

**Team:** Saami Sabiti, Adriana Kliegman, Melissa Boo, Steve Burke, Melisa Pernalete  
Esperanza Garcia, Derrek Clarke, Floren Poliseo, Joseph Persaud  
Henry Gordon-Smith (PM), Challey Comer (DM)

**Faculty Advisor:** Lynnette Widder

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## Introduction:

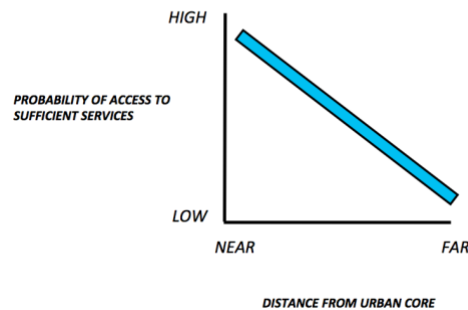
Columbia University offers a Master of Science degree in Sustainability Management, co-sponsored by the Earth Institute and the School of Continuing Education. The program combines academic leadership, scientific rigor, and professional practice to yield uniquely dynamic, interdisciplinary skills dedicated to making lasting advances in global sustainability practice (<http://ce.columbia.edu/sustainability-management>). The program culminates in a final capstone project. The capstone course is a client-based workshop that integrates each element of the curriculum into an applied project, giving students hands-on sustainability management experience (<http://ce.columbia.edu/sustainability-management/curriculum>).

This particular capstone project, conducted in the Spring 2013 semester, involved three separate clients: Yansa, Isla Urbana and Sistema Biobolsa. All three clients operate in Mexico, addressing sustainability needs for people living in the urban periphery. As such, we dubbed our capstone project “Living on the Edge,” and our group “LOTEC” (from Living on the Edge Capstone). Our team was comprised of 11 students and one faculty advisor who all contributed to the research and development of solutions for all three clients.

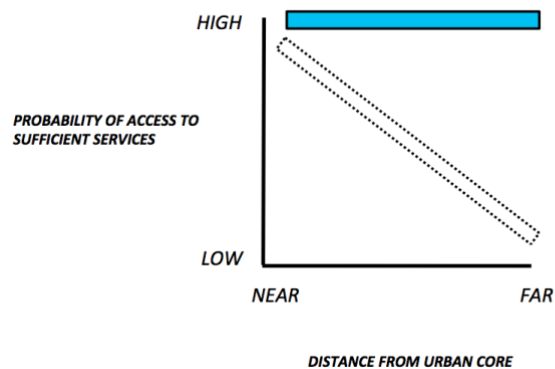
## What is “Living on the Edge”?

The linkages between urban and rural are most intensely demonstrated on the urban- periphery, or the “edge”. On the urban-periphery, an intermittent flux of people and resources creates communal uncertainty. People living on the edge cannot depend upon urban and rural resource flows.

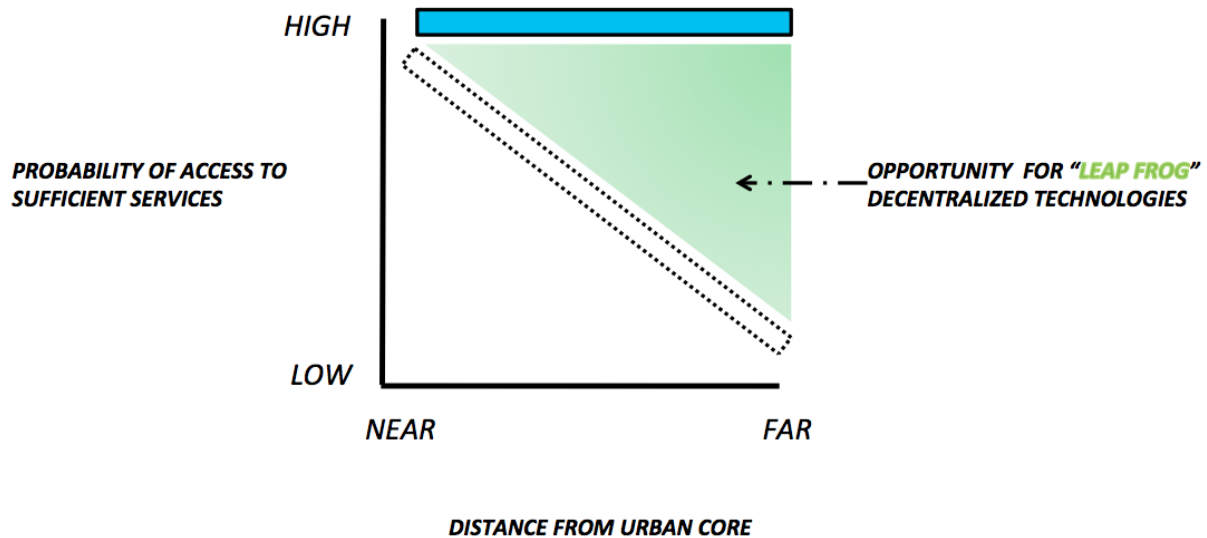
This diagram shows what typically happens on the edge:



