. Executives and teachers who encourage students to continue their academic training for a better future. Entrepreneurs who contribute knowledge and experience and organizations involved in education issues. Communities that have an interest in sustainable development of the community, entrepreneurship and improving community member finances through individual employability.

ACTIVITIES

Vocational Training: gives scholarships to students to pursue careers at prestigious universities, also provides language scholarships.

Creating Links: offers a series of workshops to train Innovative Leaderships / Talents

Promotion of culture and the arts.

Homework Club: fosters and identifies excellence and commitment among students.

Activities that require funding include scholarships, workshops, the promotion arts and culture and the maintenance and support in the classrooms.

KEY PARTNERS	KEY RESILIENCE AREAS
<ul style="list-style-type: none"> - Academic Institutions - Media Outlets - Corporate - Social Clubs - Public Funding Sources - Donors 	<ol style="list-style-type: none"> 1. Employment 2. Social Cohesion 3. Education 4. Funding*



RELEVANT PROJECTS
<p>Inequality: promotes equal development opportunities among men and women in the community.</p> <p>Employment: provides courses in skill development, broad education, general work culture and preparation in order to give community members the opportunity to seek better jobs and expand their local economy.</p> <p>Social Vulnerability: provides academic scholarships which improves the family economy by decreasing school expenses and freeing up income to be spent on other critical needs.</p> <p>Education: raises the educational levels of the population in the community by instilling in students an interest in their community, its history and its development. Provides education via academic scholarships for middle and high school students. Provides entrepreneurship and employability courses through the platform “Virtual Learning Centers of Tecnológico de Monterrey”, and books about local communities. Finances the professionalization of talented young people which improves the condition of the most vulnerable and reduces social inequality as these young people access a higher education in order to improve their quality of life.</p>

5| SOCIAL ORGANIZATIONS:
CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.4| Grupedsac

	<p>ALLIED TEAM</p> <p>Non-Ashoka Fellow</p> <p>Organization: Grupedsac</p> <p>Contact Person: Martín Leonardo Granados Villalobos</p> <p>Title: Project Director</p> <p>Email: proyectos@grupedsac.org.mx</p> <p>Link: http://grupe.org.mx/sitio/</p>
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VALUE PROPOSITION

Groupedsac works with two key suppliers that offer clean, functional technologies that have been proven in the field and work compatibility together as environmentally friendly technologies.

CUSTOMER SEGMENT

Their most important clients are vulnerable populations, particularly those in need of basic resources such as water, food, housing, energy and waste management. They are mainly indigenous and concentrated in rural areas. Grupedsac's other clients are:

- the academic sector (universities, schools and training centers) that are interested in sustainability and incorporating eco-schools into their curricula as a means of achieving sustainability. Specifically, those that are unaware of eco-technologies and the sustainable development model
- companies that want to fulfill their social (and environmental) corporate responsibility by investing in eco-technologies and by contributing the labor of their employees
- everyone interested in incorporating elements of sustainability into their personal environment and work spaces in order to improve their quality of life.

ACTIVITIES

Promotion, training and dissemination of ecotechnologies to meet the basic needs of water, food, housing, energy and waste management. Key activities require relationships with the population served and also with the organization's funding sources, which are generally corporate and independent philanthropic funders at the national and international levels.

KEY PARTNERS	KEY RESILIENCE AREAS
<ul style="list-style-type: none"> - NGOs - Construction Materials Suppliers - Foundations - Academic Institutions - Corporations 	<ol style="list-style-type: none"> 1. Ecosystem 2. Waste Management 3. Food & Agriculture 4. Housing & Buildings 5. Energy 6. Water 7. Affordability 8. Employment 9. Industry and Innovation(*) 10. Health 11. Education



RELEVANT PROJECTS
<p>Water: Grupedsac has worked in rainwater collection and storage to satisfy basic water needs.</p> <p>Food: Grupedsac provides capacity and ability to produce healthy and safe food (of vegetable and animal origin).</p> <p>Housing: Grupedsac supports the development of skills and abilities for self-construction (self-reconstruction) of housing with local materials, and local or alternative techniques.</p> <p>Energy: Development of capacities and skills and ecotechnologies for household energy, use of biomass and non-dependence on traditional hydrocarbons.</p> <p>Waste management: Development of skills and ecotechnics for the handling of excrement, urine and wastewater (gray and black) in order to avoid contamination and therefore diseases.</p> <p>Grupedsac focuses on providing education and developing skills during times of diminished self-confidence due to despondent circumstances.</p>

OBSERVATION

(*) Indicates the areas of scope that were not listed by the organization on the questionnaire (Part 2), but have been added based on a holistic evaluation of the organization's business model described in Part 1 of the questionnaire.


Note that for the matrix (**) indicates that although a network was listed, it was not deemed very effective in combating that particular vulnerability, and therefore it received a score of zero(0).

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation
- Solid Waste High Pollution/Waste and/or low treatment of waste
- Detrimental agriculture or livestock practices (monocrops, fertilizer use)
- Poor housing/building design, low quality materials or maintenance
- High reliance on fossil fuels
- Risk of water scarcity either due to large demand or Inefficient use of water
- Poor water quality
- Poor treatment and/or use of wastewater
- Poor handling of human waste, contaminated water
- High cost of basic needs relative to income: food, water, energy
- High unemployment and underemployment
- Low degree of diversity/innovation in current industries (exposure to external economic shocks)
- Low levels of innovation and business acumen which lead to poor resource efficiency
- Low levels of innovation and business acumen which lead to poor resource efficiency->cost of production increases as resources become more scarce
- Lack of coordinated Disease/epidemics control programs->increased health cost, illness, death, lower quality of life, reduced economic output
- Quality: low education levels, low opportunities for higher learning
- Education facilities and environment

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.5| Ilumexico

	<p>ALLIED TEAM Ashoka Fellow</p> <p>Organization: Ilumexico Contact Person: Ana Maria Martinez Title: Commercial Director Email: anamaria@ilumexico.mx Link: www.ilumexico.mx</p>
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VALUE PROPOSITION

Ilumexico provides electricity to remote communities that are not served by the standard electricity grid and utility services. It provides them with the ability to finance their off-grid system installment according to their payment capacity.

CUSTOMER SEGMENT

Base of the pyramid. Communities in Mexico that do not have access to the national electricity grid because they are very distant communities, difficult to access, dispersed, and have low economic capacity.

ACTIVITIES

Supply of isolated solar systems to communities without access to the conventional electricity grid, giving them the option to pay for their system in installments. Payments are replace or are lower than the monthly costs that they would have incurred for expensive and harmful lighting from sources such as diesel or candles.

KEY PARTNERS

- PV suppliers
- Governments

KEY RESILIENCE AREAS

1. Energy
2. Employment*

NATURE OF INTERVENTION

SCOPE OF OPERATIONS



REACH OF OPERATIONS



RELEVANT PROJECTS

Illumexico sells isolated solar systems of different sizes in areas where there is no access to the national electricity grid, or where the electricity service is deficient. They offer payment options so that people can pay for the system in installments with the money that they would have spent on diesel or candles. Additionally, Illumexico coordinates social responsibility projects for private sector companies through which they electrify schools, clinics, centers or community spaces using solar energy.

OBSERVATIONS

(*) Indicates the areas of scope that were not listed by the organization on the questionnaire (Part 2), but have been added based on a holistic evaluation of the organization's business model described in Part 1 of the questionnaire.


Employment is considered relevant to Illumexico mainly because it trains community engineers to maintain solar systems.

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- High reliance on fossil fuels
- High unemployment and underemployment

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.6| Isla Urbana

	<p>ALLIED TEAM Ashoka Fellow</p> <p>Organization: Isla Urbana Contact Person: Enrique Lomnitz Title: General Director Email: enrique@islaurbana.org Link: www.islaurbana.org</p>
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VALUE PROPOSITION

Isla Urbana focuses not only on installing water conservation technology but also on securing its adoption and use by the communities served.

CUSTOMER SEGMENT

Low-income populations and local governments in the areas where low income communities are concentrated. Direct customers that lack water or want to be more sustainable.

ACTIVITIES

Project management, installation of catchment systems, public relations in the field of sustainable development in water, & communications.

KEY PARTNERS

- Environmental Agencies
- Local Governments
- NGOs
- Suppliers
- Corporate

KEY RESILIENCE AREAS

1. Ecosystem
2. Infrastructure
3. Housing & Buildings
4. Water
5. Industry and Innovation (*)
6. Social Cohesion

NATURE OF INTERVENTION



RELEVANT PROJECTS

Isla Urbana installs rainwater collection systems that allow the establishment of autonomous and sustainable water supply points quickly.

OBSERVATIONS

(*) Indicates the areas of scope that were not listed by the organization on the questionnaire (Part 2), but have been added based on a holistic evaluation of the organization's business model described in Part 1 of the questionnaire.


Industry and Innovation was added to the list of key resilience areas.

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation
- Poor infrastructure (roads, public transportation) quality
- Poor housing/building design, low quality materials or maintenance
- Risk of water scarcity either due to large demand or Inefficient use of water
- Poor water quality
- Poor treatment and/or use of wastewater
- Poor handling of human waste, contaminated water
- Low levels of innovation and business acumen which lead to poor resource efficiency
- Low rates of demographic equity (age, gender, race, religious affiliation, special needs)
- Weak social institutions (religious organizations, community organizations)

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.7| Naturalia

	<p>CORE TEAM</p> <p>Ashoka Fellow</p> <p>Organization: Naturalia</p> <p>Contact Person: Oscar Moctezuma Orozco</p> <p>Title: Co-Founder</p> <p>Email: omoctezuma@naturalia.org.mx</p> <p>Link: www.naturalia.org.mx</p>
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VALUE PROPOSITION

Focuses on comprehensive environmental restoration, considering the recovery of nature as a way to ensure ongoing environmental services for human communities.

CUSTOMER SEGMENT

Rural communities, which can benefit from comprehensive environmental protection and restoration.

ACTIVITIES

Reforestation, environmental education programs, environmental restoration projects, rescue projects, regrowth of endangered species, creation and management of ecological reserves.

KEY PARTNERS

- International Foundations
- NGOs
- Corporate

KEY RESILIENCE AREAS

1. Ecosystem
2. Water
3. Education

NATURE OF INTERVENTION



RELEVANT PROJECTS

Naturalia's expertise allows them to assess the role of local ecosystems in ensuring access to water and therefore undertake restoration and protection of these ecosystems.


OBSERVATIONS

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation
- Risk of water scarcity either due to large demand or Inefficient use of water
- Poor water quality
- Poor treatment and/or use of wastewater
- Quality: low education levels, low opportunities for higher learning

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.8| Renapred

	<p>CORE TEAM Non-Ashoka Fellow</p> <p>Organization: Renapred Contact Person: Federico Núñez Iturriaga Title: Founder Email: fede.basalto@gmail.com Link: www.renapred.org.mx</p>
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VALUE PROPOSITION

Renapred aims to decrease the incidence of disability in newborns throughout Mexico via specific interventions and places a high value on “return on investment”. Renapred was recognized as the philanthropy NGO with the highest social return on investment in Mexico for two consecutive years.

CUSTOMER SEGMENT

Renapred generates value for all Mexicans via their mission to ensure Mexican children are born without diseases or deficiencies that cause disability.

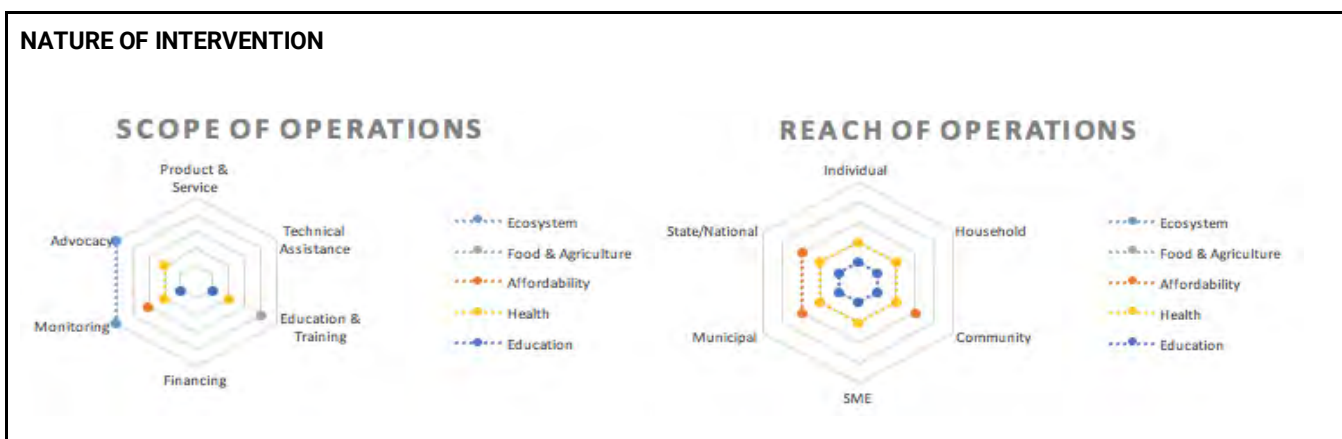
ACTIVITIES

Programs:

- 1.- Folic Acid intake- reduces the likelihood of neural tube problems at birth by up to 60%.
- 2.- Healthy Food -promoting healthy eating before, during and after pregnancy
- 3.- Deep exploration of the newborn- promotes assessing the neurological maturity and reflexes of the baby at birth in order to detect possible malformations or signs of alarm.
- 4.- Neonatal screening- high precision tests performed on newborn babies.

Program “Mexico Incluye” seeks to show civil society that people with and without disabilities can work together and achieve great goals, for example, climbing Mt. Kilimanjaro in Africa and diving in the Revillagigedo Islands in Mexico.

KEY PARTNERS	KEY RESILIENCE AREAS
<ul style="list-style-type: none"> - Foundations - Transport - Media and Advertising Corporations - Medicine Supplier - Federal Health Department - Donors - Emergency Brigades - Volunteers 	<ol style="list-style-type: none"> 1. Ecosystem 2. Food & Agriculture 3. Affordability 4. Health 5. Education




RELEVANT PROJECTS
<p>Thanks to their program graduates, Renapred created a network of trained personnel to share prevention knowledge and awareness and explain the basic actions to reduce disability at birth. This is accompanied by a register and statistics to publicize the impact of Renapred's work, from the micro (personal) to the macro (state / national).</p> <p>Renapred participates in global meetings to foster collaboration with pioneers within the realm of disability prevention.</p> <p>Renapred has also been a pioneer in the development of a methodology to transform a community or municipality into a more inclusive population for people with disabilities.</p> <p>Renapred also has "prevention brigades", staff that are dedicated to providing education on disability prevention around the country.</p>

OBSERVATIONS
<p>Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:</p> <ul style="list-style-type: none"> - Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation - High cost of basic needs relative to income: food, water, energy - Low access to health care & mental health support - High drug abuse/addiction and/or alcoholism - High rates of improper nourishment - Quality: low education levels, low opportunities for higher learning

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.9| Saber para la Vida

 <p><i>Saber para la vida</i></p>	<p>CORE TEAM Ashoka Fellow</p> <p>Organization: Saber para la Vida a.c. / Somos Vía Sapi de C.V. Contact Person: Carolina Nieto Carter Title: Co-Founder Email: carolina.nieto.cater@gmail.com Link: http://saberparalavida.org.mx/</p>
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VALUE PROPOSITION

Saber para la Vida offers a Business Training Program of two to three years, which provides producers with the skills to create and sustain a “value-add” business. Manufacturers design quality products or services, aimed at a specific market. They learn to measure their production, to calculate their cost structures, and to sell to one or more companies in higher-level purchasing markets. They learn to use the internet and email and make sure that their business is viable in the long-term. Saber para la Vida supports producers in the sales process through the platform “Somos Vía Sapi of C.V.”, where companies and designers (i.e the buyers) can interact with community producers. The focus is on developing communities' autonomy to continue with their businesses, ensure fair payment schemes and create a more equitable market. The platform and related processes reduce isolation, exploitation and poverty. It also increases awareness about the hand-made products produced in Mexico. Saber para la Vida's desire is to transform the commercial sector of participating communities.

CUSTOMER SEGMENT

ACTIVITIES

Entrepreneurial and Business Training Program, taught in several communities in Cuetzalan, Puebla; in Tlayacapan, Morelos; in Temoaya, Edo. from Mexico. Small Producer Training Program for the Walmart Foundation: Business training and sale of products in the self-service market for 30 new producers each year.

KEY PARTNERS

- Advisory Council
- Volunteers
- Students
- Donors

KEY RESILIENCE AREAS

1. Employment
2. Economy and Markets
3. Social Cohesion
4. Education*
5. Industry & Innovation*

NATURE OF INTERVENTION

SCOPE OF OPERATIONS



REACH OF OPERATIONS



RELEVANT PROJECTS

Saber para la Vida performs economic development and response in case of emergencies. They improve individual and family income, contributing to community welfare as they work with producers' groups in vulnerable situations. Further, they support the generation of self-employment.

OBSERVATIONS

(*) Indicates the areas of scope that were not listed by the organization on the questionnaire (Part 2), but have been added based on a holistic evaluation of the organization's business model described in Part 1 of the questionnaire.


Education is considered within Saber para la Vida's scope mainly because of its use of the e-commerce platform, which requires training and capacity building around the internet and information technologies. Industry and Innovation is a key area that this organization can impact given its emphasis on creating products of added value and targeting new markets. Saber para la Vida focuses on generating new product offerings and improving product quality via innovation.

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- High unemployment and underemployment
- Low degree of diversity/innovation in current industries (exposure to external economic shocks)
- High degree of reliance on imports over locally created goods
- Low levels of innovation and business acumen which lead to poor resource efficiency
- Low rates of demographic equity (age, gender, race, religious affiliation, special needs)
- Existence of demographic conflicts/tensions (class, race, gender, etc)
- Existence of social unrest, reduced ability for community members to participate in regular activities
- Low community ability to leverage human potential and assets outside economic sphere (ex: volunteer work, unpaid child care)
- Migration, decrease in local population and potential "brain drain" to other countries, ie reduced local skills
- Low access to internet/information, reduced ability to grow capacity of community and reduced options for problem solving.

5| SOCIAL ORGANIZATIONS:
CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.10| SEN

	CORE TEAM
	Non-Ashoka Fellow
	Organization: SEN
	Contact Person: Narah Septien and Esteban Robles
	Title: Co-Founders
	Email: narah1981@gmail.com
	Link:

VALUE PROPOSITION
SEN is in the process of being registered, recently created the mission at this point is to facilitate CSR for clients. Provides clients assistance with project quality, response time, cost, communication and time adaptation capabilities, and finally, locations and budgets.
CUSTOMER SEGMENT
Amex, Oracle, Exitus, Grupo Zorro, Art. Ja, Femsa, Peugeot, Seguros Banamex, Natgas, Braya
ACTIVITIES
Organization of corporate events: Free events to support specific causes, events for fundraising and logistics in general.
Toy libraries for communities in need.
Educational support in sustainable development for children.
Food provision and volunteering for emergency situations.

KEY PARTNERS	KEY RESILIENCY AREAS
<ul style="list-style-type: none"> - Volunteers - Partner Organizations - Donors - Schools - Corporations 	<ol style="list-style-type: none"> 1. Ecosystem 2. Housing & Buildings 3. Affordability 4. Social Cohesion 5. Education 6. Funding(*)



RELEVANT PROJECTS

Following the earthquake, SEN was created to foster collaboration across different industry sectors and connect them with communities in need.

The support SEN provides is primarily based on the needs of the populations. For example, in Puebla the focus is on cold weather and how to provide heat during the winter months. In Valle de Vázquez, SEN provides educational support since the community is eager to grow academically but does not have the financial means. SEN works closely with the communities. In the case of the toy libraries, SEN funds the playroom but the communities commits to maintain it and use it responsibly.

OBSERVATION

(*) Indicates the areas of scope that were not listed by the organization on the questionnaire (Part 2), but have been added based on a holistic evaluation of the organization's business model described in Part 1 of the questionnaire.


Funding is a key activity for SEN- it organizes fundraising events.

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation
- Poor housing/building design, low quality materials or maintenance
- High cost of basic needs relative to income: food, water, energy
- Low rates of demographic equity (age, gender, race, religious affiliation, special needs)
- Existence of demographic conflicts/tensions (class, race, gender, etc.)
- Weak social institutions (religious organizations, community organizations)
- Low community ability to leverage human potential outside economic sphere (ex: volunteer work)
- Quality: low education levels, low opportunities for higher learning
- Education facilities and environment
- Weak government institutions with minimal govt services & support

5| SOCIAL ORGANIZATIONS:
CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.11| Sistema Biobolsa

	<p>CORE TEAM</p> <p>Ashoka Fellow</p> <p>Organization: Sistema Biobolsa</p> <p>Contact Person: Roberto Hernandez</p> <p>Title: Manager</p> <p>Email: roberto@sistemabiobolsa.com</p> <p>Link: www.sistema.bio</p>
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<p>VALUE PROPOSITION</p> <p>The generation of small and medium scale biodigesters, which are easy to install, manage, maintain and are highly durable. Further, the integrated service includes manufacturing, installation and onsite monitoring to ensure the adoption of the technology.</p>
<p>CUSTOMER SEGMENT</p> <p>Clients are rural populations in Mexico. Sistema Biobolsa’s goal is to serve clients ranging from households with backyard animals to medium-sized producers. Sistema Biobolsa shows customers the benefits of turning waste into resources.</p> <p>ACTIVITIES</p> <p>Promotion through different channels to reach people in rural areas of Mexico. Continuous improvement of the system design in order to make the system more economically accessible to the users. User monitoring in order to review the system’s operation and adoption.</p>

KEY PARTNERS	KEY RESILIENCE AREAS
<ul style="list-style-type: none"> - Federal & State Agriculture Departments - Private and Corporate Investors - NGOs - Volunteers - Financing Institutions* 	<ol style="list-style-type: none"> 1. Ecosystem 2. Waste Management 3. Food & Agriculture 4. Energy 5. Health 6. Industry & Innovation**



RELEVANT PROJECT

Sistema Biobolsa can improve the health of people and reduce contamination by providing effective waste management. Sistema Biobolsa shows vulnerable populations how they can use the waste of their animals to generate two products: biogas and biol. Biogas is a clean source of energy and biol is a fertilizer that will improve crop yields and help regenerate their lands. Once the biogas is generated, households can reduce the use of energy sources with negative health impacts such as firewood and kerosene.

OBSERVATIONS

(*) Based on Sistema Biobolsa's business model description, financing institutions were added to its listing of key partners.

(**) Industry & Innovation has been added to the key resilience areas. The rationale is that Sistema BB can empower farmers by helping to create a new and innovative income source like the commercialization of fertilizer. Also, the use of biogas can be considered an innovative change to small business owners that can contribute to lower production costs.


Note: Sistema Biobolsa listed only one scope category per resilience area on the questionnaire. Based on the comprehensive assessment of all information sources, the scope categories were expanded in most cases.

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- Climate Change: Increased likelihood of natural disasters, temperature increases, changes in precipitation
- Solid Waste High Pollution/Waste and/or low treatment of waste
- Detrimental agriculture or livestock practices (monocrops, fertilizer use)
- High reliance on fossil fuels
- Lack of coordinated disease/epidemics control programs, increased health cost, illness, death, lower quality of life, reduced economic output

5| SOCIAL ORGANIZATIONS: CAPABILITIES ASSESSMENT & RESILIENCE PROFILES

5.3.12| Sonriendo Con Amor

	<p>ALLIED TEAM Non-Ashoka Fellow</p> <p>Organization: Sonriendo Con Amor Contact Person: Oscar Omar Ramirez Cortes Title: Co-Founder Email: oscarramirez@sonriendoconamor.org Link: www.sonriendoconamor.org</p>
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VALUE PROPOSITION

Provide programs to marginal communities using the annual dental service as a catalyst for deeper community involvement.

CUSTOMER SEGMENT

Medium and low socioeconomic segments.

ACTIVITIES

Provide services with social value to families seeking more than just dental care.

KEY PARTNERS

- Volunteers

KEY RESILIENCE AREAS

1. Employment
2. Health

NATURE OF INTERVENTION

SCOPE OF OPERATIONS



REACH OF OPERATIONS



RELEVANT PROJECTS

Sonriendo con Amor's multidisciplinary programs create ways to improve quality of life by affecting body, soul and spirit. They bring back physical health through medical, dental, nutritional, spiritual and psychosocial care, helping to emphasize the value of each individual within society.

OBSERVATIONS

The network assessment within the Social Organizations Assessment Matrix (**) indicates that the network of volunteers is not particularly useful in addressing employment related vulnerabilities. The high unemployment and underemployment vulnerability was given a score of zero (0) despite listing volunteers.

Based on the information provided by the organization and any additional notes made by the SUMA Capstone Team, the organization has the potential to help mitigate the following vulnerabilities:

- High unemployment and underemployment
- Lack of coordinated Disease/epidemics control programs
- Low access to health care & mental health support, reduced individual capacity to respond productively to chronic stressors and acute events (natural disasters, personal problems)
- High rates of improper nourishment

6| USING THE RESILIENCE MATRIX TO ASSESS THE COMMUNITY

The Community Assessment evaluates various community systems and the potential vulnerabilities within those systems. The assessment is designed to work with both qualitative and quantitative data. It is also designed to be iterative so that each iteration will lead to additional questions and data that can be gathered to improve the confidence level for each vulnerability assessed. The full community assessment template can be accessed on the Supplemental Documents Drive in the Community Assessment folder. The following is a description of its various parts and how to use it.

6.1| Data Gathering

Prior to running the assessment, Ashoka should collect the data that it currently has about the community, even if it is limited. They may want to scan the Community Assessment list of vulnerabilities to help determine if there is additional data that can be gathered or analyzed quickly before running the assessment for the first time.

To collect data for the Assessment, it is essential to administer a community questionnaire, with the help of Conciencia Quetzal. This questionnaire should be informed by the resilience matrix, so that the questions and answers serve to identify the vulnerabilities of that community across all systems. The questionnaire should be answered on-site, by a representative sample of the community's population.

Should the team want to collect more in-depth data on-site, Appendix Part 1.2: Data Gathering-Onsite Field Guide for Water, Agriculture & Dairy provides guidelines for data collection with example approaches and field data gathering templates. This selection is by no means comprehensive, but rather provides a starting point reference for gathering data on physical factors that are typically relevant to rural communities. Appendix Part 1.3: Risk Assessment Models also contains examples of risk assessment methodologies, should Ashoka want to perform a more quantitative analysis of the community and its risks.

Ideally, all of the data will be documented including qualitative data, such as interviews and site visit notes, before performing the assessment.

6| USING THE RESILIENCE MATRIX TO ASSESS THE COMMUNITY

6.2| Evaluate the Community

Go to the Rating Tab of the Community Assessment Template. Complete the following steps for each vulnerability listed on the assessment:

- 1. Rating:** Rate the community's vulnerability, with 1 being not relevant for the community and 5 being highly relevant for the community.
- 2. Rationale:** Provide a rationale for the rating. Explain your assumptions that led to that rating and any references to your documented data.
- 3. Confidence Level:** Evaluate your confidence in your rating as High, Medium or Low. If you have very little information pertaining to the vulnerability, you might decide that any rating to give it will be low confidence until you gather more information. However, there may be other vulnerabilities that you are highly confident about despite having no data. For example, if you made a site visit and there is an absence of information about violent social conflicts, you might assume that means it is not relevant to the community. There is no predetermined formula for how to determine your confidence rating. When in doubt, set the confidence as low and move on to the next step.
- 4. Additional Information to Gather:** List the types of data that you would want to gather in order to better rate the vulnerability and have a higher confidence in your rating. If there is no data, you might want to start with interview questions. If you already have a few interviews that inform the category, you might want to determine more concrete or physical data that can be collected. Information can come from ad hoc interviews, surveys, water sampling, etc

AREA	SYSTEM	VULNERABILITY	RATING	RATIONAL	CONFIDENCE	ADDITIONAL DATA GATHERING
Physical	Ecosystem	Industrial growth->increased built environment, less natural/wild environment	1	No large growth plans for residential or industrial	High	
Physical	Waste Management	Solid Waste High Pollution/Waste and/or low treatment of waste->decreased air, land and water quality	3	Waste goes to communal landfill. There is no formal wastewater treatment. One survey mentioned solid trash in water systems. When trash pickup is delayed they burn their garbage.	Medium	What organization controls trash pickup and how is it handled after pickup? Is it burned?

Example of Community Assessment using specific vulnerabilities

6| USING THE RESILIENCE MATRIX TO ASSESS THE COMMUNITY

6.3| Review Results & Iterate

Once you are done with the Ratings, you are ready to review the Assessment Results. On the Ranking Tab you will see the vulnerabilities ranked from highest to lowest ratings.

It is important to note that if you gave most of your ratings a low confidence label, then you should consider the results as tentative pending more information and re-assessment. The SUMA Capstone Team recommends that the assessment be run at least two times. The first iteration will help you identify what information needs to be gathered, how to construct your field research and interviews, etc. The second iteration will provide a more reliable assessment that can be used alongside the Social Organizations Assessment to begin finding synergistic solutions for the community.

On the other hand, it can be tempting to continually identify more data to collect, do more data collection and reassess. The SUMA Capstone Team recommends that this framework only be used as a screening tool. After attaining a reasonable level of confidence, you should move on to conducting the Social Organizations Capabilities Assessment and Fit Analysis. The final iteration of the Community Assessment should be used to provide the vulnerability rankings to match the needs with the social organizations' capabilities.

7 | CONDUCTING FIT ANALYSIS & FINDING SYNERGIES

7.1 | Purpose of the Fit Analysis

The Fit Analysis aligns the Community Assessment scores with the Social Organizations Collective Capabilities scores. The analysis helps identify which community vulnerabilities can be addressed by Ashoka's network of organizations and which are not sufficiently met by the existing social organizations resilience capabilities. Although the Fit Analysis uses the collective capabilities of Ashoka's network of organizations, it will not identify which particular organization is best equipped to address each specific vulnerability. For that, further analysis of the Resilience Profiles for organizations would be needed.

The Fit Analysis does not only show whether or not there is a fit between community needs and social organizations' capabilities. The analysis can be used to identify the vulnerabilities that could be addressed by Ashoka's network directly and immediately but can also identify critical areas of intervention that might require inviting a new organization to participate. The Fit Analysis can help prioritize the areas of intervention and ensure that community needs are valued above individual organization preferences or standard operating procedures. By listing the identified community needs in descending priority and aligning the social organizations' capacities to this list, one can identify a variety of scenarios that imply different courses of action:

High community need and high combined organizational capacity, means that Ashoka's existing partners provide great potential for interventions and collaborative planning can begin.

High community need and intermediate organizational capacity, means that existing partners have only limited potential for interventions. Ashoka might want to consider whether reaching out to additional organizations could enhance the currently limited potential.

High community need and low organizational capacity. This means that there is little to no organizational potential for interventions. Given that the community need is high, this combination raises a significant red flag. Ashoka's network evaluate whether they are truly equipped to impact the community and may consider working with additional organizations to provide capacities they are missing, in order to have real impact on the community.

Intermediate community need and high organizational capacity. These vulnerabilities could potentially be addressed, but should not be prioritized over the most urgent ones. The Synergies Analysis for Valle de Vazquez will demonstrate how this organizational capacity could be used effectively.

Intermediate community need and intermediate organizational capacity. This scenario points to limited potential for intervention and only a medium priority for the community so it is not likely to be a significant priority for Ashoka's intervention efforts.

Intermediate community need and low organizational capacity. The limited to no potential for interventions combined with the medium priority, means that it might not be necessary to consider bringing in new organizations to address these vulnerabilities, which are not crucial for building resilience in a particular community. Ashoka should be aware of their limitations and focus on highest community priorities.

7| CONDUCTING FIT ANALYSIS & FINDING SYNERGIES

Low community need and high organizational capacity. This means there is a great potential for interventions, but it would not necessarily be optimal to invest resources towards intervening in those vulnerabilities. Ashoka’s network of partner organizations should investigate whether it is possible to use that excess capacity and channel it towards other areas that are of higher need. This may require partner organizations to work in ways that are outside their core mission to lend their support to other organizations working on higher priority initiatives.

Low community need and intermediate organizational capacity. Limited capacity for interventions and low priority. Vulnerabilities under this category need not be addressed.

Low community need and low organizational capacity. Limited or no potential for interventions and low priority. Vulnerabilities under this category need not be addressed.

7.2| How to Construct the Fit Analysis

To conduct the fit analysis:

1. First complete the Community Assessment and rank the vulnerabilities from the highest rating to the lowest rating (explained in the Community Assessment section).
2. Color code the vulnerability ratings on Community Assessment to show high, medium and low priority needs. Group scores 5 and 4 under high priority, scores 3 as medium priority, and scores 2 and 1 as low priority. Use the three colors to depict different levels of priority need:

COMMUNITY NEED SCORE
5
4
3
2
1

Color Coding for the
Community Need component
on the Fit Analysis

7 | CONDUCTING FIT ANALYSIS & FINDING SYNERGIES

3. Survey the social organizations and compile the Social Organizations' Combined Capabilities Scores.

4. Color code the Social Organization's Combined Capabilities Scores to show high, medium and low overall capacity. Note that the color scheme per number value for these scores is the exact opposite to the color scheme per number value used for the community assessment scores. This is because a high vulnerability is undesirable whereas a high capacity to mitigate the same vulnerability is desirable.

>3.50	Green	Combined capacity to intervene is strong
2.5 - 3.50	Yellow	Combined capacity to intervene is modest
<2.50	Red	Combined capacity to intervene is lacking

Color Coding for the Social Organizations Collective Capabilities Assessments of the Fit Analysis

5. Align the social organizations scores to the community assessment rankings per vulnerability. The new matrix will list the vulnerabilities ranked from 5-1 and pair them with capabilities scores that are also between 1-5. For example:

AREA	SYSTEM	VULNERABILITY	COMMUNITY NEED SCORE	SOCIAL ORGANIZATION'S TOTAL SCORE	COMMUNITY NEED AND ORGANIZATIONAL CAPACITY FIT
Social	Education	Existence of mismatch between education available and jobs available locally	5	1.00	

Aligning social organization scores to community assessment rankings

7 | CONDUCTING FIT ANALYSIS & FINDING SYNERGIES

6. You will also need to color-code the sixth (6th) column to show direct fit, lack of capacity and/or excess capacity within each priority level. The SUMA Capstone team chose to use 9 colors to differentiate among vulnerabilities. Here is the legend used in our analysis:

FIT ANALYSIS - LEGEND			
COMMUNITY NEED SCORE	SOCIAL ORGANIZATION'S TOTAL SCORE	COMMUNITY NEED & ORGANIZATIONAL CAPACITY FIT	
HIGH PRIORITY	High Capacity		High community need, high combined organizational capacity. Great potential for interventions.
	Medium Capacity		High community need, intermediate organizational capacity. Limited potential for interventions.
	Low Capacity		High community need, low organizational capacity. Little to no potential for interventions. Red flag to get other organizations on board.
MEDIUM PRIORITY	High Capacity		Intermediate community need, high organizational capacity. Potential for intervention, but medium priority.
	Medium Capacity		Intermediate community need, intermediate organizational capacity. Limited potential for intervention and medium priority.
	Low Capacity		Intermediate community need, low organizational capacity for interventions. Limited to no potential for interventions and medium priority.
LOW PRIORITY	High capacity		Low community need, high organizational capacity. Great potential for interventions, but low priority.
	Medium Capacity		Low community need, intermediate organizational capacity. Limited capacity for interventions and low priority.
	Low Capacity		Low community need and low organizational capacity. Limited or no potential for interventions and low priority.

Color Coding for the Community Need and Organizational Capacity Fit Column

7| CONDUCTING FIT ANALYSIS & FINDING SYNERGIES

7.3| Synergies

The synergies analysis, which will be described and illustrated in Part 2, using the example of Valle de Vazquez, requires the information obtained through the Fit Analysis. It builds upon the Fit Analysis to further identify which specific organizations could work jointly to address high priority community vulnerabilities. It also illustrates how the various systems are interrelated, where interventions can take place and how interventions can have a combined positive feedback loop throughout the community. There is no single template or set of instructions for generating synergies. Rather, the process is usually iterative and may benefit from diagramming to illustrate system and intervention interactions. For more information, see the Synergies section within Part 2: Valle de Vazquez Pilot Project.

PART 2: VALLE DE VAZQUEZ PILOT PROJECT



8| VALLE DE VAZQUEZ COMMUNITY DATA

Valle de Vazquez community data contains geographic and demographic data gathered during initial research; a small sampling of survey answers to a questionnaire administered by Conciencia Quetzal; and a variety of on-site interviews. Additionally, geographical information systems (GIS) tools were used to map the three-part water system used to serve Valle de Vazquez along with water quality measurement tools to evaluate the quality of potable water at its sites of consumption and its sources.

8.1| Geography & Demographics

Valle de Vazquez, nicknamed 'Los Hornos', is located in the municipality of Tlaquiltenango, within the state of Morelos. It is situated at an elevation of approximately 957 meters above sea level just southeast of Mexico City. Valle de Vazquez's rural setting is in sharp contrast to the metropolis that is Mexico City, whereas Valle de Vazquez's abundant vegetation lends itself to the panoramic view that surrounds it. Climate conditions for the region have historically remained predictably steady within the range of an average high temperature of 28° during the month of April and reaching a low 22° during January. The combined elements of temperature and elevation have afforded the region positive precipitation patterns ranging from the highest rainfall amount of 281mm in July to the lowest rainfall amount of 13mm in December. The positive rainfall helps contribute to the replenishment of the Cuautla sub-basin which represents 20.36% of the Balsas hydrological region. This is important to Valle de Vazquez because the Cuautla River is the town's main, but not its only, water source (a nearby lake and an aquifer also provide water).



Map of Valle de Vazquez in Central Mexico. Source: scribblemaps.com

8 | VALLE DE VAZQUEZ COMMUNITY DATA

Valle de Vazquez' geographic setting houses a community which consists of approximately 1,125 inhabitants, of which 5.87% comes from outside the State of Morelos. Community members are made up of an estimated 546 men and 579 women, with a fertility rate of 2.71 children per woman or household. Ethnic makeup of the population consist of .36% indigenous of which .09% speak an indigenous language, but the entire population speaks Spanish as the official language. Illiteracy rates hover at a low 5.51% of the population, 6.41% for men and 4.66% for women. Education and training has provided 28.27% of the population over 12 years of age with employment (43.41% of men and 13.99% of women either in agriculture, dairy farming or self-employment).

Currently there are 394 homes in Valle de Vazquez in which 99% of the residents benefit from being connected to the electrical grid and 86% have piped water available to them. Of the households, 93% percent have an indoor toilet. Rate of other amenities are slightly lower, such as refrigerators at 89.35% and washing machines at 58.71%. Resident ownership of homes fall under the Mexican ejido system, a legal entity which allows a community to own a large territorial area that may be distributed among its members. These members have the right to build homes on the land they are allocated and to cultivate it.. The town remains connected to the outside world via several communication platforms, such as television (which 94% of households own, radio (which are in 76% of the households and landlines (which are installed in 62% of the households. Modern communication platforms such as internet and cell phone networks are still being developed. Only 11% of the population own a personal computer and only 6% of them are connected to the internet, but 11% them own cell phones. Thirty-five percent of the residents own automobiles and others use public transportation providing the the mobility to work and/or travel around the region.

8| VALLE DE VAZQUEZ COMMUNITY DATA

8.2| Physical System

The community is highly integrated with and dependent on the quality of its physical surroundings due to their main industry: farming, specifically dairy cattle raising; cheese making; and sugar cane cultivation.

8.2.1| Water

8.2.1.1| Overview of Valle de Vazquez Water System

Valle de Vazquez, Mexico has a three-part water system that provides water for the town's three primary uses: irrigation, food processing and household. The first part of the system involves the Rio de Cuero, which is located north of Valle de Vazquez and is diverted through a series of canals to provide irrigation water to 140 collectively owned hectares of sugarcane. The Rio de Cuero has water year round, but the flow of water dwindles during the dry season, and this seasonal variation may be exacerbated in the future due to climate change and rising temperatures. The second part of the water system is a lake, called Lake Parom, located northeast of the city. It provides water to twelve homes situated on the northern town limits. During the summer, the reservoir dries up, and residents are forced to drive into town and fill their cisterns with potable pumped water from the centralized system. The third part of the water system is a groundwater pump located on Morelos Alpuyecá street. The groundwater pump is eighty meters deep and belongs to the ConAgua the local water utility.. Water is pumped to a concrete water tower high up on a slope, treated with chlorine, and is gravity fed to individual homes. Unfortunately, the groundwater pump only provides water to the homes located near the center of the city. As a result, most homes on the edges of town are not part of the main water system and have private wells to draw up groundwater. Additionally, the SUMA Capstone Team visited at least one smaller agricultural plot that uses the surface water of nearby streams to water crops.



Water Sampling Locations, Valle de Vazquez. Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Water Pump, Valle de Vazquez, Source: SUMA Capstone Team

8.2.1.2| Water System Test Results

Prior to our community assessment, Valle de Vasquez's precise water quality was unknown and subjective evaluations from community members varied. There are two primary sources of potable water to the community: piped groundwater in a central system and individual household well-water. Assessing the state of potable water consumption from both sources was a top priority to inform evaluations of quality of life, the state of natural resources, and the ways that water supports or limits economic development. In Valle de Vazquez the SUMA Capstone Team used a YSI, a top-tier water quality measuring device, to test water sources at three locations: the main water pump (labeled Groundwater Pump in the related image), a household receiving the central pumped water (labeled Dairy House in the image) and a household using individual well water (labeled Marco Antonio in the related image). The results showed that the overall water quality was moderately good with minor issues relating to phosphate, bacteria, and dissolved oxygen levels. For more information about the water quality results, see Appendix 2.2: Valle de Vazquez Water Test Results.

8 | VALLE DE VAZQUEZ COMMUNITY DATA

8.2.2| Energy

The main sources of energy in Valle de Vazquez are firewood and propane gas tanks for cooking and water heating; and the electric grid for household electricity and water pumping. Firewood and wood burning stoves are often culturally preferred for cooking even if alternatives are available. Residents are aware of the potential health hazards of smoke from cooking. They demonstrated home-made exhaust pipes to direct smoke away from the kitchen when cooking with wood. Gas tanks were used for heating whey in the cheese-making process and other cooking. Electricity is provided via overland electric grid and although subject to outages during storms and earthquakes has generally been restored quickly in the past. Residents have good electricity coverage with infrequent outages; however the cost of the electricity comprises a large portion of their expenses and is a constraint on business scaling due to the cost to pump water. Along with food, energy consumes a large portion of household income.



Wood Burning Stove, Valle de Vazquez, Source: SUMA Capstone Team

8 | VALLE DE VAZQUEZ COMMUNITY DATA

8.2.3| Food & Agriculture

8.2.3.1| Overview of Food & Agriculture

Valle de Vazquez' agricultural products include sugarcane, cattle raising, milk and dairy and an assortment of other fruits and vegetables such as limes, mangos and avocados. Sugarcane production is a primary industry covering 140 hectares of fields and the community is highly dependent on commercial sugarcane farming for its income.

Much of the food for Valle de Vazquez is grown locally or can be obtained in the nearby town of Jojluta and the city of Cuernavaca. In general, farmers demonstrated efficient use of resources. This included efficient use of a water tank and hose to provide water only to the base of plants in a lime orchard. It also included the reuse of animal waste products, for example, the addition of chicken excrement to supplement cattle feed because the excrement is only partially digested and therefore high in protein. Manure is also used or sold to fertilize fields. A main concern was that although water was abundant, the farmers could not expand their farming due to the cost to pump more water.

8.2.3.2| Lime Orchard Test Results

The SUMA Capstone team did a sample field test at the location of a lime orchard. The farmer has 2 hectares of land and a total of 150 lime trees. After conducting some measurements and collecting observations, the results indicate that most of the trees are young and healthy. However, the team was informed that some of the lime trees were afflicted by a root disease. Curling and scaling of leaves were also evident. More information about the Lime Orchard tests can be found in Appendix 2.3: Valle de Vazquez Lime Orchard Test Results.

8.2.4| Waste

Waste consists of solid waste, human waste and water waste. In the case of solid waste, much of Valle de Vazquez' organic waste is currently reused. For example, cattle manure is used as fertilizer and cheese whey is used as pig feed. Household trash is picked up every two weeks and removed from the community. If the trash is not picked up, households will burn the trash themselves. Human waste is disposed of into septic tanks although the rates of septic tank use and their depth relative to the water table need to be confirmed. Wastewater is handled at the building scale. There are no storm drains or consolidated wastewater treatment plants in town.

8 | VALLE DE VAZQUEZ COMMUNITY DATA

8.2.5| Infrastructure

Infrastructure is made up of buildings, roads, energy and communications networks. As a result of the September 2017 earthquake, over 70 homes were destroyed along with two significant community buildings: a local school and the medical center. The collapse of these buildings show an underlying deficit in the design and maintenance of the built environment. Although new homes with better structural integrity are being built by the social organization Echale, older buildings may remain on properties and pose a safety risk. Valle de Vazquez is well served by both maintained roads and a public transportation network that was not significantly affected by the earthquake. Similarly, the existing communication network (telephone landlines) seem to be in good quality with little disruption during the last earthquake. However, the town has limited internet access and this may become a constraint on business growth and opportunity in the future.

8.3| Economic Systems

Valle de Vazquez operates within a mixed economic system of both individual entrepreneurship and communal land ownership via the ejido system. This hybrid system is common in Mexico and the ejido system is written into the constitution. There is large-scale government oversight and ownership of many services.

The ejido system allows the lands to be held in common with some parcels of land allocated to individual households and other lands shared and worked collectively by the community. In Valle de Vazquez, the ejido members receive profit sharing from the sugar crops. In addition, many community members have other part or full time jobs, often inside the household, for example, cattle raising, tending orchards or making cheese.

Outside of land ownership, most goods are obtained through purchase, (i.e. by earning and spending money as individual households). However, for the purposes of convenience, some utilities such as the water bill, are billed to the community as a whole with the community dividing up the cost locally. Specifically, Valle de Vazquez' water bill for household drinking is not metered at the household level and the cost is distributed equally among all households. The electricity bill for buildings is sub-metered at the building level so families pay only for what they use. However, the electricity bill for the water pump feeding the agricultural system is a collective bill.

8 | VALLE DE VAZQUEZ COMMUNITY DATA

8.3.1| Employment, Markets & Innovation

Employment is closely tied to markets and innovation. For example, finding an innovative way to produce a more desirable product or produce a product with less cost can generate more profit that can be used to grow a business and hire additional employees. Valle de Vazquez has limited areas of employment, mainly related to agriculture and several people interviewed had multiple part time jobs. With few industries, there is chronic underemployment, if not actual unemployment. Most educated young people look for jobs outside the town in Cuernavaca rather than trying to start new businesses in town. Community members mentioned that younger people have little interest in farming. Since Valle de Vazquez sells most of its products locally, there is little current pressure to be more innovative.

8.3.2| Affordability, Assets & Financing Tools

In addition to limited opportunities to earn money, there are limitations to how money can be spent or saved in the community. A small sample of community members surveyed reported that food, water and energy consumed at least 60% of household income, not surprising for a subsistence rural economy. The same survey respondents reporting not having any household savings. Also, there does not seem to be access to financial instruments such as a local banks offering savings accounts, insurance products etc, although this needs to be confirmed.

8.4| Social Systems

Valle de Vazquez' most critical social systems, health and education, were both highly impacted by the earthquake.

8.4.1| Health

Valle de Vazquez residents have limited access to the health care. Survey respondents referred to a type of health insurance program but also mentioned that they would have to borrow money in case of a medical condition or emergency. There is no longer a doctor stationed at Valle de Vazquez because the medical clinic was destroyed in the earthquake.

8.4.2| Education

Literacy rates are high throughout the community, over 94%. The local high school serves a magnet school for other towns in the area. Many of the students go on to study at University and get a bachelor's degree. The local school was destroyed during the earthquake and classes are currently being held outside under tents.

8| VALLE DE VAZQUEZ COMMUNITY DATA

8.4.3| Social Cohesion

Conversations with community members did not reveal any significant social inequities, social conflicts or debilitating crime rates. This social cohesion is a significant asset to the community.

8.5| Political Systems

Due to limited time for interviews and data collection, the SUMA Capstone Team did not make a full evaluation of the political systems and their policy nuances. Information in this report reflects information that emerged during interviews with community members but may not be comprehensive. Ashoka should validate political systems information and update the Valle de Vazquez community assessment if needed.

Valle de Vazquez benefits from some well provided state-level services like the maintenance of roads connecting it to other towns and the electricity grid. In general, the SUMA Capstone Team did not see evidence of robust funding for social programs such as comprehensive health care or community services such as policing. On the other hand the quality education system seemed well funded. The community finds ways to function effectively with existing funding levels and solve their needs locally.

8.5.1| Law & Order

The ejido system provides for local decision-making. While there are no local police present, the community did not mention a current concern with crime that would require a greater law enforcement presence. There was also no mention of concerns regarding corruption or bribery preventing them from accessing basic services.

8| VALLE DE VAZQUEZ COMMUNITY DATA

8.5.2| Leadership & Execution

Leadership in this context reflects the coordinated will of local and national governing bodies to include resilience in their planning efforts and ensure programs are carried out. Valle de Vazquez, as a small rural community, does not benefit from a coordinated, government-led resilience plan in the same way that Mexico City benefits from local government collaboration with the 100 Resilient Cities initiative. Thus, to enable resiliency, the local ejido members collaborate with social organizations to meet community needs.

8.5.4| Regulations

During site visits, very little information was gathered about regulations, their enforcement and/or regulatory gaps. Since the topic of regulations did not arise during conversations with community members, the SUMA Capstone Team made two assumptions. First, it was assumed that building regulations prior to the earthquake were either insufficient or not well enforced. Second, since no one mentioned onerous regulations as an impediment to their business, the SUMA Capstone Team assumed that Valle de Vazquez does not experience the stagnation and lack of business growth that can be caused by too many regulations that are time consuming and confusing to navigate.

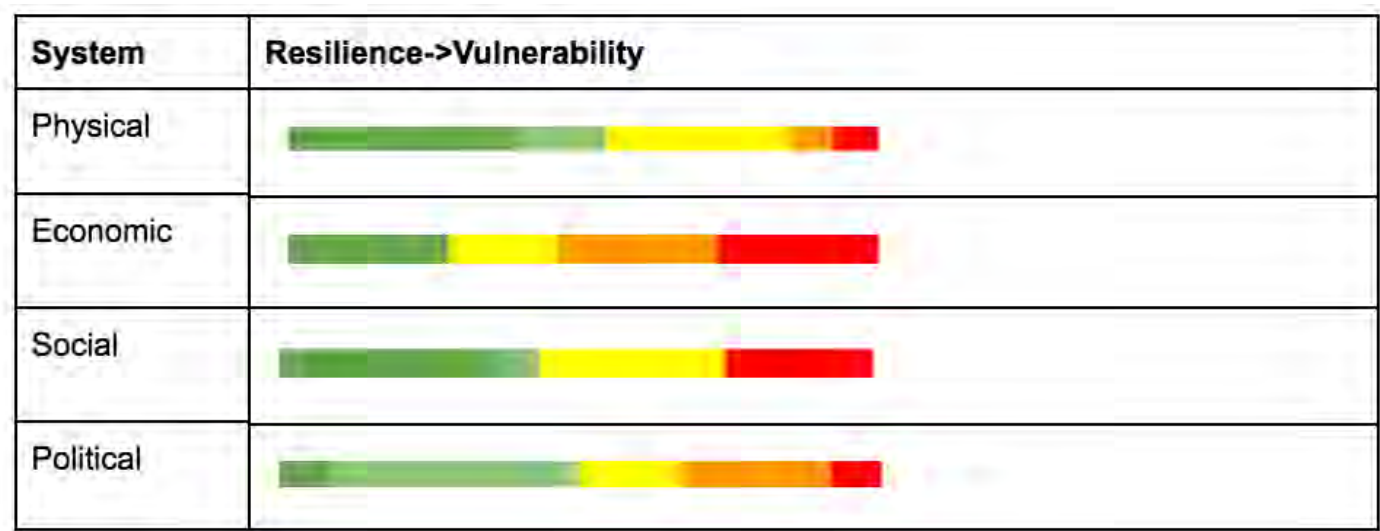
8.5.5| Governance & Ownership

Community owners can participate in governance for land and water but not electricity. Although community members may not have private real estate holdings, they have titles granted for land use that allow them to determine how they will use the property within community-approved uses. Further, although Valle de Vazquez may not directly own the water systems or have private property water rights, the ejido participates in a conference of regional ejidos to make decisions regarding the water uses. Additionally, Valle de Vazquez receives preferential treatment in policy discussions because they are downstream from other ejidos. The electricity is provided by an outside utility that the ejido does not control or influence.

9 | VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

The Valle de Vazquez Community Assessment was done in two iterations. The first was completed before the site visit and was based on remote research reviewing community demographics, geography and sample surveys. The second iteration was done after the site visit and was adjusted to take into account interviews with organizations and community members. The results listed below reflect the second iteration compiled after the site visit. In addition to our standard assessment, at Ashoka’s request, we also noted which systems were made more vulnerable by the earthquake of September 2017.

This analysis uses a stacked bar chart to visualize the results of the assessment. Stacked bar charts allow comparison between groups even when the number of items in each group might be different and therefore averages or sums might be misleading. To construct the bar chart, vulnerabilities were each given a rating from 1-5 during the assessment. Then for each system (i.e. Physical), the aggregate number of vulnerabilities per rating was determined. For example, within the Physical System, only one vulnerability was marked as 5, one was marked as 4, five were marked as 3, etc. The color on the stacked bar chart reflect the portion of the total group that were given the corresponding rating. Dark green represents a rating of 1, light green represents a rating of 2, yellow represents a rating of 3, orange represents a rating of 4 and red represents a rating of 4-5. For example, the visualization shows at a glance that roughly 50% of the vulnerabilities within the Physical System were rated as 1 or 2 and less than 20% of the vulnerabilities were rated as a 4 or 5.



Overall Valle de Vazquez Resilience Ratings per System

9 | VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.1 | Physical Systems

Physical systems include water, energy, infrastructure, agriculture, waste management and infrastructure. In general, the community was rated as having low to moderate risk across most areas of physical vulnerabilities. The exceptions were infrastructure (specifically buildings), vulnerability to earthquakes as well as dependence on fossil fuel energy for electricity and water pumping.



Valle de Vazquez Resilience Ratings for Physical Systems

9.1.1 | Areas of Physical Resilience

Based on the assessment, the community demonstrates good resilience for specific vulnerabilities relating to water, transportation, farming practices and land use. For example, there is abundant water availability and an acceptable quality of chlorinated drinking water. The transportation infrastructure is well maintained and there is widely available public transportation. The community demonstrates good farming practices including leveraging waste products, and efficient water use during irrigation. There was no evidence of chemical runoff affecting water supplies. Finally, there was adequate land area for current population and expected growth rates.

9.1.2 | Areas of Physical Vulnerability

Vulnerabilities that were rated highly for the community include the housing and building quality and ability to withstand likely earthquakes and the high dependence on fossil fuel energy for critical needs such as electricity and water supply for both home use and farming.

Although of lesser urgency, there were several moderate vulnerabilities as well. Waste management practices could be improved to reduce impacts on the environment, specifically air quality and water supply. Communications infrastructure, specifically the internet, is lacking and could become more critical to business and education in the future. Finally, although strictly speaking an economic and not physical factor, the cost of water pumping limits the supply to the community even though it appears to be abundant in nature.

9 | VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.1.3| Earthquake Impact

As noted, the primary physical system impacted by the earthquake was infrastructure, specifically housing and buildings. While new houses are being built with more rigorous design to withstand earthquakes, community members may still have older and more vulnerable structures remaining on their properties. In addition, the school has yet to be rebuilt and some services such as the medical clinic have yet to return because there is no building of sufficient quality to replace the one lost in the earthquake. The school will be rebuilt by the Federal Office of Monuments Preservation but the timeline was not discussed during onsite interviews.

9.1.4| Confidence & Additional Data Gathering

Confidence ratings were affected by limited data gathering. On the whole, confidence in the majority of ratings within the physical area is medium to high. However, given that most of the data was derived from interviews, future assessments of Valle de Vazquez can focus on gathering more quantitative data about the physical environment to validate the current assessment. For example:

- Determine how solid waste is treated after pickup
- Determine what percentage of households have septic tanks vs an alternative method of handling human waste, and monitor depth of septic tanks relative to adjacent wells for potential hazardous cross-contamination
- A more representative sample of well water quality and well water levels, ideally over a period of years to determine if there are any long term trends in quality or groundwater level
- Determine what fertilizers are being used on sugar cane fields and where water runoff from the fields resides

9.1.5| Detailed Assessment Results

The following chart shows the assessment per vulnerability within physical systems:

CATEGORY	RATING	>EARTHQUAKE	RISK/VULNERABILITY->IMPACT	RATIONALE	CONFIDENCE RATING	ADDITIONAL DATA TO COLLECT
Housing & Buildings	5	Y	Poor housing/building design, low quality materials or maintenance->potential collapse in a disaster or degradation over time	Buildings were affected in earthquake. Houses were destroyed.	High	
Energy	4	N	High reliance on fossil fuels->lack of access during interruptions in supply due to natural disasters or price increases	Community is not using a lot of energy but is using traditional sources: gas, electric and firewood Firewood collection may not be sustainable over the long term but currently there is no shortage. Energy used to pump water prevents farming from scaling. Electricity only comes from the grid which is a high fixed cost- and can prevent future community services such as community center due to the cost for operations (with no corresponding budget).	Medium	How much would farmers scale business if water pumping cost 20% less, 50% less, etc.? How much energy would be required to run a community center? What is the lost value of being able to grow more water intensive crops such as alfalfa and maize if water pumping was more affordable?
Waste Management	3	N	Solid Waste -High Pollution/Waste and/or low treatment of waste->decreased air, land and water quality	Waste goes to communal landfill. There is no formal wastewater treatment. One survey mentioned solid trash in water systems. When trash pickup is delayed they burn their garbage.	Medium	What organization controls trash pickup and how is it handled after pickup? Is it burned?
Infrastructure (Roads, Communications)	3	N	Poor infrastructure (communication networks: telephone and internet, etc.) quality->decreased capacity for basic services and business	Community mostly has access to landlines, some mobile phones. Lack of internet can reduce economic growth and access to information for education. We didn't hear about phone lines being down after the earthquake for a significant amount of time.	Medium	Better understand potential opportunities for education and employment for rural communities with internet access.
Water	3	N	Risk of water scarcity either due to large demand or inefficient use of water->can contribute to water scarcity and reduced	Community members haven't noticed an annual trend (only seasonal trends) but no measurements have been taken year over	Low	Annual measurement of wells

			water for agricultural and industrial needs	year. Aqueduct tool showed moderate risk to groundwater but unclear what data feeds this assessment.		
Water	3	N	Poor handling of human waste->contaminated water, increased disease	Some toilets go to septic tanks. The test of water at Marco Antonio's drinking water well didn't show contamination. It did show slightly higher levels of phosphate & sulfate potentially due to being near to agriculture.	Low	Need a better understanding of human waste disposal methods across the whole community.
Water	2	N	Poor water quality->increased cost to clean water and/or increased health problems (This item refers specifically to water for human drinking.)	The main well water for drinking is treated before being distributed. There were mixed survey results regarding whether water was contaminated Our water quality tests showed low levels of chemicals and only one case of bacteria (at cheese maker's location)	Medium	Additional tests for water quality at a representative set of locations.
Ecosystem	1	N	Industrial growth->increased built environment, less natural/wild environment	No large growth plans for residential or industrial	High	
Food & Agriculture	1	N	Detrimental agriculture or livestock practices (monocrops, fertilizer use)->reduced soil quality and long term output	A least one survey mentioned fertilizer use and didn't use organic fertilizers No one mentioned reducing yields or physical barriers to farming over time. Ad hoc conversations revealed that commercial fertilizers aren't used if they are perceived to negatively impact animals (goats). Animal manure is used as fertilizer. Its unclear how the sugar crops are fertilized. Ad hoc conversation with Lime farmer showed us drip irrigation via a hose.	Medium	Are commercial fertilizers used in sugar cane farming? Are most farmers using drip irrigation?
Infrastructure (Roads, Communications)	1	N	Poor infrastructure (roads, public transportation) quality->potential collapse, decreased capacity for basic services and business	No mention of concerns about roads and there seems to be sufficient public transport Ad hoc community discussion said that few roads were affected by	Medium	

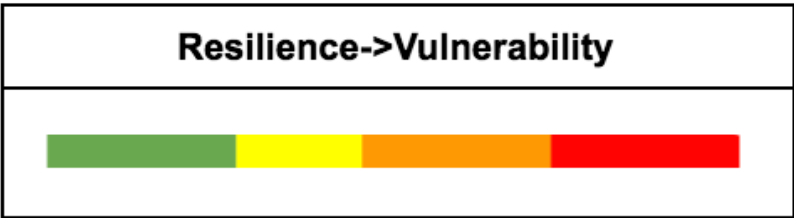
				earthquakes.		
Infrastructure (Roads, Communications)	1	N	Population growth rate- >increases to build environment & infrastructure	Doesn't sound like Valle de Vazquez has high population growth because young people move to other towns	High	
Water	1	N	Poor treatment and/or use of wastewater-> lower quality of water for drinking and agriculture	People are reusing household grey water for plants, water quality is addressed elsewhere	High	

Valle de Vazquez Detailed Assessment Results for Physical Systems

9| VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.2| Economic Systems

In general, the community was rated as having significant economic vulnerabilities, the most critical vulnerabilities being the areas of affordability and employment. Additionally, there was limited data about the sugarcane production at the time of this assessment and follow up interviews on the vulnerability of this crop should take place.



Valle de Vazquez Resilience Ratings for Economic Systems

9.2.1| Areas of Economic Resilience

Valle de Vazquez is highly resilient when it comes to home ownership and locally made goods, especially food. Due to the ejido system and the communal land ownership, community members are not paying rent or purchasing land on an unregulated market. As a result, they cannot lose their homes or be “priced out” of the existing housing stock due to a decrease in wages or an increase in real estate values. This provides them with a very stable base for meeting their housing needs. Additionally, by creating foods locally, they are insulated from potential global shocks to food prices.

9.2.2| Areas of Economic Vulnerability

The economic system overall proved to be one of Valle de Vazquez’ largest vulnerabilities. The community suffers from unemployment and underemployment, a high cost of basic goods (food, water and energy in relation to income and very little accumulated savings for emergencies. Farmers disclosed that the cost of pumping water restricts their ability to scale their businesses and generate more income. Further, there is minimal innovation in the existing industries, little diversification of products being produced and minimal access to loans to begin new businesses. There are minimal financial instruments that could assist the community in building or protecting income or assets, for example, savings institutions or insurance products to protect against crop blight and adverse weather, unexpected unemployment or health problems.

9 | VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.2.3| Earthquake Impact

The main aspect of the economic system that was significantly impacted by the earthquake is employment. When the medical center collapsed, the staff there could no longer work and there is no longer a doctor in town. Further, some people work out of their homes and the collapse of old buildings, along with the disruption of rebuilding, means that people have to stop working or modify how they are working until their shelter is fully rebuilt. The cost to rebuild housing is not significantly affecting the community members at this time because Fundacion Azteca, as a supplement to government earthquake recovery programs, is funding the rebuilding being done by Echale. However, without this funding from Fundacion Azteca, the community would have had a substantial economic burden. Supplementary funding for recovery for future adverse events is not guaranteed.

9.2.4| Additional Data Gathering

Although there is medium to high confidence in the current assessment of the economic systems, more quantitative data could be gathered. Examples include:

- Determine underemployment rates among adults
- Confirm the percentage of income going to water, energy, food across the community
- Determine households that are outside of the ejido system
- Determine the state and/or availability of economic instruments to build and create assets:
 - Farm insurance
 - Unemployment insurance
 - Health insurance
 - Business loans

9.2.5| Detailed Assessment Results

CATEGORY	RATING	IMPACTED BY EARTHQUAKE	RISK/VULNERABILITY->IMPACT	RATIONALE	CONFIDENCE RATING	ADDITIONAL DATA TO COLLECT
Affordability	5	N	High cost of basic needs relative to income: food, water, energy->less income for education, health, economic investments	Based on surveys, food and energy seems to be a high proportion of income (about 60%) High cost of water impacting farming and business->can't scale business. Food is mostly affordable but some people are paid per day and therefore may not have enough daily to purchase food. There are no cheaper alternatives or market competition for the basic utilities.	Medium	Additional assessment of the % of income used for basic needs (energy, food and water).
Employment	5	Y	High unemployment and underemployment->reduced access for food, health, education and economic investments	Surveys and interviews have both shown concern for employment (even with university degrees), and income generation. People want to earn more and grow their businesses Young people move to other towns for employment or pursue non-farming careers. Survey data showed that someone wasn't working after earthquake. The medical clinic closed after being destroyed by the earthquake ending employment there.	High	Unemployment rate for adults
Assets & Financing Tools	5	N	Low access to investment/savings vehicles for households (savings accounts, stocks, bonds)->inflation erodes assets	Many of those surveyed did not have a bank account.	High	What are the reasons for not being able to? lack of local institutions or lack of available income?
Employment	4	Y	Having too few key industries (exposure to external economic shocks)->higher impact/collapse if key industry fails ->increased unemployment, less income for households	Mostly products are sold within the community, so changes in demand are unlikely.. Sugar cane is the primary crop that is sold outside the community and would be sensitive to price changes and/or problems with production. Marco Antonio implied that a steady income comes from sugar cane and the other jobs are supplemental.	Medium	How was employment disrupted as a result of the earthquake?

Assets & Financing Tools	4	N	Low access to Insurance products (unemployment, homeowners, rental, health, disability)->assets are destroyed during unfortunate unforeseen events (natural disaster, health catastrophe)	No mention of insurance for earthquakes or unemployment. According to survey info health care coverage is limited (some people need to borrow money for emergencies.)	Medium	Would people be interested in weather or farm insurance? How do unemployment and health insurance schemes work? Is earthquake insurance available at all?
Industry & Innovation	4	N	Low levels of innovation and business acumen which lead to poor resource efficiency->cost of production increases as resources become more scarce	Survey results reflect people follow habitual practices. There doesn't seem to be much innovation in production. Ex: farmers are not harvesting rainwater.	High	Do people have businesses to bring goods to the community that are in demand?
Employment	3	N	Low degree of diversity/innovation in current industries	Was not specifically mentioned but it could be an underlying cause of unemployment and other issues. Mixed feedback on whether people try out new ideas in their production. Not highly innovation-focused but we are assuming neither are their competitors in local markets.	Medium	
Assets & Financing Tools	3	N	Low access to financing (loans, investors) for businesses, sole proprietors->unable to expand economic opportunities	Mixed survey results. Young people are moving to other towns and might have business ideas that can't be implemented locally without access to loans.	Medium	What could they do if they had a loan available? Current level of access and awareness of any opportunities?
Assets & Financing Tools	1	N	Low Home Ownership rates->reduced household wealth, increased risk of not being able to afford housing	The ejido system provides access to land for most families.	Medium	Verify rates who are and are not eligible for land title or ejidadio.
Assets & Financing Tools	1	N	High Cost of Home Ownership relative to incomes->risk of future asset deflation	The ejido system provides access to land for most families. The reconstruction of houses are funded by Fundacion Azteca.	Medium	Verify rates who are and are not eligible for land title or ejidadio.
Economy & Markets	1	N	High degree of reliance on imports over locally created goods->reduced access to necessities or goods for economic production during global supply chain disruptions	Majority of produce is local	Medium	What necessities are not local and what are their cost?

9| VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.3| Social Systems

Prior to the earthquake, Valle de Vazquez would likely have scored relatively well across most of the social systems. Even today, many of the social systems are fairly resilient, the two major exceptions being the health and education systems. Both the community clinic and local school were destroyed in the earthquake, greatly reducing the basic services available within the community.



Valle de Vazquez Resilience Ratings for Social Systems

9.3.1| Areas of Social Resilience

Valle de Vazquez shows strong social resilience in the areas of social cohesion and education. The community demonstrates strong community bonds as evidenced by positive survey results, anecdotal stories about earthquake recovery and town meetings in the square to address important community topics. No conflicts regarding demographic bias or concerns regarding high crime or drug use were reported.

As for education, community members are especially proud of the quality of education available for children in Valle de Vazquez. The formal education curriculum for children prepares them well for university and jobs outside of Valle de Vazquez. Surrounding communities send their children to the school in Valle de Vazquez to take advantage of the education offered there.

9 | VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.3.2| Areas of Social Vulnerability

Valle de Vazquez' highest social vulnerabilities are the lack of medical and educational facilities on site. Valle de Vazquez residents have limited access to mental and physical health care and have to travel to Jojutla or Cuernavaca for care. Especially lacking are emergency services. Parents specifically mentioned concerns about children's accidents or sickness from being bitten by scorpions while at play. (Scorpions are blown down from the mountain during high winds and bites can be fatal.) Further, due to limited health insurance coverage, affordability may affect community members' willingness to seek preventative and early care for medical conditions.

Although Valle de Vazquez has a strong formal educational system, there is potentially a gap between the education system and Valle de Vazquez' local employment needs. Future programs tailored to engage students in thinking creatively about the local environment and community might encourage more young adults to stay in Valle de Vazquez and start new businesses locally. Additionally, the adult residents might benefit from continuing education addressing innovations in farming, conservation, business practices, and alternative energy sources.

9.3.3| Earthquake Impact

The earthquake's greatest impact to date is within the social systems. Although many individual homes were destroyed, the rebuilding effort for housing has been successful with over 70 houses having been completed by Echale. However, the community buildings have not yet been restored, greatly reducing the access to health and limiting the educational facilities in the community.

9.3.4| Confidence & Additional Data Gathering

Much of the additional data that could be gathered about social systems will continue to be qualitative. Some of the data that could be helpful includes:

- Determine what the health insurance covers vs residents have to fund themselves.
- Determine whether people are getting sufficient physical and mental health care, and whether they have adequate nutrition.
- Determine if alcoholism or domestic violence is prevalent.
- Determine how gender might affect legal, political & economic power within the community.
- Understand the funding and timeline for rebuilding the health clinic and school.

9.3.5| Detailed Assessment Results

CATEGORY	RATING	IMPACTED BY EARTHQUAKE	RISK/VULNERABILITY->IMPACT	RATIONALE	CONFIDENCE RATING	ADDITIONAL DATA TO COLLECT
Health	5	Y	Lack of coordinated Disease/epidemics control programs->increased health cost, illness, death, lower quality of life, reduced economic output	There was a clinic but it was destroyed by earthquake and now there is no doctor in town.	High	
Health	5	Y	Low access to health care->reduced individual capacity to respond productively to chronic stressors and acute events (natural disasters, personal problems)	At least two surveys mentioned wanting doctors or health. There was a clinic but it was destroyed by earthquake and now there is no doctor in town. Most surveys mentioned respiratory health problems in community. Sara identified health care as a primary issue in the community. There is a high risk of scorpion bites especially when its windy and scorpions are dragged from the mountains. They scorpions are deadly and a high risk to children.	Low	
Education	5	Y	Education facilities and environment	The school was destroyed by the earthquake. The high school students studying outside are being distracted by sun and noise during lessons.	High	What is the timeline for rebuilding the school?

Education	5	N	Existence of mismatch between education available and jobs available locally->leads to low return on education investment and/or insufficient community skills to fill required jobs	Education is good but jobs (especially higher level jobs) are not available. Well educated young people choose to live elsewhere.	High	Why do people pursue higher education when jobs are not available locally? What is their expectation/plan? What do they perceive as the barriers locally to higher level jobs forming in the community?
Health	3	Y	Low access to mental health support->reduced individual capacity to respond productively to chronic stressors and acute events (natural disasters, personal problems)	At least one survey identifies needing psychological support. Community women talked about being fearful after the earthquake and paranoid when shaking sensations occur.	Low	Are there cultural barriers to receiving care? Are people exhibiting signs of stress after the earthquake- difficulty sleeping, etc.?
Health	3	N	High rates of improper nourishment-> increased disease (diabetes, heart, obesity), death	Some survey responses mentioned not enough food in past three months, mostly an affordability issue but impacts health. When asked, women did not identify not having enough to eat, but they may not have wanted to disclose that information publicly	Low	Is affordability the primary driver for people not having enough food? What are eating habits regarding junk food vs healthy food?
Social Cohesion	3	N	Low rates of demographic equity (age, gender, race, religious affiliation, special needs)->community members cannot fully contribute to social and economic activities	Very little insight into gender issues in community based on surveys. Age and race have not been mentioned as issues. Gender roles tend to be defined with men farming and women cooking, making cheese and yogurt.	Low	What are the relative employment rates by gender? Do women have decision making power in the household and community? Do women have access to informal employment and/or community contributions? Are womens' assets or lifestyle protected from negative impacts of divorce, etc?

Social Cohesion	3	N	Increasing Urbanization - >decrease in rural population and potential "brain drain" from rural areas to urban areas, i.e. reduced local skills	Young people move to other towns. Future risk of declining population can cause problems such as less investment in services for those remaining (such as education and health care) and also less household assistance for an aging population.	Low	What are population trends in last 10+ years? What is the likely trend in the coming 10 years?
Education	3	Y	Low access to internet/information - >reduced ability to grow capacity of community and reduced options for problem solving	Most surveyed either don't have internet access or do via a cafe which is still low access. Internet may be increasingly desired in the coming years. Not having access inside the home restricts ability to leverage internet for education, home business and personal growth. There is a mobile van for computer lessons.	Medium	What is the community desire for internet access? What do they use it for? Are they missing access to services or opportunities by not having increased access?
Social Cohesion	2	N	Migration-<decrease in local population and potential "brain drain" to other countries, i.e. reduced local skills	At least one person told Lynette they had been in the States to work. Also as a general rule young people leave for work.	Low	What are the migration rates? Do they get remittances from US? Do young people, see a future in the community? Where do they want to live in 5 years and why?
Health	1	N	High drug abuse/addiction and/or alcoholism->reduced individual ability to contribute to household income and manage responsibilities	No mention of problems thus far	Medium	
Social Cohesion	1	N	Existence of demographic conflicts/tensions (class, race, gender, etc.)->reduced ability for collective productive community level problem solving	Surveys, site visit and reports by Federico reflect good community spirit.	High	

Social Cohesion	1	N	Existence of social unrest ->reduced ability for community members to participate in regular activities	No mention thus far When asked about drug cartel issues in the region none were identified.	High	
Social Cohesion	1	N	Weak social institutions (religious organizations, community organizations)->reduced forums for community members to collectively share ideas and work towards agreed solutions	Well served by non-profit organizations and the community participation was high. Could benefit from more formal meeting place since they are meeting in the plaza and its hard to hear during meetings.	Medium	Are there community groups or religious groups via which people donate time and money to support the community or which influence community decision making?
Social Cohesion	1	N	Low community ability to leverage human potential and assets outside economic sphere (ex: volunteer work, unpaid child care)->reduced ability to solve community needs	Grandparents help with grandchildren while parents work. People work several jobs and have informal employment.	Medium	How to unemployed and underemployed contribute to the community? Do people share responsibilities with neighbors or help neighbors at various times?
Education	1	N	Education Quality: Low education levels, low opportunities for higher learning->reduced local skills for economic value add employment, reduced capacity to solve local problems	At least half of surveys had university degrees.	High	

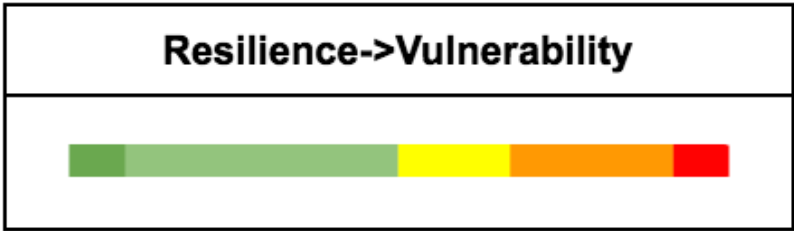
Valle de Vazquez Detailed Assessment Results for Social Systems

9| VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.4| Political Systems

As mentioned, the SUMA Capstone team did not do an extensive analysis of political systems, policy and how they affect Valle de Vazquez. The assumptions in this section are based on what was discussed in interviews, as well as what did not arise during conversations with community members. Ashoka should validate any assumptions regarding political systems and update the community assessment if necessary.

In general, Valle de Vazquez has a well functioning local governance system through the ejido model which gives community members a forum for community decision-making. However, it is possible that there could be a lack of national and state political support to address the chronic structural vulnerabilities in the community as well as a lack of capacity for local emergency response. For example, community members did not mention having comprehensive health insurance and mentioned in surveys that they would have to borrow money from neighbors in the case of a medical emergency. Also, there is not a local police force or fire department that would be available for emergency response. On the other hand, the federal government did provide aid retrospectively after the earthquake to partially fund the houses being built by Echale.



Valle de Vazquez Resilience Ratings for Political Systems

9.4.1| Areas of Political Resilience

The main source of resilience politically is the local ejido system. The ejido system provides a forum for community decision-making. The governance control extends to management of local water systems where the community receives preferential treatment in watershed level policy decisions because they are downstream of other communities. This governance structure of having those adversely affected by changes directly involved in the decision-making enables resilience. Other political vulnerabilities that might be significant in other areas of Mexico, such as corruption or insufficient law and order in response to crime, are not particularly relevant to Valle de Vazquez. Political instability at a national level is unlikely to highly affect Valle de Vazquez given its distance from the capital and limited dependence on government support. Further, Valle de Vazquez has a low risk of experiencing any politically motivated destruction or harm.

9 | VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.4.2| Areas of Political Vulnerability

Areas of high political vulnerability include a lack of participation in electricity provisioning, a lack of emergency response services, a lack of formal resilience planning and uncertain funding.

Unlike the interaction with the water system, Valle de Vazquez experiences vulnerability with relation to governance of their energy supply, namely the electrical grid. Electricity is provided via an entity that Valle de Vazquez cannot control or influence and the cost of the product is high in relation to income. Further, there are currently no easily accessible market alternatives to meet their needs.

Emergency response and planning is not sufficiently provided at the national, state and local levels. The community does not have a police force, fire department or emergency medical staff. As a result, they have a high vulnerability to future negative events because response times will be longer than if those teams were in place.

Similarly, there is a lack of formally coordinated resilience planning such as enforced regulations or funding tied to resilience goals. While local leadership is appreciative of collaboration with social organizations and open to increased partnership with Ashoka, they will need ongoing guidance on how to incorporate resilience goals into future community planning.

Funding is also a critical vulnerability. The SUMA Capstone Team's research into current global resilience efforts reveals that the most comprehensive proactive interventions are often taking place in large urban cities at the local government level and are highly funded by the government by incorporating resilience goals into existing and new government programs and services. As a small rural town, proactive resilience efforts will likely not come in the form of a government-led resilience plan but via Ashoka's new resilience initiative. Therefore, funding to address chronic stressors will come from outside donors funding the social organizations and the market mechanisms in the social organizations' business models. The only currently known exception to this is the housing aid being provided by the federal government which is helping to rebuild houses at standards which should allow the houses to withstand future earthquakes.

All solutions provided by social organizations intended to improve community resilience will require start-up funding even if the project is self-perpetuating and has a short payback period. Social organizations provided mixed responses when asked whether they thought funding would be easier to obtain as part of a coordinated effort in Valle de Vazquez or whether each partner would have better success seeking funding on their own. In any event, seeking outside funding is dependent on the preferences of donors rather than the community needs and choices. Depending on outside donors creates a higher vulnerability than being funded by a local tax base and revenue pool that the community members can control entirely on their own or via representational governance.

9 | VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.4.3| Earthquake Impact

While the political system was not made more vulnerable due to the earthquake, the event highlighted the need for building regulations and better emergency response systems. In the case of building regulations, current houses being built by Echale adhere to national building regulations, but older existing building may not and are unlikely to be retrofitted to any promoted safety standards.

9.4.4| Additional Data Gathering

Additional data that could be gathered includes a better understanding of the electrical energy utility and if the community has any input or leverage over the services provided. For example:

- Could working with other communities to communicate concerns and find collaborate solutions result in reduced electric bills?
- Understand if regulations are actually reducing business growth but this was not raised during the site visits
- Understand if the community is experiencing reduced services due to corruption and bribery but it was not discussed during the site visit
- Understand the extent of local, state and national proactive and reactive aid to communities across all systems

9.4.5| Detailed Assessment Results




CATEGORY	RATING	IMPACTED BY EARTHQUAKE	RISK/VULNERABILITY->IMPACT	RATIONALE	CONFIDENCE RATING	ADDITIONAL DATA TO COLLECT
Leadership & Execution	5	N	Low government leadership capacity to respond to structural & acute stressors->long turnaround for recovery, minimal support to communities in recovery	It has been over 6 months and the community is still in need with nonprofits providing significant assistance.	Medium	What has the gov't provided since earthquake? What support could have been more extensive or provided with a quicker turnaround?
Funding	4	N	Weak government institutions with minimal govt services & support->greater burden on other institutions (religious, nonprofit, community, networks) to provide services & support	Local ejido gov't works well for decision-making and distribution of small resources. Larger gov't doesn't seem to provide comprehensive safety net for social welfare.	Medium	What gov't services does national vs state provide, any social services? What is the relationship between community and gov't? How does the community request programs or support from government?
Regulations	4	N	Loosening or lack of land use or building codes->potential reduced protections for ecosystem and infrastructure resiliency	Houses were affected by earthquake potentially due to lack of standards in housing or because of lack of enforcement of those standards.	Medium	What regulations for housing were in place before and after the earthquake? Are there regulations affecting dairy cows re land use for grazing?
Leadership & Execution	4	Y	Low awareness or contingency plans for emergency events across a variety of institutions (police force, hospital, businesses, government, community organizations, households)->greater injury or loss of life in an emergency, longer time to recovery	Uncoordinated and informal assistance after the earthquake. Children in the schools might get training on evacuations. Someone mentioned wanting a warning system by phone.	Medium	For formal institutions, what are their emergency management plans? Do they have any?
Funding	3	N	Low political will to fund social and resiliency programs and/or include resiliency factors into budget planning->funds unavailable for resiliency efforts	Mexico has a fund for reconstruction. Also has a renewable energy plan These are small isolated programs as opposed to resilience being integrated into all funding proposals. Non-profit organizations are funding programs but the government isn't tying funds to resiliency. Community received money from Fundacion Azteca to rebuild houses.	Medium	How does local govt vs national govt promote resiliency if at all?
Law and order	3	N	Low maintenance of law/order (policing, court system)->low adherence to regulations intended to promote resiliency	Local ejido system provides some social structure There are no police, firemen, etc.	Low	Are there problems with law enforcement (such as corruption, bribery, ineffectual) that prevent community problems from being solved?

Law and Order	2	N	Local or National political instability->disruption of government services and support	Local instability not mentioned but other areas of Mexico have political instability and drug related crime.	High	
Law and order	2	N	High levels of corruption and bribery->access to services is restricted to those who can pay, services are provided at potentially inefficient prices (i.e. priced higher than they otherwise might be)	No mention but Mexico has a reputation for having these challenges.	Low	Are there problems with law enforcement (such as corruption, bribery, ineffectual) that prevent community problems from being solved?
Governance & Ownership	2	N	Low community access to governance for essential needs (food, electricity, water)->needs of community (ex: affordability) may be overlooked	Ejido has input into watershed management and wider decision-making.	Medium	Who owns the resources? How are decisions made by which parties? What is the communication channel between the community and the utilities?
Governance & Ownership	2	N	Low ownership/control of essential resources (ex: water rights)-> reduced access or affordability as future stressors evolve (ex. water scarcity)	Insufficient information but no concerns related to this were mentioned by the community.	Low	Who owns the resources? How are decisions made by which parties? What is the communication channel between the community and the authority?
Regulations	2	N	Existence of complex, hard to navigate regulations->reduced formal economic activity	No mention was made of this problem.	Low	Are there regulations that are so hard to navigate that people do not improve their living conditions? Do people pay taxes? If not why not?
Governance & Ownership	1	N	Existence of conflicting and oversubscribed water rights in the context of water scarcity->reduced access or affordability, increased social conflict	Ejido has input into watershed management and wider decision-making	Medium	How are farmers' water rights determined? Are there ever water shortages? Seasonal? Year-long droughts?

Valle de Vazquez Political Systems Detailed Results

9| VALLE DE VAZQUEZ COMMUNITY ASSESSMENT RESULTS

9.5| Summary of All Systems

System	Resilience->Vulnerability
Physical	
Economic	
Social	
Political	

Overall Valle de Vazquez Resilience Ratings per System

The community's top vulnerabilities include:

- Physical: infrastructure (mostly buildings) vulnerability to earthquakes
- Economic: low levels of employment, high cost of basic needs relative to income and low access to savings vehicles
- Social: low access to health and education facilities locally as a result of the earthquake
- Political: lack of resilience and emergency management plans and resilience goals is not highly integrated into all government funding and programs

These vulnerabilities should inform Ashoka's collaboration with Valle de Vazquez and drive the goals of participating social organizations. While economic and social vulnerabilities dominate, the effective functioning and resilience of other systems should not be overlooked as a potential source of solutions to community challenges.

10| VALLE DE VAZQUEZ FIT ANALYSIS

The SUMA Capstone team conducted the Fit Analysis for Valle de Vazquez. For this purpose, the Resilience Matrix was used and both the Community Needs Assessment and the Social Organizations Capacity Assessment were juxtaposed to identify fit. The Fit Analysis results are presented in detail in the Supplemental Documents Drive in the Fit Analysis folder.

As presented in the The Resilience Framework section, the Fit Analysis evaluates the collective ability of Ashoka's network of social organizations to meet the needs of the community, focusing on the organizations' scope of operations and strength of collaborative network.

The following chart summarizes the findings of this analysis:

Fit Analysis Diagram



Fit Analysis Summary for Valle de Vazquez.

10| VALLE DE VAZQUEZ FIT ANALYSIS

10.1| High Priority Community Needs

10.1.1| High Collective Organizational Capacity

Considering the highest priority needs for Valle de Vazquez identified in the Community Assessment, the SUMA Capstone Team found that Ashoka's network of social organizations has a high joint capacity to address the vulnerabilities listed in the upper right quadrant. The high community need and the high combined organizational capacity, signal that there is great potential for creating impact and building resilience in Valle de Vazquez when addressing these vulnerabilities. Ashoka and its network of social organizations seem well suited to intervene in activities that address poor housing and building design and quality, high reliance on fossil fuels, low levels of innovation and low business acumen, etc. Ideally, when designing an execution plan, Ashoka's network would focus its resources on the vulnerabilities within this quadrant.

Note that the results of the Social Organizations Capabilities assessment were obtained through a questionnaire that asked the participating organizations to self-identify their resilience-aligned areas of expertise. It is recommended that when designing an execution plan, Ashoka and the participating organizations delve further into the results of the analysis. For example, "Low access to health care & mental health support" is a vulnerability that appears in the upper right quadrant. However, the organizations that identified health as a key resilience area have strictly defined operating models and limited services. Sonriendo con Amor focuses mainly on dental health and mental health services, Renapred on the prevention of birth defects and nutrition and Conciencia Quetzal on education around health. Thus, Ashoka should consider the nuances of each vulnerability when devising an intervention plan around health care access and mental health support.

10.1.2| Moderate Collective Organizational Capacity

There are other vulnerabilities of high priority to the community. The upper center quadrant includes the vulnerabilities that are critical to the community, but for which Ashoka's network of organizations only has moderate capacity. See for example "Low access to investment/savings vehicles for households". Addressing this vulnerability could potentially have a great impact on building resilience in Valle de Vazquez, but Ashoka's team only has a moderate ability to effectively impact that vulnerability. The business models and the networks of the participating organizations only partially relate to investment and savings. Ashoka and its resilience team should examine their joint capacities when drafting the execution plan to find out whether or not and how their individual activities could complement each other to address vulnerabilities in this quadrant. Ashoka should also contemplate whether adding additional organizations to the network or partnering (either temporarily or permanently) with organizations outside of the new resilience team could help Ashoka better address these high priorities for the community. There will be more discussion on the implications of this quadrant in the synergies analysis.

10| VALLE DE VAZQUEZ FIT ANALYSIS

10.1.3| Low Collective Organizational Capacity

There are also vulnerabilities that have been identified as strongly affecting the community but cannot be directly or immediately addressed by Ashoka's current network of organizations. The Ashoka resilience team has very limited or no joint capacity to improve these vulnerabilities. The categories are depicted in the upper left quadrant and should be given careful attention. Questions that Ashoka should consider include: How much of the overall success of the resilience-building efforts depends on addressing vulnerabilities for which the team lacks capacity? Would it help to invite other social organizations that are fit to address those vulnerabilities to become part of the project? Can the participating organizations 'stretch' their business models or engage their individual network of collaborators to consider these important vulnerabilities in their execution plan? These ideas are central to the synergies analysis, which will be presented in the following section of this report.

10.2| Medium and Low Priority Community Needs

While the SUMA Capstone Team recommends that Ashoka focus on the highest rated vulnerabilities in the community, that does not mean that lesser priority needs should be left out of intervention plans completely. A balance between the kinds of interventions organizations are able to provide and the highest community needs should be negotiated. Ultimately, community needs should drive the areas of greatest resource investment and the team's overall plan of action.

10.2.1| Business as 'unusual'

If an organization contributes its standard interventions but its programs only address the vulnerabilities rated as a low concern for the community, then the organization would be conducting 'business as usual'. However, in the context of the resilience venture, the SUMA Capstone Team is recommending that participating organizations conduct 'business as unusual'. This would entail organizations working together to lend their capacity and skills to the highest needs of the community although it might be outside the scope of their normal operations. Further, rather than simply iterating through interventions in the medium to low need quadrants in priority order to utilize existing joint capacity, novel combinations of interventions may be more effective for increasing resilience in Valle de Vazquez. This insight will be presented in more detail in the next section, which focuses on exploring relationships among vulnerabilities and the potential for collaboration among the participating organizations to create interventions that are highly impactful for the community.

11.1| Types of Synergies

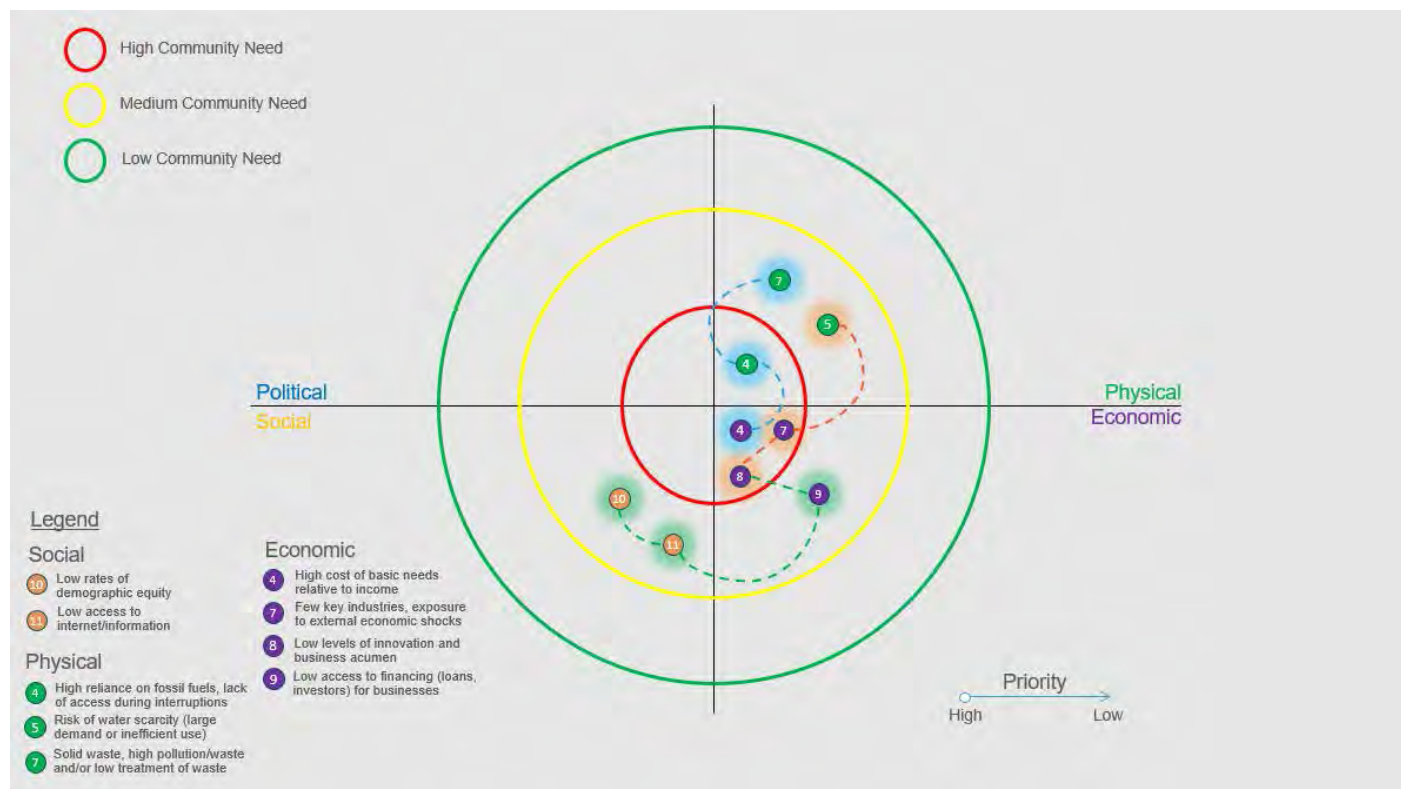
In order to benefit from the fit analysis and use it as a guide to decision-making for collaborative intervention, it is important to dive deeper into its components and find synergies. The concept of synergies, in the context of this project, can be best understood by imagining two types of synergies:

1. **System synergies** refers to connections between community vulnerabilities across different systems. The synergies illustrate how seemingly different systems are interdependent. A lower ranked vulnerability can affect or limit the ability to respond to a higher ranked vulnerability. Similarly, addressing a higher ranked vulnerability can be dependent on successfully improving a lower ranked vulnerability.
2. **Synergies between social organizations** refers to organizations working together to lend their capacity, skills and extended network to address one vulnerability (or a set of vulnerabilities), even if this means working somewhat outside the scope of their normal operations. Using the scope of operations assessment from the Social Organizations Assessment Framework (found in the Social Organizations Capabilities Assessment Folder of the drive), we can differentiate between organizations that have a self-sustaining business model and provide market products or services to VdV, and the other organizations which provide an array of non-market services. The non-market services include advocacy, education & training, technical assistance, finance, and monitoring, that can complement the social enterprise interventions, provided that they are able to raise the required funding.

11 | VALLE DE VAZQUEZ SYNERGIES

11.1.1 | System Synergies

The diagram below illustrates examples of how addressing a lower ranked vulnerability can have a positive impact on a higher ranked vulnerability. These vulnerabilities can be within the same system or across systems.



Synergies across different systems and vulnerabilities.

For example, although the physical vulnerability “Solid waste, high pollution/waste and/or low treatment of waste” is ranked medium/low as per the community assessment, addressing this vulnerability through waste-to-energy initiatives could in turn impact another physical vulnerability such as “high reliance on fossil fuels, lack of access during interruptions” as well as the economic vulnerability “high cost of basic needs relative to income” by diversifying energy sources and lowering energy costs. In this case, tackling a lower ranked physical vulnerability can have a positive impact on a higher ranked economic vulnerability.

Similarly, in Valle de Vazquez, the current electricity cost to pump water negatively impacts water affordability for agriculture, preventing farmers from scaling their businesses and forcing farmers to grow crops that are not water-intensive such as sugarcane as opposed to other potential cash crops. The community assessment ranked “Risk of water scarcity (due to large demand or inefficient use)” as medium priority, since scarcity per se is not perceived as a high vulnerability by the community, however the cost of water procurement is prohibiting expanded economic activity. By implementing technologies that pump irrigation water at a lower cost and via a system which does not depend on large grid infrastructure (e.g.

community or domestic-scale solar energy, addressing water scarcity can improve the overall resilience of multiple systems related to water. Through such interventions, the lower cost of water provides an opportunity to diversify and expand agricultural operations, and this ultimately reduces high ranked economic vulnerabilities such as 'Few key industries, exposure to external economic shocks' and 'Low levels of innovation and business acumen'. (Note that to truly be resilient, a program that leads to increased groundwater pumping should include methods for monitoring water levels in local wells to ensure that groundwater levels are not significantly lowered by the increased water withdrawals.

The two previous examples show how vulnerabilities across physical systems are interdependent with those across economic systems. Social and political systems also have interdependencies to economic systems. An example of a social-economic interdependence is the relationship between social vulnerabilities such as "Low access to internet/information" (Social/Education, and "Low rates of demographic equity" (Social/Cohesion) and the highly ranked "Low levels of innovation and business acumen" (Economic/Industry) and "High Unemployment/Underemployment" (Economic/Employment). Though community members in Valle de Vazquez did not show a deep concern for their limited access to internet or the prevalence of traditional gender roles, these could be factors impacting the higher priority economic systems of industry and therefore employment. The community assessment identified important economic vulnerabilities including 1) little innovation and use of technology in order to scale businesses, diversify or improve efficiency of operations and 2) little ability to provide new opportunities for employment. Considering synergies across systems reveals how addressing social needs such as training the community on internet technologies, and increasing business education and opportunity for all demographics (men and women, different age groups, etc.) can ensure that the maximum number of community members have the essential skills needed to pursue business and employment. Social initiatives can foster an inclusive community which can lead to more community members participating in industries, bringing a greater diversity of ideas, strategies and innovation to the business sector.

11.1.2| Synergies between Social Organizations

Using the “reach of scope” data from the Social Organizations Assessment Framework and the information about each organization’s network, organizations can be divided into those that 1) have a self-sustaining business model and can provide a product or service to Valle de Vazquez, and 2) other organizations that provide non- market services in the areas of advocacy, education & training, etc., which can complement the social enterprise interventions, provided that they are able to raise the required funding. For example, as seen in the screenshots below, Sonriendo con Amor appears to have the capacity to provide a Product or Service for addressing “Low access to health care & mental health support”, while Conciencia Quetzal and Renapred could potentially provide complementary Advocacy, Education & Training and Technical Assistance. In addition, from the network section, it appears that Sonriendo con Amor has a network of Volunteers, and Conciencia Quetzal and Renapred are well connected to a variety of key partners and additional resources that could complement Sonriendo Con Amor’s efforts.

Area	Risk/Vulnerability->Impact	SCOPE OF OPERATIONS		
		Sonriendo Con Amor	Conciencia Quetzal	Renapred
		ALLIED	CORE TEAM	CORE TEAM
PHYSICAL				
Health	Low access to health care & mental health support->reduced individual capacity to respond productively to chronic stressors and acute events (natural disasters, personal problems)	P&S, TA, E&T, M, A	TA, E&T, M	E&T, M, A

Screenshot of Social Organizations Assessment Framework - Mental Health Example

Area	Risk/Vulnerability->Impact	NETWORK		
		Sonriendo Con Amor	Conciencia Quetzal	Renapred
		ALLIED	CORE TEAM	CORE TEAM
PHYSICAL				
Health	Low access to health care & mental health support->reduced individual capacity to respond productively to chronic stressors and acute events (natural disasters, personal problems)	Volunteers 1	Foundations, Cultural and Arts Centers, Media Outlets, Filming and Production, Transport, NGOs, Volunteers, S&MEs	Foundations, Transport, Media and Advertising Corporations, Medicine Supplier, Federal Health Department, Donors, Emergency Brigades, Volunteers 1

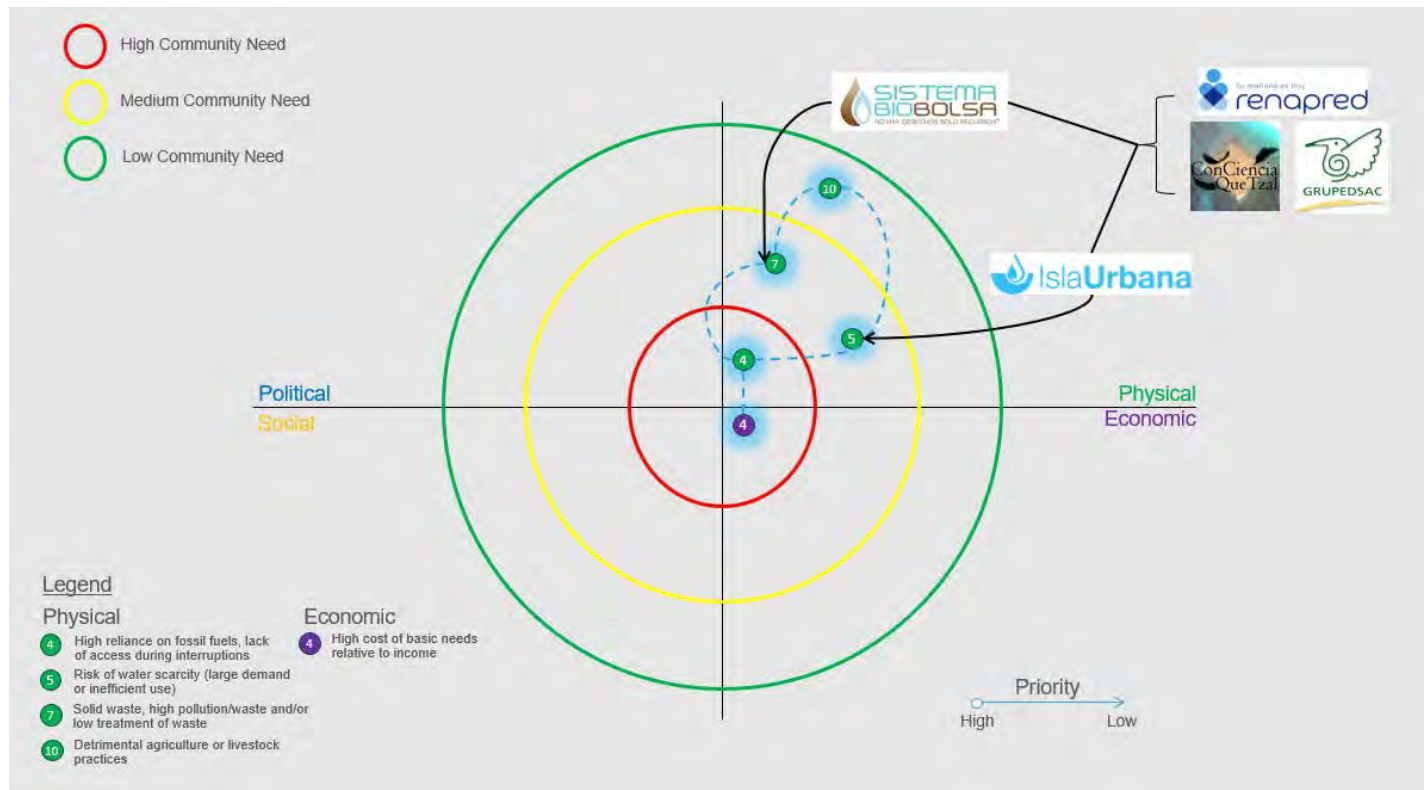
Screenshot of Social Organizations Assessment Framework - Mental Health Example

11 | VALLE DE VAZQUEZ SYNERGIES

11.2| Combining All Synergies

Surveying the two types of synergies, it is possible to imagine scenarios for Valle de Vazquez where the community can benefit from both types of synergies. Examples are depicted in the diagram below.

11.2.1| Combined Synergies Example at the Household Level



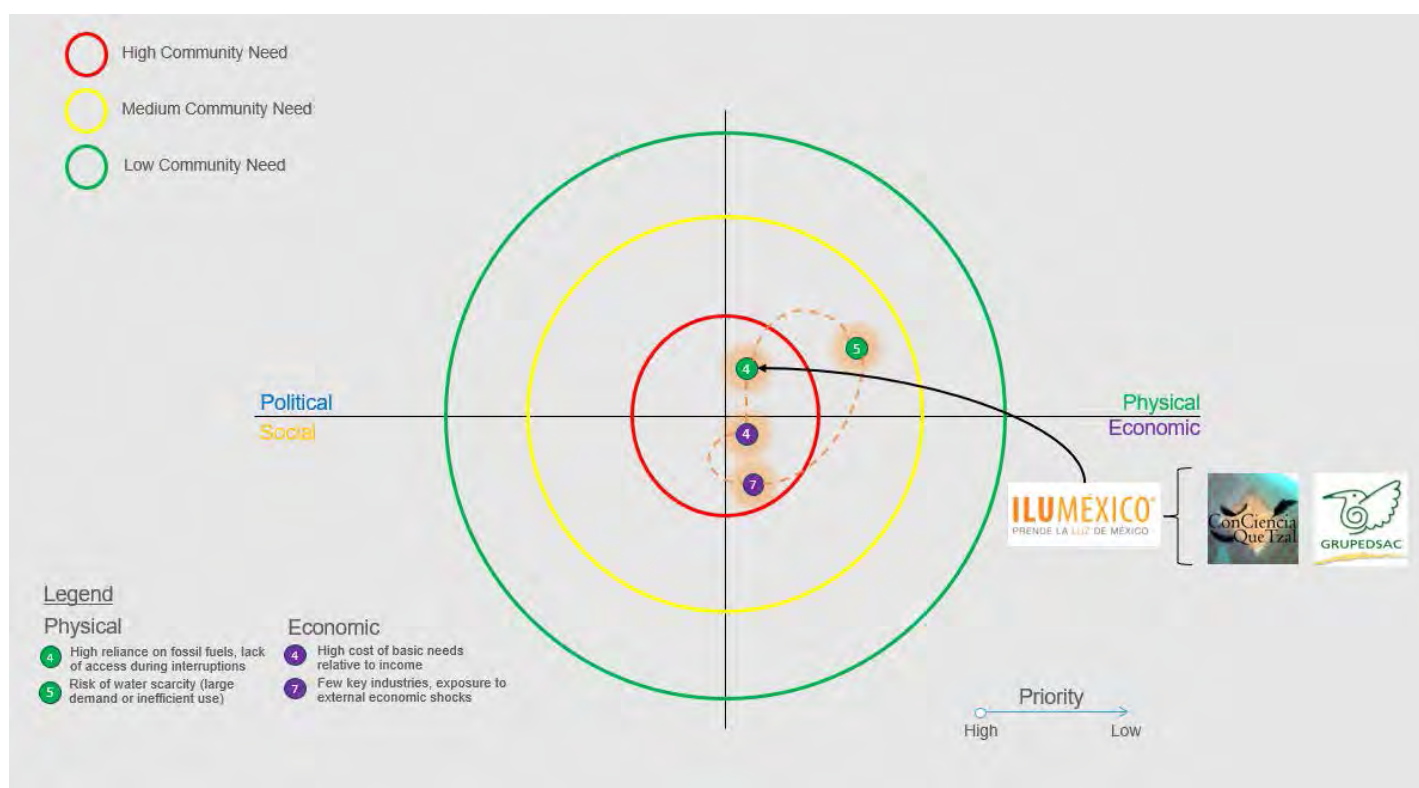
Combination of Synergies among Social Organizations and across Vulnerabilities - Example 1

At the household level for livestock owners, Sistema BioBolsa's services can tackle "Solid Waste, High Pollution/Waste and/or low treatment of waste" (a medium priority vulnerability) with their biodigestion technology which uses animal waste and water to decompose the waste into a slurry which creates energy as a byproduct. Their services can work in tandem with Isla Urbana, whose rooftop rainwater capture systems can improve the "Risk of water scarcity (due to large demand or Inefficient use)", another medium priority vulnerability. The combination of these two products results in water captured by an Isla Urbana tank being fed into the Sistema BioBolsa biodigester as the necessary water input for biodigestion. The household will not have to procure stream water or well water to use the biodigester. The biodigester will break down animal waste into a slurry which can be used as fertilizer. The natural fertilizer can improve "Detrimental agriculture or livestock practices", a lower ranked vulnerability. The families can use the fertilizer to increase the yield and quality of their orchards or vegetable gardens. This process can improve a high priority vulnerability, which is

11 | VALLE DE VAZQUEZ SYNERGIES

“High cost of basic needs relative to income”, by allowing more food to be grown at home reducing the cost to purchase food from someone else or by reducing the cost of purchased fertilizer to grow the food. Simultaneously, biogas produced as a byproduct by the biodigester can provide the family with an alternative cooking or water heating fuel, reducing costs of firewood or bottled propane, further addressing “High cost of basic needs relative to income” and at the same time impacting “High reliance on fossil fuels”. In this example, synergies exist both among organizations and across physical and economic vulnerabilities. Though the main synergy is between the product and services provided by Sistema Biobolsa and Isla Urbana, other organization can play supporting roles. For example, Grupedsac, Conciencia Quetzal and Renapred can provide Technical Assistance, Education & Training, and Monitoring for a more holistic intervention.

11.2.2| Combined Synergies Example at the Business and Agricultural Level



Combination of Synergies among Social Organizations and across Vulnerabilities - Example 2

Another example can be found at the business and agricultural level. As previously mentioned, “Risk of water scarcity (due to large demand or Inefficient use)” is not perceived as a high vulnerability by the community. Rather the community assessment identified the cost of irrigation (and “High reliance on fossil fuels”) as a high concern. Ilumexico has a product which can provide renewable energy, making electricity available at a lower cost, addressing the vulnerability “High cost of basic needs relative to income”. The electricity could be used to pump irrigation water, making it more affordable, and therefore more feasible for farmers to scale and diversify their

business by growing new crops, thereby also tackling the economic vulnerability “Few key industries, exposure to external economic shocks”. In this case, Ilumexico is the only organization with a product or service related to electricity, so the intervention would be heavily based on their participation and business model. However, other organizations such as Conciencia Quetzal and Grupedsac have Technical Assistance, Education & Training, and Monitoring capacities that can complement this intervention.

The above examples show how, by collaborating, organizations can exploit synergies both among their capacities and also across multiple vulnerabilities. Therefore, intervening in a community in a coordinated manner can have more impact than if each organization were to provide services within their own individual implementation plans. Collaboration is encouraged in order to identify the high priority vulnerabilities for which the collective capacity is insufficient as well as to address vulnerabilities that were ranked medium to low priority but have the potential of impacting a higher priority vulnerability. The goal of the deeper analysis is to examine each vulnerability and determine if the collective scope of existing operations can be reimagined, or if there are partner organizations/ collaborators of the participating organizations that can be leveraged to participate as well, thereby increasing the collective capacities of the group.

Finally, lesser priority needs should not be left out of intervention plans completely. Further synergy analysis should explore how using the excess capacity of organizations for the medium to low ranked vulnerabilities could potentially be repositioned and leveraged to positively impact the higher priority vulnerabilities.

CONCLUSIONS



12| CONCLUSIONS

This section summarizes the key conclusions made by the SUMA Capstone Team after devising The Resilience Framework and testing its application via the pilot project in Valle de Vazquez. The summary will assist Ashoka in determining the next steps in Valle de Vazquez and will support the success of its future community resilience projects.

12.1| The Collaborative Network is More Than the Sum of Individual Organizations

Our synergy analysis confirms the immense value of Social Organizations working collaboratively instead of individually within a community.

1. Collaborative work among Social Organizations can contribute to a new system of interactions that reinforce and multiply the impact of individual contributors by creating positive feedback loops across the community.
2. To realize maximum potential, the Social Organizations participating in the collaborative network will need to conduct their business “as unusual”: Social Organizations bring key capabilities to a project that may need to be leveraged in ways that do not align with their typical core missions or standard operations. For example, while Illumexico might normally decline to work in a community like Valle de Vazquez because residents already have a high rate of household electricity coverage, Illumexico’s expertise with solar energy could greatly improve the community by making water pumping for irrigation more affordable, thereby allowing the community to scale their business and impact affordability concerns.
3. A full analysis of organizational capacity of each Social Organization should include the skills and expertise an organization might not identify as central, such as professional networks, innovation or community outreach capacities. These capacities might be of assistance to other organizations in the network.

12.1.1| Ashoka Needs a Clear, Accepted Definition of Resilience and How that Relates to Intervention Strategies to Improve Collaboration

A challenge that became apparent when interviewing Social Organizations was a lack of consensus regarding the definition of resilience and its implications for community interventions. Not having a precise definition of resilience meant that Social Organizations each operated under their own interpretation which led to confusion and difficulty in prioritizing community interventions. For example, the question was raised whether creating a new community center would truly be a resilient intervention or simply an intervention. According to the Resilience Framework presented here, a community center could be resilient but only if a clear, affordable plan to cover electricity and maintenance costs are considered. Those plans could consist of solar power or other technologies that lower the ongoing cost to provide services. It is essential that Ashoka and the participating Social Organizations discuss and refine together the meaning of resilience to ensure they have a common understanding of their goals and to facilitate prioritization and collaboration. Using the generally accepted definition of resilience will also enable Ashoka to select future communities for resilience interventions.

12 | CONCLUSIONS

12.1.2| A Problem in One System can be Solved by Intervening in Another System

The fit and synergy analysis identified the interdependencies of systems and how solutions to one system can significantly impact and improve another system. For instance, an intervention in the physical system such as providing a solar-powered water pump can positively impact affordability which is a subsystem of community economics. This solution is not immediately apparent when looking at each of the Physical Water and Economic Affordability systems alone.

12.2.3| Onsite Interviews Are Essential to Data Gathering

The most effective means of data gathering proved to be community questionnaires and interviews. While extensive academic research can be found on rural resilience, direct engagement with community members is essential to understanding the situation “on the ground”. Interviewing community members and asking them what they need, experience and rely on in their day-to-day lives uncovers key information that can escape remote data gathering efforts. For example, the SUMA Capstone Team did not understand the significance of sugarcane farming to the Valle de Vazquez economy until the onsite visit.

12.1.4| Iterative Levels of Data Collection Are Needed

To maximize interventions, the needs of each community must be defined. It is essential to develop a questionnaire and research methods adapted to each stage of the intervention. In Valle de Vazquez, the initial questionnaire was a compilation of individual organizations’ questions, making the resulting list repetitive and too time-consuming for the community members to complete. In the future, Ashoka should collect information with the following guidelines in mind:

1. In the early stages of the intervention, the questionnaire needs to include questions that attempt to understand community vulnerabilities at a high level across all systems. The Resilience Matrix provides a guide to the vulnerabilities and types of community behaviors that could be addressed in an early-stage questionnaire. Once key vulnerabilities have been identified, a follow-up questionnaire can help gather further details and provide additional data to assess potential interventions.
2. There is no single template for comprehensive community analysis based upon best practices. A bottom-up approach in concert with high level considerations is absolutely paramount in performing the community needs analysis.

12 | CONCLUSIONS

12.1.5| Ashoka Needs to Determine Whether Political Intervention is Within Their Scope

As mentioned, Ashoka's resilience network initiative is unique in the space of resilience actors because it relies on non-profit organizations and social entrepreneurs to develop resilience solutions for communities. In many other places, resilience development is driven primarily by local, state and/or national government entities. The Valle de Vazquez analysis identified the political system as a primary vulnerability that is not effectively met by Ashoka's current network of organizations. While existing Social Organizations may be able to affect political systems at a small scale (for example by working collaboratively with the ejido leaders) , it is essential for Ashoka to determine how it wants to position itself in the future in terms of influencing political channels, for example, through advocacy, activism, etc. Ashoka may decide not to pursue greater political involvement but will then have to accept the limitations of their interventions. The extent of social program funding and the quality of town infrastructure exists within a political context, and its centrality to community resilience should not be underestimated.

12.1.6| Early Stage or Weak Governance Can Hinder Collective Progress

Ashoka's resilience initiative is still in its early stages, which presented benefits and challenges. First it meant that a framework for how to conceptualize resilience had to be developed. It was extremely beneficial to use practical information gathered about Valle de Vasquez in order to refine the framework which can now be used by Ashoka in other communities.

However, a remaining challenge that will not be resolved by the proposed framework is that the governance and organizational structure among stakeholders is still evolving. Without strong governance or control over network organizations, it may be difficult to gather information needed from Social Organizations in a timely manner. The analysis done by the SUMA Capstone Team draws upon the information available at the time, but may be incomplete. Ashoka should work to put in place a governance structure that is strong enough to enable alignment and cooperation while respecting the autonomy of the individual organizations. For example, the group could negotiate and commit to "response turn-around" timelines for future requests for information.

APPENDIX PART 1: USING THE ASSESSMENT



A1 | COMMUNITY DATA GATHERING TOOLS

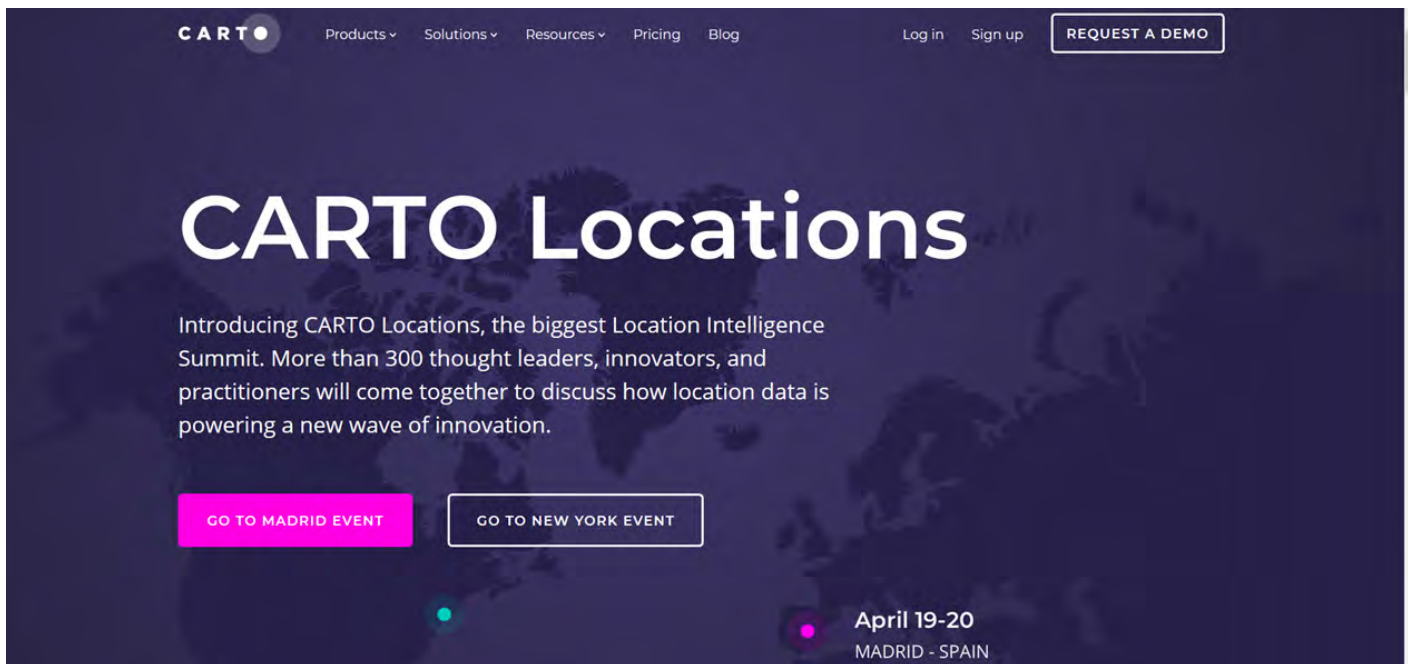
A1.1 | Geographical Information Systems (GIS)

Geographical Information Systems allow the user to create maps with data attached to specific locations on the map. Any spatial data can be mapped. Data is then visualized on the map with icons or other indicators configured by the map creator.

A1.1.1 | Carto

Carto is an online GIS program that is incredibly user friendly. All accounts are free and users are able to upload datasets using any of the supported geospatial data formats, connect to public datasets from the Data Library, or create an empty dataset. All work done in Carto can also be exported to another GIS program and be designated as public or private, depending on the need. Thus, the user is able to add, manage, and connect data resources via an easy to use process on any computer at anytime without having to take a GIS course.

Link: <https://carto.com/learn/guides/intro/getting-started-with-carto-builder/>.



Screenshot of Carto Website

A1 | COMMUNITY DATA GATHERING TOOLS

A1.1.2| Inegi

Inegi is a part of the National Institute of States and Geography for the state of Mexico. Inegi possesses key GIS information, shape-files and databases necessary for building a map with varying layers. The data can be applied to any GIS program.

The screenshot displays the INEGI (Instituto Nacional de Estadística y Geografía) website. The header includes the INEGI logo, navigation links (Inicio, Contacto, Siguenos), and social media icons. A main banner features the 'Encuesta Nacional de Victimización de Empresas 2018' and the survey period 'del 26 de febrero al 30 de abril de 2018'. Below the banner, there is a section titled 'México en cifras' with a map of Mexico and a dropdown menu for selecting a state or municipality. To the right, there is a section for 'Ciclos económicos' with a line graph. The footer includes links for 'Noticias', 'Calendario', and 'Sala de prensa', along with the date '28 de marzo de 2018'. The bottom right corner features the 'SNI-EG' logo and a '2016 REPORTE ANUAL' banner.

INEGI INSTITUTO NACIONAL DE ESTADÍSTICA Y GEOGRAFÍA

Inicio | Contacto | Siguenos: RSS Twitter Facebook YouTube

Estadística ▾ Geografía ▾ Investigación ▾ Productos y Servicios ▾ Acerca del INEGI ▾

Encuesta Nacional de Victimización de Empresas 2018

Periodo de levantamiento: del 26 de febrero al 30 de abril de 2018

De interés

- Anuario estadístico y geográfico de los Estados Unidos Mexicanos
- Censos Económicos 2014
- Índices de Precios
- DENUE
- Microdatos
- Gobierno
- Ocupación y empleo
- PIB y Cuentas Nacionales de México
- Encuesta Intercensal
- Para desarrolladores

México en cifras
Información nacional, por entidad federativa y municipios

Seleccione la entidad en el mapa o en la siguiente lista:
Estados Unidos Mexicanos ▾
Ir

Ciclos económicos

SNI-EG
Sistema Nacional de Información Estadística y Geográfica

2016 REPORTE ANUAL

Noticias | Calendario | Sala de prensa

28 de marzo de 2018

Screenshot of INEGI Website

A1 | COMMUNITY DATA GATHERING TOOLS

A1.1.3| TripCarta

TripCarta can be used to extract information about topography that can be put into Arcmap, Esri. For example, for Valle de Vazquez one can discover the mountainous range alongside the town. Precipitation rates can be verified by ConAgua, the government of Mexico's precipitation monitoring system. TripCarta also shows the Rio de Cuero and direct downward slope towards the city. Valle de Vazquez is able to divert water from the Rio de Cuero to irrigate farms because of the unique topography shown. This tool can provide critical information about waterways and topography without having to do an onsite visit.

Link: <https://tripcarta.com/19393768/Map>



Example of Trip Carta Map of Valle de Vazquez

A1 | COMMUNITY DATA GATHERING TOOLS

A1.1.4| ArcMap - Esri

Arcmap is a widely accepted, professional GIS tool. It has the capacity and tools to conduct any geographical assessment an organization wishes to analyze, but requires proper training or use of online videos to truly harness the power of the program. If Wifi is available, Arcmap has an app that enables users to mark data points while being in the field and that can be easily transferred to the desktop version. If Arcmap is used by a trained associate, this tool is highly recommended as data can be imported from any GIS platform.

Link: <https://www.esri.com/en-us/home>



First example of Esri Map of Valle de Vazquez



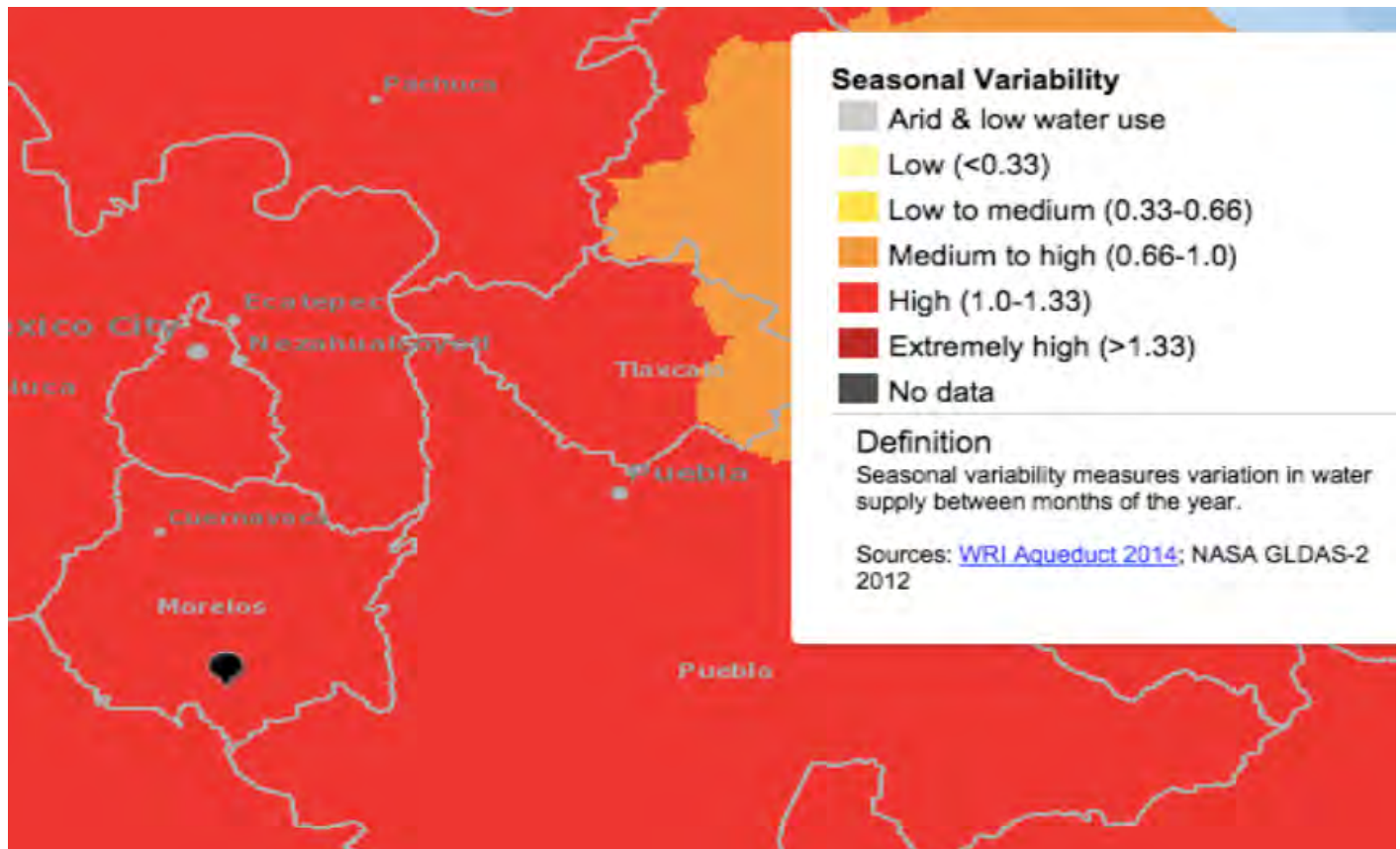
Second example of Esri Map of Valle de Vazquez

A1| COMMUNITY DATA GATHERING TOOLS

A1.2| Aqueduct : Assessing Water Risk

The Aqueduct Water Stress Projections Data include indicators of change in water supply, water demand, water stress, and seasonal variability, projected for the coming decades under scenarios of climate and economic growth. This analysis models potential changes in future demand and supply of water over the next three decades. Globally, Aqueduct estimates indicators of water demand (withdrawal and consumptive use), water supply, water stress (the ratio of water withdrawal to supply), and intra-annual (seasonal) variability for the periods centered on 2020, 2030, and 2040 for each of two climate scenarios, RCP4.5 and RCP8.5, and two shared socioeconomic scenarios, SSP2 and SSP3.

Link: <http://www.wri.org/our-work/project/aqueduct>



Valle de Vazquez Example in Aqueduct

A1| COMMUNITY DATA GATHERING TOOLS

Running the tool for Valle de Vazquez as an example reveals high seasonal variability and high flood likelihood:

- Baseline Water Stress: Med-High
- Inter Annual Variability: Low-Med
- Seasonal Variability: High (Rainy season : June-Sept; Almost no rain : Jan-March)
 - Flood Occurrence: High
 - Drought Severity: Low-Med Upstream
- Storage: No Major Reservoirs
- Return Flow Ratio: Low-Med

A1.3| Conagua : Assessing Rainfall Pattern

ConAgua is a government website that tracks census and precipitation data for all cities within Mexico. It has historical data thereby enabling a researcher to see any climate change trends, economic trends, and income distribution. This site also has information about the various municipalities throughout Mexico, the areas they serve and areas they do not serve. This tool is incredibly useful to determine the amount of resources available for any city and can help Ashoka find useful information before a community assessment has been conducted.

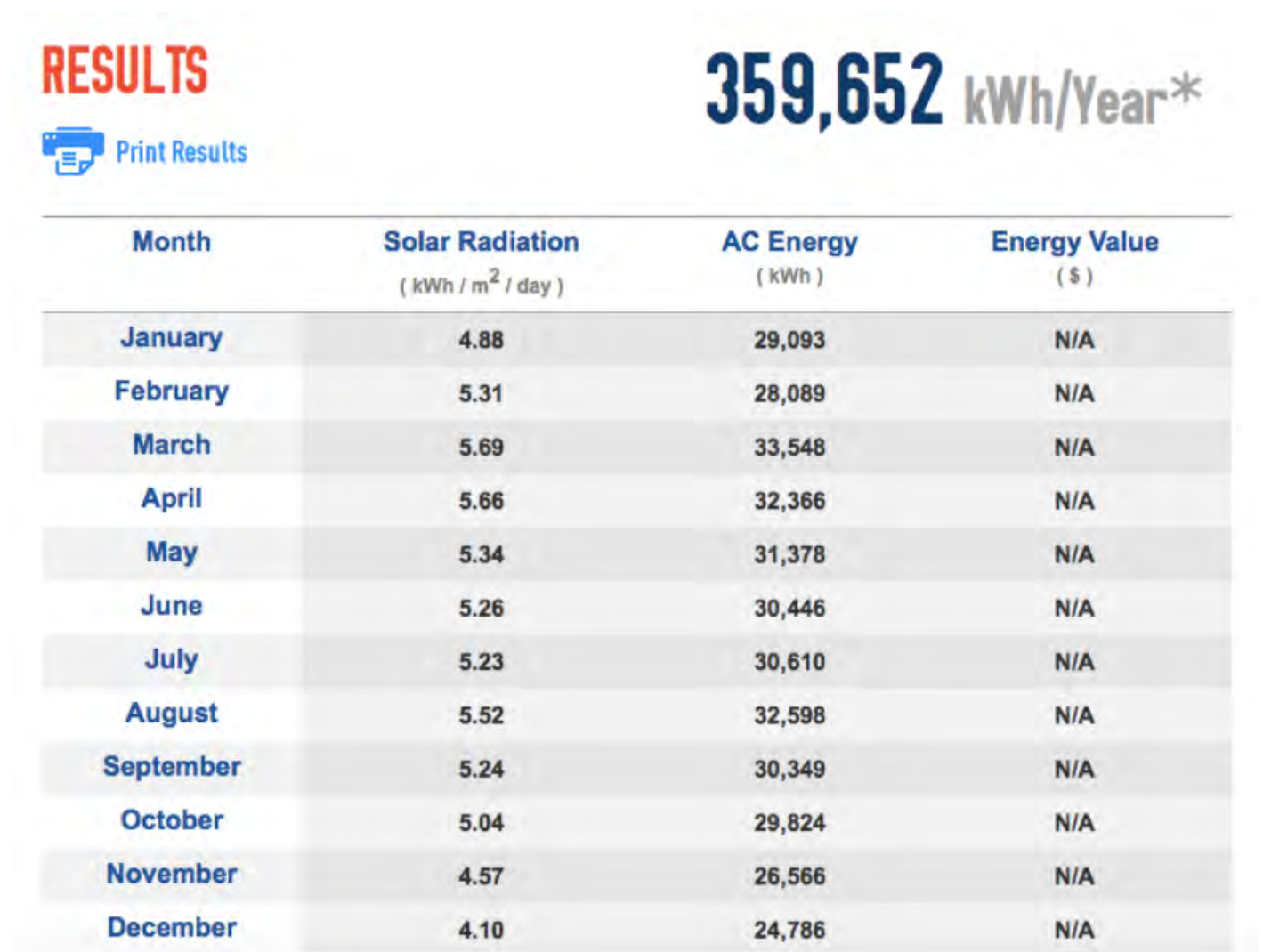
Link: <https://www.gob.mx/conagua>

A1 | COMMUNITY DATA GATHERING TOOLS

A1.4 : PV Watts Calculator: Assessing Solar Potential

NREL's PVWatts® Calculator is a tool that assesses the solar potential of a specific area by estimating the energy production and cost of energy of grid-connected photovoltaic (PV) energy systems. It allows homeowners, small building owners, installers and manufacturers to easily develop estimates of the performance of potential PV installations.

Link: <http://pvwatts.nrel.gov/>



Energy Production - Solar System Output in Valle de Vazquez. Source: PV Watts Calculator website

A2| DATA GATHERING: ONSITE FIELD GUIDE FOR WATER, AGRICULTURE & DAIRY

Extensive instructions for on site data gathering as well as references to specific tools and other resources can be found in the Field Data Guide for Onsite Data Gathering document on the Supplemental Documents Drive. Topic addressed in the document include:

- Water Testing
 - Overview
 - Test Procedures
 - Test Items
- Agricultural (Orchard) Testing
 - Overview
 - Species Identification
 - Diameter at Breast Height
 - Tree Condition
 - Tree Height
 - Canopy Diameter
 - Annual Fruit Yield
- Dairy Farming
 - Overview
 - Farm Biosecurity Risk Assessment

An abbreviated version of water testing and agriculture testing can also be found in Appendix 6 and Appendix 7 which describe specific test procedures and results for Valle de Vazquez.

A3| RISK ASSESSMENT MODELS

A3.1| Risk Assessment Overview

Risk is the probability that a hazard will result in an adverse consequence. Assessing risk of potential hazards helps to determine the proper mitigation strategy and priorities. Risk ratings and scaling can show where additional resources are required. This appendix outlines three available models that can guide qualitative and quantitative risk assessment.

- Hazard Ranking Methodology
- IADB Rapid Assessment Framework
- Risk Assessment for Resiliency Planning

These models identify critical issues, prioritize poorly performing sectors, and assist in developing an plan of action for innovative, feasible solutions.

A high degree of training is required to consistently and accurately rate probability of occurrence and severity of consequences. Experienced risk analysis staff should do risk assessments to ensure reliability of risk assessments.

A3.2| Hazard Ranking Methodology

A3.2.1| Objective and Background

The All Hazard Mitigation Plan was created in response to the Disaster Mitigation Act of 2000 (DMA 2000). The methodology is used by Tetra Tech (a consulting and engineering services company) in New York, USA.

The framework evaluates risks on both a qualitative and relative basis. It is used by many government agencies as the primary tool for identification of possible hazards and establishing priorities. The hazard ranking is done on the basis of the impacts on population, property and the economy.

A3.2.2| Methodology and Assumptions

Using this framework, hazards are ranked to describe their probability of occurrence and their impact on population, property, and the economy. A review of historic events can be used to assist with probability of occurrence of hazard but other factors should be considered as well.

A3 | RISK ASSESSMENT MODELS

Rating	Probability	Definition
1	Rare	Hazard event is likely to occur less than once every 30 years.
2	Occasional	Hazard event is likely to occur less than once every 5 years, but more often than once every 30 years.
3	Frequent	Hazard event is likely to occur more than once every 5 years.

Probability of Occurrence Ranking Factors. Source: DMA 2000 Hazard Mitigation Plan – Village of Briarcliff Manor, New York July 2007 Report.

The risk ranking for each hazard is then calculated by multiplying the numerical value for probability of occurrence by the sum of the numerical values for impact. The equation is as follows:

$$\text{Probability of Occurrence} \times \text{Impact Value} = \text{Hazard Ranking Value}$$

Based on the total for each hazard, a priority ranking is then assigned to each hazard of concern (high, medium, or low). Because risk identification and rating establish priorities, this assessment should be incorporated early in the evaluation process.

Finally, a weighting factor is assigned to each impact category: three (3) for population, two (2) for property, and one (1) for economy. Impact on population represents the health and wellbeing of the community and is therefore given the greatest weight. The table below presents the numerical rating, weighted factor and description for each impact category

Category	Weighting Factor	Low Impact (1)	Medium Impact (2)	High Impact (3)
Population	3	No injuries or loss of life; Evacuation or short-term sheltering is not necessary	Minimal injuries or death; Limited/localized evacuation and short-term sheltering	Large number of injuries or death; Massive evacuation and/or sheltering operation
Property	2	Limited damage or loss	Local resources are adequate to repair/replace the loss	Major damage or destruction; State and/or Federal resources may be necessary to restore the loss
Economy	1	Limited to no impact	Short-term/Temporary disruption; Losses are easily recovered	Long-term disruption

Numerical Values and Definitions for Impacts on Population, Property and Economy. Source: DMA 2000 Hazard Mitigation Plan – Village of Briarcliff Manor, New York July 2007 Report.

A3| RISK ASSESSMENT MODELS

An example of ranking after the weighting is applied:

Hazard Ranking	Hazard of Concern	Category
1	Severe Storm (windstorms, hurricanes, tropical storms, thunderstorms, hail, lightning and tornados)	High
2	Flood	High
3	Severe Winter Storm	High
4	Vehicular Accident (including hazardous materials in transit)	Medium
5	Wildfire	Low
6	Drought	Low
7	Earthquake	Low

Hazard Ranking Results for Hazards of Concern for the Village of Briarcliff Manor. Source: DMA 2000 Hazard Mitigation Plan – Village of Briarcliff Manor, New York July 2007 Report

A3.2.3| References

The “All-Hazard Mitigation Plan (HMP or Plan)” i.e. a hazard ranking methodology developed by the Village of Briarcliff Manor (Village) in Westchester County (WC), New York in response to the requirements of the Disaster Mitigation Act of 2000 (DMA 2000), :

Link:http://www.briarcliffmanor.org/Pages/BriarcliffManorNY_Trustees/HMP/Section%205.3%20Hazard%20Ranking%20-%20Final.pdf

A3| RISK ASSESSMENT MODELS

A3.3| IADB Rapid Assessment Framework

A3.3.1| Objective and Background

The Rapid Assessment Framework was created by the Inter-American Development Bank (IDB) in 2010 in response to rapid and largely unregulated urbanization in the Latin American and Caribbean (LAC) region, and the resulting urgent need to deal with the sustainability issues faced by the region's rapidly growing intermediate-size cities.

The framework evaluates risks on a qualitative and relative basis. It is used to identify critical issues and evaluate resources via key indicators and benchmarks thereby resulting in areas of potential concern.

A3.3.2| Methodology and Assumptions

The framework addresses three dimensions of sustainability: environmental sustainability and climate change, urban sustainability, and fiscal sustainability and governance. The environmental dimension includes topics such as air and water quality, mitigation of greenhouse gas emissions, adaptation to climate change, reduction of vulnerability to natural disasters, and utilities coverage. The urban dimension looks at the physical, economic, and social aspects of urban development. The fiscal and governance dimension looks at characteristics of good governance, such as transparency, public participation, and management for results, as well as cities' fiscal practices, such as service cost recovery, debt management, and public investment. This multi-sectoral approach allows cities to overcome typical pitfalls associated with thinking in sectoral silos.

The framework has one to nine indicators for each of 23 different topics related to the environmental, urban, and fiscal/governance dimensions of sustainability. There are three ranges to classify the value of each indicator as "green" (sustainable, good performance), "yellow" (potentially problematic performance), or "red" (unsustainable, highly problematic performance). Based on the resulting color designations of each topic's indicators, the topic itself is classified as red, yellow, or green.

The topics that are classified red, or critical, are then evaluated and prioritized based on three criteria ("filters"): public opinion (how important this issue is to the citizens), vulnerability to climate change (impact of climate change on this topic or mitigation problems associated with this topic), and the potential cost of the issue to the city's economy (i.e. cost of not resolving the problem). With the community's input and approval, the two to five topics with the highest scores in these three prioritization exercises are selected to be the subject of the action plan. Specialists, consultants, city officials, and other relevant actors then analyze the prioritized topics in more depth, and begin to develop solutions to the selected topics, choosing the best combination of solutions for the plan.

If no adequate data is available, information from comparable contexts—that is, with similar socioeconomic, cultural, and geographical characteristics—can be used.

A3 | RISK ASSESSMENT MODELS

Water quality

Topic:	Sub-Topic:	
Water	Efficiency in the water supply service	
Definition		
Percentage of water samples in a year that comply with national potable water quality standards		
Methodology		
Many water utilities will carry their own sampling campaigns for treated water, covering treatment plants and some representative network points. The analysis is made either by an internal or external laboratory. The operation unit of the water utility will keep records on the historical results of the water samples. Usually the figure for the water quality indicator is estimated as a monthly average.		
Benchmarks		
Green	Yellow	Red
> 97%	90–97%	< 90%
Rationale		
Water is one of the great necessities of human life. A supply of clean water is absolutely necessary for life and health, yet many people lack access to adequate water supply or can only obtain it at high prices. Improving access to safe water implies less burden on people, mostly women, to collect water. It also means reducing the global burden of water-related diseases and improving the quality of life.		
(Based on ERM 2006: <i>The Current Status of City Indicators</i> . Discussion Paper – Annexes. Indicator 4: Access to safe water.)		
Other organizations or agencies that use this indicator		
Ministry of Urban Development, Government of India		

Description of Water indicator. Source Issuu website, IDB-ESCI Methodological Guide

A3.3.3 : References

IDB-ESCI Methodological Guide - Emerging and Sustainable Cities Initiative

Link: https://issuu.com/ciudadesemergentesysostenibles/docs/methodological_guide__esci

A3| RISK ASSESSMENT MODELS

A3.4| Risk Assessment for Resiliency Planning

A3.4.1| Objective and Background

The framework evaluates risks on absolute scale. It is used by many government agencies, Disaster Management corporations, and consultants in conjunction with local governments as the primary tool to quantify the impact of the various risks in terms of potential losses and to model the needed recovery costs. It is intended to minimize risk exposure by building the case for mitigation or adaptation measures.

A3.4.2| Methodology and Assumptions

Evaluation of risk is performed based on statistical probability or determined events ("what if...?" scenarios). Using actuary industry probability index standards of measurement, the model uses the risk level as a metric for development and to gauge current resiliency levels.

- Risk resides at the overlap of three domains:
- Hazard (Natural Disaster or Man-made)
- Assets (Exposure)
- Vulnerability (Physical or Social or the assets given the hazard)

The domains are multiplied to provide a risk score:

$$\text{Event Risk} = \text{Probability (Hazard)} \times \text{Asset Value} \times \text{Vulnerability (Physical/Social)}$$

Probability of Loss is defined separately taking into account the probability of the event and the probability of a negative consequence:

$$\text{Probability of Loss} = \text{Probability of Hazard} \times \text{Probability of Consequence}$$

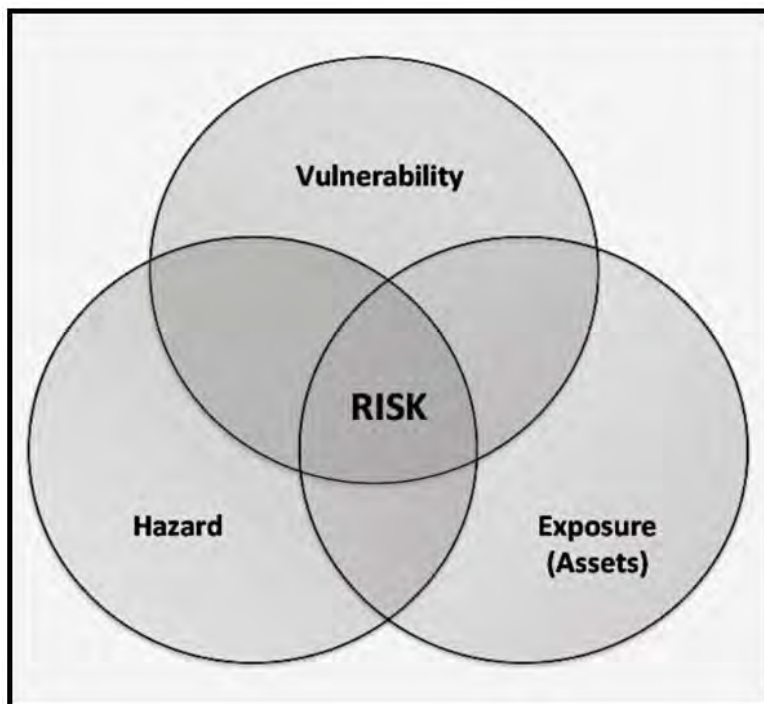
Then we can measure up the entire region for risk with

$$\text{Region Risk} = \text{Sum (Region)} \times (\text{Hazard} \times \text{Asset} \times \text{Fragility})$$

A3| RISK ASSESSMENT MODELS

A comprehensive risk analysis can be done on several dimensions:

- A. Quantifying the different hazards in terms of their severity and frequency of occurrence and map them spatially within a region
- B. By evaluating the assets (monetary value and importance to livelihood) that are exposed to the different hazards
- C. By evaluating the vulnerability (Fragility) of the assets to different hazard types and severity (i.e. Building ability to withstand earthquakes)
- D. GIS tools where available) and estimating the loss magnitudes vs their frequency of occurrence. Adding up all likely losses (small and big) over time, over space and analyzing their economic and social impacts on the national, regional and community levels and by sector for the national and local economies.



Venn diagram for representing risk components for resiliency planning. Source: Jacob, K. (2017) "Lecture 1: Course Preview [Power Point slide]." Retrieved from Lamont-Doherty Earth Observatory of Columbia University: Disaster Risk Management & Sustainable Urban Resilience.

A3.4.3 : References

Framework for shared drinking water risk assessment

Link: <http://prod.sandia.gov/techlib/access-control.cgi/2017/170241.pdf>

A4| RESILIENCE PROFILE TEMPLATE

The following template should be used to construct a Resilience Profile for each social organization in the network.

<p>ORGANIZATION'S LOGO</p>	<p>CORE TEAM / ALLIED TEAM Ashoka Fellow / Non-Ashoka Fellow</p> <p>Organization: [NAME] Contact Person: Title: Email: Link:</p>
<p>VALUE PROPOSITION</p> <p>[Descriptive paragraph]</p>	
<p>CUSTOMER SEGMENT</p> <p>[Descriptive paragraph]</p> <p>ACTIVITIES</p> <p>[Descriptive paragraph]</p>	
<p>KEY PARTNERS</p> <p>- [LIST]</p>	<p>KEY RESILIENCY AREAS</p> <p>[List 1-5. If additional areas are added or removed, mark and explain below]</p>

NATURE OF INTERVENTION [EXAMPLE]

SCOPE OF OPERATIONS



REACH OF OPERATIONS



RELEVANT PROJECTS

[Descriptive paragraph]

OBSERVATIONS

[Descriptive paragraph]

[LIST OF RESILIENCE VULNERABILITIES IDENTIFIED]

APPENDIX PART 2: VALLE DE VAZQUEZ DATA



A5| VALLE DE VAZQUEZ INTERVIEW SUMMARY

The SUMA Capstone Team visited Valle de Vazquez in March 2018 to learn more about community life and to gather information needed to complete the Community Assessment.

A5.1| Interview with Cheesemaker

The following are the key items that we learned about a cheesemaker's dairy business and operations after interviewing her in Valle de Vazquez:

- She does not own cows, but buys the milk from dairy cow owners in Valle de Vazquez.
- She makes cheese, cream and curd.
- Curd is made from the whey, byproduct of cheese making.
- To make curd, she boils the whey using firewood-she has tried with a gas cooker but the flame is not strong enough for the process.
- Any further residuals are discarded or fed to pigs.
- Queso Communo has a 1:10 yield from milk.
- The older the cow the better the cheese yield from the milk.
- Best milk is found during the rainy season, since it is the season when cows are mostly grass fed. The feed affects the quality and taste of the milk and this varies with the seasons.
- Cheese making is her primary job and she makes around 20 kilos per day.
- She sells in Valle de Vazquez and Jojutla two days a week and dedicates the rest of the week to making cheese.
- She has four fridges for storage. Though they are not all used at the same time all the time, she has a high cost of electricity. Electricity is metered and tiered. The more expensive pricing tiers for businesses keeps her from registering her address as a business rather than a home- by being registered as a home, it keeps the electricity cost lower. She mostly stays in the lower tier for residential, is quiet about her business so that she is not charged the business rate.
- Her current cost of electricity is about 800 pesos every two months.
- She also sells chilled beer to optimize the use of refrigeration. However she does not advertise this.
- There are five other cheese producers in Valle de Vazquez who produce similar amounts as her, but they all vary slightly in taste and texture.
- Household waste water goes to the septic tank which is 3-4 meters down
- She has 2 water systems, 1 chlorinated for household use, and another which is not potable.
- She has chickens and dogs but no other animals.
- She takes care of her grand daughter while her daughter works in a nearby town

A5| VALLE DE VAZQUEZ INTERVIEW SUMMARY

A5.2| Interview with Lime Orchard Farmer

The following are the key items that we learned about agricultural practices from a lime orchard after visiting it in Valle de Vazquez and interviewing the main person in charge:

- He has two hectares of land and 150 plants
- Trees are planted approximately 3-4 meters apart on a rough grid
- Harvest season is spring
- Has problems with insects and pests but does not want to use pesticide because goats will come in and eat it, causing them to fall ill or die.
- At one time, he used water from a stream nearby via a hose. But a landslide closer to source blocked the stream 5 years ago. He now uses a hose that connects to a water source further away. Has a tank to store water. The tank fills, the water is distributed to the plants via a hose with holes along it to allow for drip irrigation. He has rows of plants and moves the hose to water them (rather than having a hose per row). Tank capacity is 1100 liters and it takes three hours to fill
- More water doesn't bring more harvest- in the rainy season, the harvest is the same
- He also separately has 10 cows in his backyard and uses the cow manure for fertilizer sometimes
- Believes that yield is approximately the same each year but is not sure because he just started the orchard two years ago
- His main objective is his own consumption (most of the yield) but takes the rest of the yield to a market 1 hour away
- He has another job - he is a combi driver and the orchard is for additional income and food. As combi driver makes 6 trips per day to Jojutla
- He also tends to his cows. He is the only one in his family harvesting and raising cows
- He uses piped water for home and cows but stream water from nearby ranch for the lime orchard
- Discussion regarding the town's central water system:
 - Cost of energy for pump/well: always expensive
 - Horsepower of well shakes earth
 - Agriculture water is diverted via canals from River Cuautla and there is a water quota for a for the collection of nearby ejidos. Valle de Vazquez gets preference in negotiations because they have a natural disadvantage of being downstream.
 - Trying to restore the canal where the landslide occurred is unlikely.
 - Canal probably has fertilizer waste from upstream.
 - Con Agua is the water utility for potable water
 - Domestic water bill is 100-110 per month per household

A5| VALLE DE VAZQUEZ INTERVIEW SUMMARY

A5.3| Interview with Community Members

A5.3.1| Women's Group

- When asked about what they would like to see improved, women mentioned medical services
- Women would like to see the community area to have a nice park with lighting at night (since it is too dark), workshops and training for women, and exercise classes.
- During the rainy season, electricity is frequently disrupted by storms; the typical disruption is twice a week but the longest was 15 days
- During the dry season, they have not received potable water for up to 5 days
- One household of 5 people pays \$300 per month for electricity; another pays \$500 per month for 6 people; both live 15 minutes by foot from the town center
- The names we noted were: Margarita Bahona Mayera-Tapia; Maria Luisa Rivera Figeroa; and Vianey Sorrano Sanchez
- Women are proud and happy with the education provided to their kids up to and including high school, although high school conditions at the moment are not optimal because students get distracted by the heat and noise.
- Most women work at home (mostly cooking), but some help in farms
- Their highest cost is food
- They only leave VdV on weekends with family
- They communicate with radio broadcasts throughout town
- For earthquakes, there is no emergency training or evacuation plan. This only exists for school children
- A sample household is home to a woman and her husband (farmer), their two daughters and a granddaughter who attends kindergarten.
- They mentioned there is no doctor in the health center. This is really dangerous because of the number of scorpions and dengue-carrying mosquitoes in the area. Scorpions mainly appear when there is a lot of wind
- Transportation needed to reach nearest health facility with a doctor (it is in Jojutla which is 30 minutes away).
- Young people who get degrees tend to end up moving to Cuernavaca or Mexico city to get jobs. People are concerned about the lack of jobs.
- Some people do not always have enough food. If for example they work at a farm and get paid by day, sometimes it is not enough.

A5| VALLE DE VAZQUEZ INTERVIEW SUMMARY

A5.3.2| Men's Group/Dairy Farmers

- Some make cheese as well as milk to sell outside the community
- A dairy farmer said that he milks the cows and his wife makes yogurt and cheese to sell in the Jojutla market
- They use the cows' waste as fertilizer. Some of them sell it but it's cheap and not a main source of income. Cows eat grains, in rainy season they can graze in grasslands
- Their young adult children leave the community for jobs in Jojutla or Cuernavaca because they are not interested in farming
- When asked what was lacking they mentioned the lack of a good farmers' or food market in Valle de
- Vazquez - they go to Jojutla or Cuernavaca for things that are not produced locally
- Cost of water pumping prevents them from scaling their business and irrigating other crops. Sugar cane is not a water demanding crop hence why it is their main crop
- A farm owner says he pays 1404 pesos of water per month to irrigate 1,200 square meters of sugarcane. He would grow crops such as alfalfa and maize if he could afford more water.
- There are different sized dairy farms e.g. 20 x 20, 20 x 30, 40 x 40. The biggest hold around 50 animals.
- Some dairy farmers make cheese, others sell their milk, or breed calves. Some just use animals for own consumption.
- Milk production is around 8-10 liters per cow per day

A5| VALLE DE VAZQUEZ INTERVIEW SUMMARY

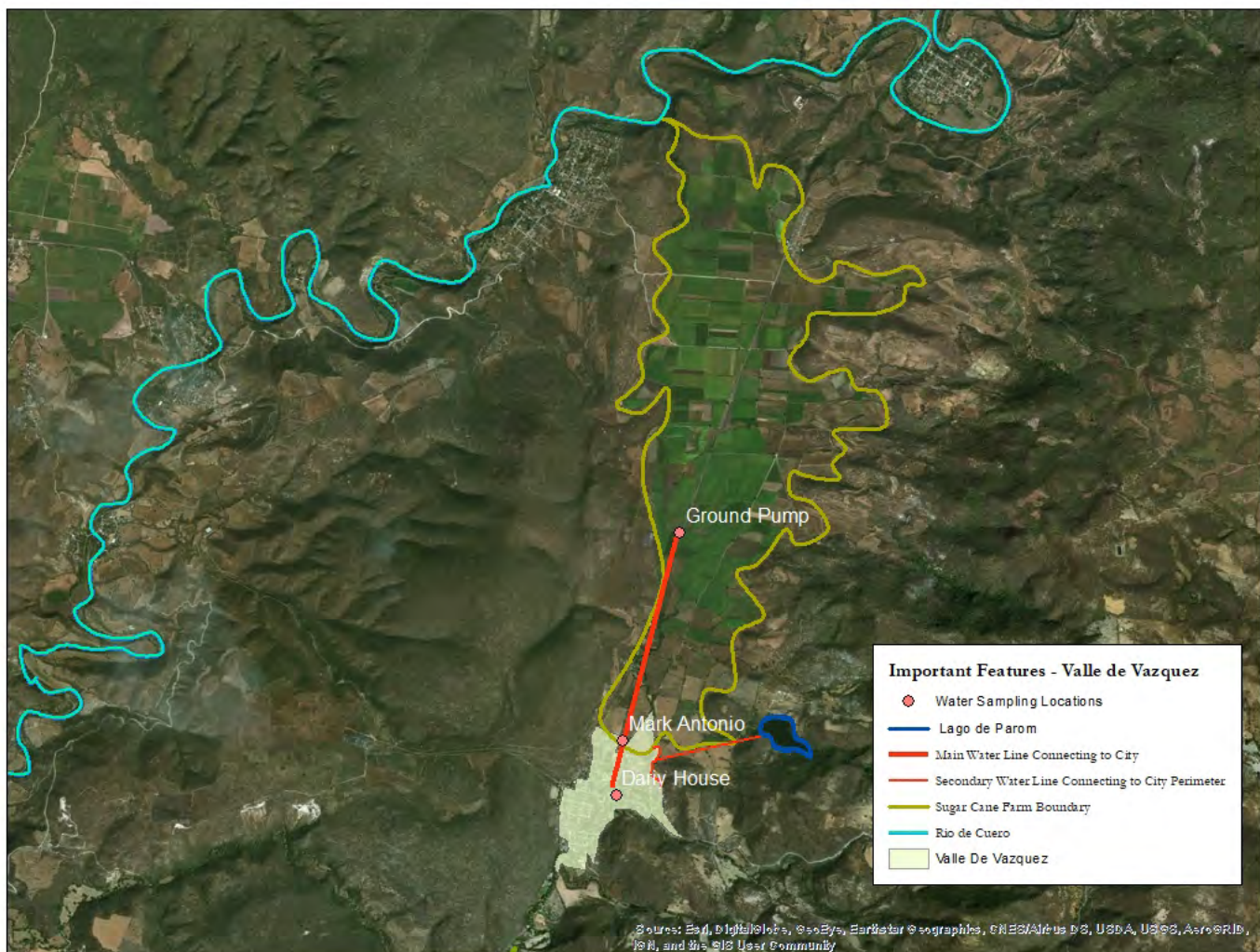
A5.3.3| Other Interviews

- The community operates under the ejido system. There is no private property. People are granted permission to a plot of land and work on it.
- For governance, the ejido committee selects a representative. Decisions regarding property are made as a community.
- After the earthquake, there was not much damage to roads, but the ones that were damaged were those that went from Valle de Vazquez to towns further away (i.e. not the roads from populated centers to Valle de Vazquez)
- There is no fireman, police or health services available
- There was a doctor in the community before the earthquake but the clinic was destroyed during the earthquake and doctor left
- Houses throughout the town center have enclosed outdoor areas and keep cows, goats or sheep
- Flowering and fruiting trees are common throughout, but most plants are decorative, not edible
- Private wells were about 9-11 meter deep, with around 2 meter fluctuation in depth between dry and wet seasons
- Town owns sugar cane and there is profit sharing from the income. It is the main source of income for the community.
- Other: On LW's first visit in January, the woman running the project for Echale mentioned that the government provided partial funding for material and labor for rebuilding the houses (some funding was paid to households in cash, another part paid directly to the contractor).

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.1| Water System Overview

Valle de Vazquez, Mexico has a three-part water system that provides water for every aspect of the town. The first part of the system involves the Rio de Cuero, which is located north of Valle de Vazquez and is diverted through a series of canals to provide irrigation water to 140 hectares of sugarcane. The Rio de Cuero has water year round, but the flow of water dwindles during the dry season, which may be exacerbated by climate change. The second part of the water system is a lake, called Lake Parom, located northeast of the city, and it provides water to twelve homes situated on the northern city limits. During the summer, the reservoir dries up, and residents are forced to drive into town and fill their cisterns with groundwater. Therefore, the final part of their water system is a groundwater pump located on Morelos Alpuyeca street. The groundwater pump is eighty meters deep and belongs to the government of Mexico. Unfortunately, the groundwater pump only provides water to homes located near the center of the city. Thus, most homes on the parameter limits have private wells to draw up groundwater.



Valle de Vazquez GIS Map, Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

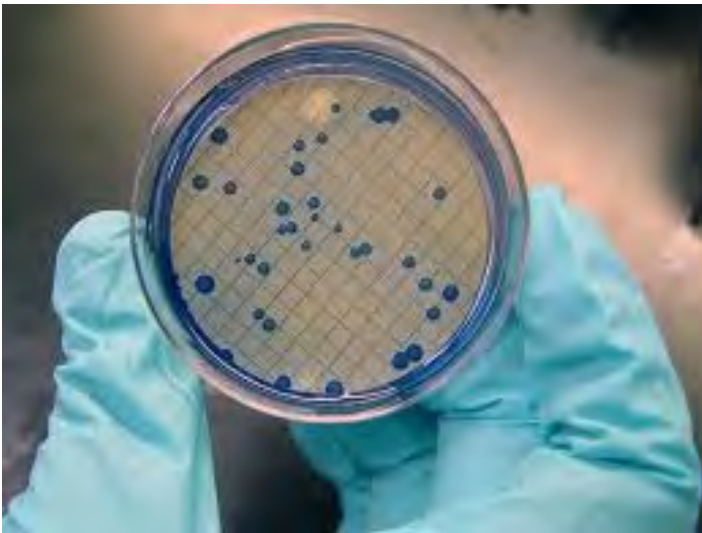
A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.2| Definition and Standards

Water quality should be routinely monitored at the service tap and source of water, especially if the source of water is located near significant agriculture production. It is recommended that water temperature, pH, conductivity, turbidity, color and E. coli are regularly monitored for a permanent water supply. Also, routine sanitary inspection of a temporary water supply is also critical. If any problem related to water quality arises, remedial actions should be taken promptly.

A6.2.1| Bacteria

Bacterial growth in potable water can be from many different forms of bacteria. However; coliform bacteria is the most common form of growth and can pose health concerns. In general, coliform bacteria is in feces of all warm-blooded animals and humans and is an indicator for the presence of disease-causing organisms. There are three groups of coliform bacteria: total coliform bacteria, fecal coliform bacteria, and E.Coli. Total coliform bacteria are usually harmless, especially if lab results only identify this form of bacteria. Fecal coliform resides in intestines and feces of people and is also not typically harmful. E.Coli, on the other hand, can cause illness and represents recent fecal contamination. If E.Coli is identified, an investigation of the water system should be conducted to determine the source of pollution and actions be taken to prevent future contamination.



Coliform Bacteria growth on test plate. Source: Right to Live Healthy, 2015

All Potable Water: E.Coli	Must not be detectable in a 100-ml sample
Treated Water into Distribution System: E.Coli and Total Coliform Bacteria	Must not be detectable in a 100-ml sample
	In the case of large supplies, where sufficient samples are examined, must not be present in 95% of samples taken throughout any 12-month period

Coliform Bacterial Guidelines. Source: World Health Organization bacteriological quality of drinking water (WHO, 1996)

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.2.2| Total Dissolved Solids (TDS)

Total dissolved solids (TDS) describes the inorganic salts and small amounts of organic matter present in water. The principal constituents are calcium, magnesium, sodium, and potassium, carbonate, hydrogen carbonate, chloride, sulfate, and nitrate anions. These materials originate from natural sources, sewage, urban and agricultural run-off and industrial wastewater. Concentrations of TDS is measured in mg/L and do not present any adverse health effects at low levels. If high levels of TDSs are detected, the constituents should be identified since boron, fluoride, and nitrates can have negative health impacts. Lastly, varying degrees of TDS could deteriorate the taste of the water depending on consumer preferences.

Generally accepted guidelines for drinking water:

TDS (mg/L)	Excellent < 300	Good 300-600	Fair 600-900	Unacceptable 900-1200
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TDS guidelines for drinking water. Source: WHO (2003) Total dissolved solids in drinking-water. Background document for preparation of WHO Guidelines for drinking-water quality. Geneva, World Health Organization (WHO/SDE/WSH/03.04/16).

A6.2.3| Dissolved Oxygen (DO)

Dissolved oxygen refers to the gaseous oxygen (O₂) and it an important indicator for assessing water quality because it influences the organisms living within the body of water. Dissolved oxygen is recorded in mg/L and will vary depending on the temperature, pressure, and salinity of the water. Thus, if DO levels drop below a certain level, below 5.0 mg/L, fish mortality rates will rise, especially in sensitive freshwater fish such as salmon resulting in dead zones. Dead zones are usually a result of over-fertilization causing algae blooms and phytoplankton growth.

Dissolved Oxygen (mg/L)	<5.0 Aquatic life is under stress	<1 Large fish kills	>110% Aquatic life suffers from gas bubble disease
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Dissolved Oxygen guidelines. Source: Fondriest Environmental, Inc

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.2.4| Nitrates and Nitrites

Nitrate (NO3) is naturally found in the environment and is critical to plant health. However, nitrates are also one of the most common surface and groundwater contaminants in rural areas. Specifically, nitrates and nitrites are a consequence of agricultural activity (i.e. fertilizers), poor wastewater disposal, leakages from septic tanks, and oxidation of human and animal waste. Nitrites (NO2) are not typically present in significant concentrations but can be formed chemically in distribution pipes during periods of stagnation of nitrate-containing and oxygen-poor drinking water. Infants consuming high levels of nitrates, higher than 10 mg/L according to the United States Environmental Protection Agency (EPA), can develop methemoglobinemia, or "blue baby" disease, which reduces oxygen-carrying capacity and can lead to death. However, consuming large concentrations of nitrates is not harmful to adults.

Nitrates and Nitrites

United States Environmental Protection Agency (EPA) Guidelines

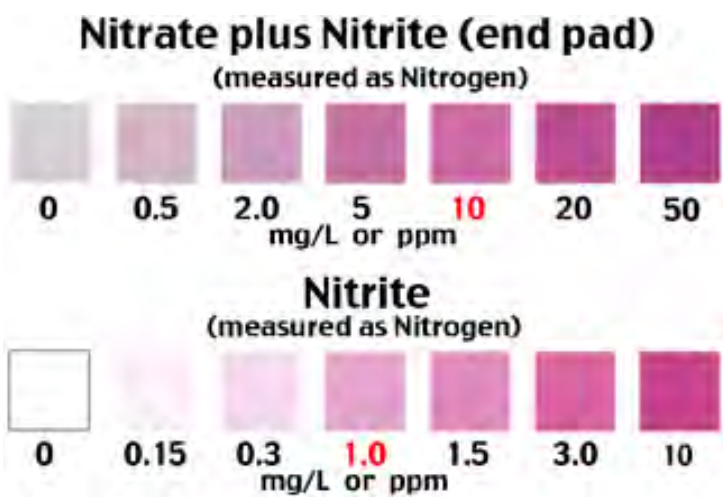
Max Potable Water: Nitrite-Nitrogen (mg/L)	< 10
Max Regulated Public Water Systems: Nitrite-Nitrogen (mg/L)	< 1

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World Health Organization (WHO) Guidelines

Max Potable Water: Nitrogen (mg/L)	<50
Max Potable Water: Nitrite (mg/L)	<3

Nitrates and Nitrites Guidelines, Source: WHO



Color Comparator Chart for this test reports concentrations compatible with EPA limits of total nitrogen and nitrite nitrogen in water.

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.2.5| Phosphorus

Phosphorus is necessary to the growth of plants and animals. However, in large concentrations of phosphorus from over-fertilization can cause eutrophication (reduced oxygen levels) which in turn can cause extensive plant death, destroying aquatic life and ecosystems. Phosphates enter waterways from human and animal waste, laundry, cleaning, industrial effluents, and agricultural fertilizer runoff. They are measured in mg/L or parts per million (ppm).

EPA Guidelines (1986)

Freshwater: Phosphorus (mg/L)	Streams <0.1	Streams into Reservoirs <0.05	Reservoirs < 0.025	
Impoundments Phosphorus (mg/L)	Water Supply < 0.015	Aquatic Life <0.025	Lakes 0.05	Mountain Lakes <0.02

Phosphorus Guidelines, Source: EPA

WHO Guidelines

Impoundments Phosphorus (mg/L)	Water Supply < 5
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Phosphorus Guidelines, Source: EPA

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.2.6| Conductivity

Conductivity measures the water’s capability to pass electrical flow, which is determined by the ions in the water. Conductivity is a result of dissolved salts and inorganic materials such as alkali, chlorides, sulfates, and carbonate compounds. These TDS’ generate more conductivity, and when conductivity increases, salinity also increases, especially when the water is warm. An increase or decrease in conductivity can indicate pollution due to discharge, or some other source of disturbance that has decreased the relative condition or health of the water. As a general rule, humans tend to increase the dissolved solids entering our waterways which results in increased conductivity.

Conductivity measures the ions in the water and is recorded in micromhos per centimeter (µmhos/cm) or microsiemens per centimeter (µS/cm). Distilled water has a conductivity ranging from 0.5 to 3 µS/cm, while most streams range between 50 to 1500 µS/cm. Freshwater streams ideally should have a conductivity between 150 to 500 µS/cm to support diverse aquatic life.

Despite the lack of standards and the effects of the surrounding environment on conductivity, there are approximate accepted values.

Conductivity (µS/cm)	Distilled Water 0.5-3	Melted Snow 2-42	Tap Water 50-800	Potable Water (USA) 30-1500	Freshwater Streams 100-2000	Industrial Wastewater 10,000	Seawater 55,000
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Conductivity Guidelines. Source: *Testing the Waters: Chemical and Physical Vital Signs of a River* by Sharon Behar. Montpelier

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.2.7| Turbidity

Turbidity is cloudiness or haziness of a fluid caused by suspended particulates that are visible to the naked eye. The measurement of turbidity is reported in nephelometric turbidity units (NTU) that describe the relative clarity of a liquid. High levels of turbidity can inhibit the natural disinfectant process by the sun via UV disinfection and can pose health concerns. Particles contributing to turbidity can provide food and shelter for pathogens, microorganisms, and stimulate the growth of bacteria. Water with turbidity less than 5 NTU is usually acceptable for consumption, although this may vary with local circumstances. Water with median turbidity of 0.1 NTU is adequate for disinfection.



Turbidity Examples: At 5 NTU, water still appears clear. It is cloudy at 55 NTU and opaque at 515 NTU, Source: USGS, 2016

At 5 NTU, water still appears clear. It is cloudy at 55 NTU and opaque at 515 NTU

As a general rule, turbidity should be below 1 NTU for ideal potable consumption.

Turbidity (NTU)	Ideal Potable Water <1	Effective Disinfection < 5	Max Potable Water <15
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Turbidity Guidelines. Source: World Health Organization (WHO), 1993

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6..2.8| pH

Ideal drinking water should have a pH of 6.5-8.0. Although it does not directly impact human health, it is one of the most critical water quality parameters. If the pH of drinking water range is outside these parameters, purification processes could be inhibited. Further, an abnormal pH can contribute to concentrations of calcium, chloride, and sulfate which foster iron corrosion in the distribution pipes making water for the end user unsafe.

pH Scale



pH Scale. Source: World Health Organization (WHO), 2001

A6.2.9| Salinity

Salinity is the concentration of dissolved salts in water, also called total suspended solids or total dissolved salts, and is recorded in parts per thousands (ppt). The tolerance for crops varies from as low as 360 mg/L for sensitive vegetables and up to several thousand mg/L for tolerant crops such as barley. Salinity varies in rivers, streams, and lakes due to evaporation and saline groundwater inflows. It can also change during the year due to rain diluting the salt in the water thereby generating high levels of salinity in the summer and low levels of salinity in the winter.

Drinking Water Parameters from Fresh to Hyper-saline Water

Salinity (mg/L)	< 80 Excellent	80 - 500 Good	500-800 Fair	800-1,000 Poor	>1,000 Unacceptable
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Salinity Drinking Water Parameters. Source: Environmental Protection Agency (EPA), 2015

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.3| Valle de Vazquez Water Results

A6.3.1| Dairy House

The SUMA Capstone Team took water measurements at a local resident's home where she produces dairy products. The longitude and latitude coordinates are 18.528758, -99.068733 in the Decimal Degree (DD) notation. The household uses piped water for drinking from the town's central water system. Water tests were done on water extracted from a yard hose.

A6.3.1.1| Detailed Results

Test	Result
Bacteria (Y/N)	Yes
Nitrates (mg/L)	0.7
Phosphates (mg/L)	0.1
Conductivity (s/cm)	0.009
Turbidity (NTU)	15
pH	7.58
Salinity (ppt)	0
Oxygen Demand (mg/L per ppm)	5.15
Depth (m)	0
Temperature (°C)	30.2

Valle de Vazquez Detailed Dairy House Water Test Results

A6.3.1.2| Analysis

Assuming the instrumentation was working correctly, the results showed that there was bacterial growth in the water supply. Based on this test alone, the contamination could have come from the piped water source, the distribution lines to the household or at the household itself. However, based on the groundwater pump tests (see below), it is unlikely that the water pump was the source of the contamination. The nitrate levels are within acceptable potable water consumption parameters according to the EPA and WHO standards. Phosphate levels exceed EPA standards but are within acceptable parameters according to WHO. Conductivity, pH, salinity, and oxygen demand results are also within accepted ranges with turbidity levels at the maximum acceptable level.

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.3.2| Groundwater Pump

The groundwater pump (located at coordinates 18.548405, -99.063945 DD) provides drinking water to the community.

A6.3.2.1| Detailed Results

Test	Result
Bacteria (Y/N)	No
Nitrates (mg/L)	0.05
Phosphates (mg/L)	0.05
Conductivity (s/cm)	0.57
Turbidity (NTU)	0
pH	7.65
Salinity (ppt)	0.27
Oxygen Demand (% or mg/L)	5.2
Depth (m)	80
Temperature (°C)	28.9

Valle de Vazquez Groundwater Pump Detailed Water Test Results

A6.3.2.2| Analysis

Provided the instrumentation was working correctly, the results yielded no bacterial growth in the water supply. Nitrate and phosphate levels are within appropriate levels according to the EPA and WHO standards. Turbidity, pH, oxygen demand, conductivity, and salinity are also within acceptable levels as they do not exceed critical thresholds.

A6| VALLE DE VAZQUEZ WATER TEST RESULTS

A6.3.3| Marco Antonio's Well

The SUMA Capstone Team also tested the water of a household well (located at coordinates 18.532834, -99.068256 DD).

A6.3.3.1| Detailed Results

Test	Result
Bacteria (Y/N)	No
Nitrates (mg/L)	2
Phosphates (mg/L)	0.035
Conductivity (s/cm)	0.009
Turbidity (NTU)	0
pH	7.18
Salinity (ppt)	0
Oxygen Demand (% or mg/L)	0.03
Depth (m)	8
Temperature (°C)	28

Valle de Vazquez Marco Antonio's Household Well Water Test Results

A.6.3.3.2| Analysis

Provided our instrumentation was working correctly, the results yielded no bacterial growth in the water supply and nitrate levels are at acceptable levels. Phosphate levels are high according to the EPA standards but not according to the WHO criteria. High levels of phosphate could be a result of the well being surrounded by agriculture and the residents pumping groundwater from only eight meters below the surface thereby allowing phosphates to enter into the drinking water. The turbidity, pH, and salinity results are acceptable as they do not exceed critical thresholds. Oxygen demand results are low, which for potable water consumptions is not problematic. However, if the water was discharged into a body of water with aquatic life, it could cause significant fish kills as marine life needs a minimum of 1 mg/L of oxygen to survive.

A7| VALLE DE VAZQUEZ LIME ORCHARD TEST RESULTS

A7.1| Agriculture Tests in Valle de Vazquez

Sugarcane production is a primary agricultural product in Valle de Vazquez. The town maintains 140 hectares of sugarcane fields and is dependant on the crop year round. Residents in Valle de Vazquez also grow limes, mangoes and avocados. With limited time onsite, the SUMA Capstone Team was only able to visit and take measurements at one farm, a lime orchard outside of town. The farmer has 2 hectares of land for lime production and has a total of 150 lime trees. The lime orchard one of several jobs for the farmer. He also works as a driver and as a dairy farmer.

A7.2| Definition and Standards

A7.2.1| Species: *Citrus aurantifolia*

The Mexican lime tree, *Citrus aurantifolia*, is a shrubby tree with a height ranging from 2 – 4 m (6.5 – 13 ft) and usually has many slim branches spreading around the main trunk. The evergreen leaves have an elliptic shape, are 5 – 7.5 cm (2 – 3 in) long and are pleasantly aromatic. The fruits are typically round, and a single branch generates 1-3 limes, in a rare occasion, a cluster of fruits. The fruits have a green and glossy color; pale-yellow when ripe. Lime trees begin to fruit in 3 to 6 years and will reach peak production in 8 to 10 years. They are usually grown in a warm, moist climate and can withstand drought better than other citrus fruits. However, excessive rainfall and flooding may cause fungal diseases to inhabit the crop. The limes produced are primarily sold as a whole fruit, but the juice and lime oil are by-products that are also commonly distributed around Mexico.

A7.2.2| Tree Disease

There are numerous diseases that are a threat to crop production. The ones outlined here are those that are common to citrus trees. According to the University of California's Statewide Integrated Pest Management Program, some common diseases to citrus are as follows:

- Armillaria root rot – caused by a fungus that is usually found at the top of the root system, causing roots underground to darken and develop white mats of fungus below the bark in infected areas. Trees affected will undergo foliage thinning, discoloring, and premature leaf drop. A main cause of this disease is over irrigation which provides a moist environment for the fungus to thrive in.
- Citrus greening (Huanglongbing) – is a bacterial disease spread by a flying insect called the Asian citrus psyllid. Trees affected will produce hard, bitter and misshapen fruit, causing the tree to die in a few years. Phytophthora root rot – is caused by a fungus that destroys the feeder roots, limiting uptake of nutrients and water for the tree. Trees affected suffer stunted growth and a wilting foliage. A main cause of this disease is also over irrigation which provides a moist environment for the fungus to develop its colony.

A7| VALLE DE VAZQUEZ LIME ORCHARD TEST RESULTS

A7.2.3| Trunk Diameter

Trunk diameter is the most important measurement of standing trees as it indicates the size of a tree. This information will be useful for tree inventory analysis. By comparing diameter with age, tree health can be determined. The measurement should be made below the bud union (where the trunk branches first). An average one-year old lime tree should have a trunk diameter of around 1.2 – 2 cm ($\frac{1}{2}$ – $\frac{3}{4}$ in). At two years old, they should measure about 2 – 3.2 cm ($\frac{3}{4}$ – 1 $\frac{1}{4}$ in).

A7.2.4| Condition

Overall tree condition is a characteristic way to define tree health and should be determined as accurately as possible to plan management steps. The following guidelines are provided by Vermont Urban & Community Forestry's Tree Inventory Guide:

- Good:
 - Full canopy: 75-100% live foliage
 - No significant structural defects (cankers, seams, decays, etc.)
 - Minimal to no mechanical damage to trunk
 - No suckering (root or water)
 - Form, foliage color, and leaf size is characteristic of the species
- Fair:
 - Thinning canopy: 50-75% live foliage
 - Medium to low amount of new growth (stunted)
- Insect/disease affecting the tree
 - Significant mechanical damage to trunk
 - Foliage may be off color with smaller or sparser leaves
 - Form not representative of species
- Poor:
 - Tree is declining: 25-50% live foliage
 - Visible dead branches
 - Severe mechanical damage to trunk, usually including decay
 - Small or stunted amount of new foliage
 - Foliage may be off color with smaller or sparser leaves
- Dead:
 - No signs of life with new foliage
 - Bark beginning to peel

A7| VALLE DE VAZQUEZ LIME ORCHARD TEST RESULTS

A7.2.5| Tree Height

Tree height is also a typical method to observe growth in lime trees. A healthy lime tree can grow up to 4.5 – 6 m (15 – 20 ft).

A7.2.6| Canopy Diameter

Canopy diameter is another measure that indicates a healthy tree. Canopy size is usually related to tree growth and thus, is an important factor for crop management. The average canopy diameter for lime trees are around 4 – 5 m (13 – 16 ft).

A7.2.7| Spacing

Tree spacing is a very important factor in citrus plantings because it may affect fruit distribution and yield. The average spacing for a lime orchard is typically around 4 – 8 m (12 – 25 ft). Different varieties of lime trees require different distances to avoid tree management problems.

A7.2.8| Fruit Yield

Fruit yield refers to the fresh fruit weight measured after harvesting and before ripening.

A7| VALLE DE VAZQUEZ LIME ORCHARD TEST RESULTS

A7.3| Lime Orchard Test Results

A7.3.1| Tree #1

A7.3.1.1| Detailed Results

Category	Result
Species	Citrus aurantifolia
Trunk Diameter	16.8 cm
Condition	Fair, some scaling on leaves
Tree Height	134 cm
Canopy Diameter	196 cm
Spacing	4 m
Mean Annual Fruit Yield	N.A.
Age	2 years

Lime Orchard Tree #1 Test Results

A7.3.1.2| Analysis

The results yielded no major disorders on Tree #1. Trunk diameter shows healthy growth. Tree height, canopy diameter, and spacing are also within the standards, considering the tree is still in the early stages of growth. However, some scaling was found on several leaves. This could potentially inhibit the growth of the lime tree. Mean annual fruit yield was not gathered because the tree had not yet reached fruit development stage.

A7| VALLE DE VAZQUEZ LIME ORCHARD TEST RESULTS

A7.3.2| Tree #2

A7.3.2.1| Detailed Results

Species	Citrus aurantifolia
Trunk Diameter	14 cm
Condition	Fair -> Curling leaves
Tree Height	128 cm
Canopy Diameter	176 cm
Spacing	4 m
Mean Annual Fruit Yield	N.A.
Age	2 years

Lime Orchard Tree #2 Test Results

A7.3.2.2| Analysis

The results yielded no major disorders on Tree #2. Trunk diameter shows a healthy growth. Tree height, canopy diameter, and spacing are also within the standards, considering the tree is still in the early stages of growth. However, curling leaves were identified. This could be a symptom of the phytophthora root rot, which was also confirmed by the farmer. Mean annual fruit yield was not gathered because the tree had not reached fruit development stage.

A7| VALLE DE VAZQUEZ LIME ORCHARD TEST RESULTS

A7.3.3| Tree #3

A7.3.3.1| Detailed Results

Category	Result
Species	Citrus aurantifolia
Trunk Diameter	14 cm
Condition	Fair -> Curling leaves
Tree Height	127 cm
Canopy Diameter	198.9 cm
Spacing	4 m
Mean Annual Fruit Yield	N.A.
Age	2 years

Lime Orchard Tree #3 Test Results

A7.3.3.2| Analysis

The results yielded no major disorders on Tree #3. Trunk diameter shows a healthy growth. Tree height, canopy diameter, and spacing are also within the standards, considering the tree is still in the early stages of growth. However, a significant amount of curled leaves was identified. This tree may be affected by the phytophthora root rot more severely than Tree #2. Mean annual fruit yield was not gathered because the tree had not reached fruit development stage.

A7| VALLE DE VAZQUEZ LIME ORCHARD TEST RESULTS

A7.3.4| Tree #4

A7.3.4.1| Detailed Results

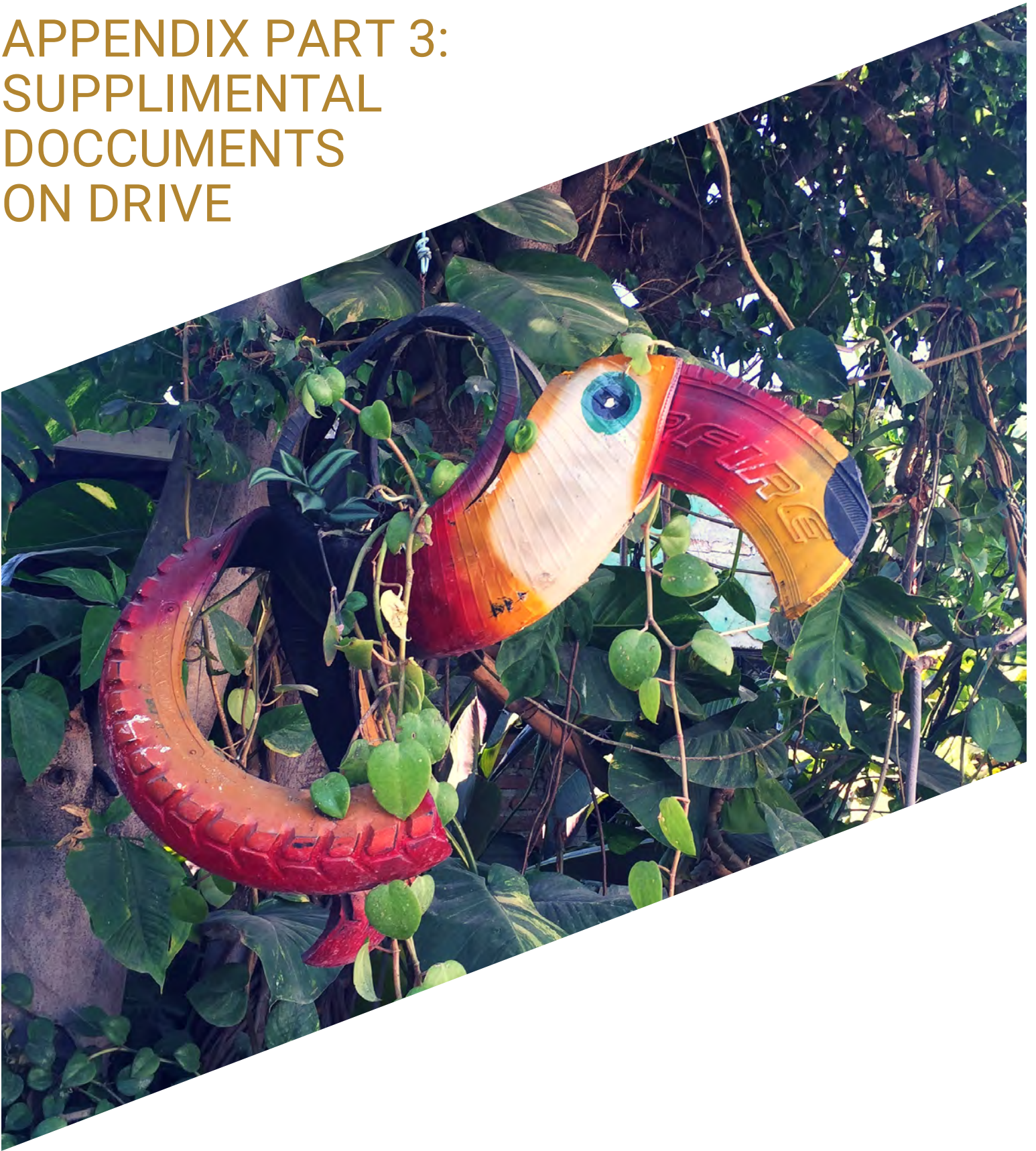
Category	Result
Species	Citrus aurantifolia
Trunk Diameter	14 cm
Condition	Fair -> Curling leaves
Tree Height	102 cm
Canopy Diameter	163 cm
Spacing	4 m
Mean Annual Fruit Yield	N.A.
Age	2 years

Lime Orchard Tree #4 Test Results

A7.3.4.2| Analysis

The results yielded no major disorders on Tree #4. Trunk diameter shows a healthy growth. Tree height, canopy diameter, and spacing are also within the standards, considering the tree is still in the early stages of growth. However, significant scaling on leaves were observed. Mean annual fruit yield was not gathered because the tree had not reached fruit development stage.

APPENDIX PART 3: SUPPLIMENTAL DOCUMENTS ON DRIVE



A8| SUPPLEMENTAL DOCUMENTS ON DRIVE

The following documents are available on the drive provided.

A8| Background Research

Files in the Background Research folder summarize the research done while formulating the Resilience Framework and potential approaches to community data gathering.

Solar Energy Potential for Mexico: Explains the physical and policy factors that make solar energy an attractive resource for Mexico's energy needs.

Resilience Organizations: Outlines significant organizations working in the resilience space, most of which are global non-profit organizations.

Literature Review: Contains a list of academic journals and other literature discussing off-grid solutions for the water-energy nexus and sustainable dairy farming for rural communities.

Assessing Water Requirements for Agriculture Needs: Contains preliminary ideas on how to assess the water needs of various crops and dairy farming. These ideas are elaborated on more fully in the Appendix items that describe data gathering methods.

A9| Social Organizations Capabilities Assessment

The following documents on the drive in the Social Organizations Capabilities Assessment folder will assist with updating the information collected from Social Organizations.

Resilience Questionnaire: This document is the template used for the construction of the online questionnaire. The questionnaire will evaluate the resilience capacity of each social organization by looking at their business model and resilience related experience.

Perfil de Respuesta de Resiliencia: The online questionnaire in spanish, with the responses from the social organizations.

Social Organizations Assessment Framework: This spreadsheet evaluates the social organizations according to the systems and vulnerabilities established in the resilience framework. The evaluation has two parts: assessing the organization's scope of operations and assessing the organization's network. The last three columns display the collective score for the organizations and the count of organizations that can impact each vulnerability.

A8| SUPPLEMENTAL DOCUMENTS ON DRIVE

.A10| Community Assessment

The Community Assessment folder on the drive contains the following document:

- Community Assessment Template: A blank worksheet that allows Ashoka assess new communities by rating vulnerabilities and noting the rationale and confidence level for each rating.

A11| Fit Analysis

The Fit Analysis folder on the drive contains the following document:

- Fit Analysis - Valle de Vazquez: A spreadsheet showing the community needs aligned to organizational collective capacity per each vulnerability within systems.

A12| Data Gathering

The Data Gathering folder on the drive contains the following document:

- Field Data Gathering: Describes methods for gathering field data relating to water and agriculture.

A13| Bibliography

The Bibliography folder on the drive contains the following document:

- Bibliography: A spreadsheet containing all of the sources (journal articles, publications, websites) that were used in the research for this report and the supporting files on the drive.