The blue line on this diagram represents the “ideal”, where everyone living on the edge has equal access to services:



While life on the edge can present greater challenges, it can also present greater opportunities, especially for those who are able to draw simultaneously on the comparative advantage of urban and rural areas. What arises, is an opportunity to “leap frog” decentralized, sustainable, alternative technologies. Our three clients are social entrepreneurs engaged in such technologies in Mexico.



Since January 2013, we have developed three communications strategies to serve our three clients: Isla Urbana, The Yansa Group, and Sistema Biobolsa. Contained within this brief, is an introduction to the three clients and the respective strategies that we designed for them. Visit our website <http://lotecapstone.wix.com/mexico> for the best way to learn about our work.

## Isla Urbana - Mapping Tool:

### **Background on client:**

Residents of Mexico City are faced with intermittent water service for their household water needs due to a rapid boom in population, lag in new infrastructure to reach these citizens, and existing, decaying pipes. Solutions are expensive and inconvenient, costing valuable hours away from work and school for the efforts to obtain water for washing dishes, flushing toilets, taking showers, and other basic household needs.

Isla Urbana (IU) sees rainwater harvesting as a way to provide affordable and reliable domestic water to residents in the periphery of Mexico City. A project of IRRI Mexico, Isla Urbana designs, builds and installs rainwater collection systems for homes in periurban regions of Mexico City. Additionally, they teach rainwater harvesting courses, host community events, and are dedicated to making Mexico City's water management policy sustainable. They do all this working household by household, ensuring

decentralized water security. As of May 2013, IU has installed over 1,000 rainwater harvesting systems, with a significant portion of these installations concentrated in the Ajusco region of Mexico City.

After our extensive research period and visit to Isla Urbana in Mexico City, our team determined that a spatial analysis of IU's work would be the most strategic way to enhance Isla Urbana's communications to stakeholders.

## **What is the tool and how will it benefit client?**

Our team has created the framework for an interactive, layered map that will communicate the extent of Isla Urbana's work in the Ajusco region of Mexico City. The map currently includes infrastructure (roads, homes, water pipes), boundaries, demographics, and topography. With digitized records, Isla Urbana will be able to geocode their installations in Ajusco and quantify their systems' impact by including figures such as: rainwater harvesting system capacity, household water use, number of annual truck deliveries, percent of income spent on domestic water, and months of year with adequate municipal water. Mapping such figures will help answer questions including: What percentage of homes' household needs is Isla Urbana currently supplying? What are the cost incentives for families to adopt Isla Urbana systems? How much money might governments save from avoided truck delivery costs, should decentralized rainwater harvesting be widely implemented? If everyone in a neighborhood has an IU system, would they be able to rely entirely on rainwater if municipal water didn't flow for 3 months or longer?

Once Isla Urbana's work in Ajusco is adequately quantified, Isla Urbana can use those figures to project rainwater harvesting's potential impact in similar periurban regions of Mexico City. The ultimate goal of this map is to help Isla Urbana calculate and communicate the extent that rainwater harvesting can supplement city infrastructure to meet Mexico City's citizens' needs.

Conducting such analysis through a mapping tool enables Isla Urbana to visually show the impact of their systems to supporters. Images, coupled with embedded data points, can create narratives for three important audiences: policy-makers, investors, and customers. Map presentations to policy-makers can help to focus government policy and funding away from areas of sufficient water distribution and towards areas of insufficient water quality and water related health and safety. The map will also illustrate to investors the demand, feasibility, and benefits of IU's technology. Furthermore, map-driven scenario-planning has the potential to galvanize neighborhoods around self-sustaining decentralized water infrastructure.

- In the short term (6 months - 1 year), the mapping tool will serve as a customer relationship development database. Developing this function will be essential to the future implementation and success of the mapping tool. This database will consist of records of all installed systems to date and applicable indicators. Tracking of installed systems and growth will aid in scaling IU to reach and service more communities efficiently. Initializing this database will also help with existing client follow up and tracking of issues for future product development.

- Medium term (1 year - 2 years) benefits of the mapping tool are two-fold. The first is the visual communication of system adoption rates and water use benefits of installed systems to local communities. This will be beneficial to show the rate of water independence of system users for potential system purchasers. Another medium term benefit is the ability for IU to recognize water scarce areas where more focus is needed to increase adoption rates. Conversely, IU could choose to increase adoption rates in those areas where system use appears to be prevalent, creating water independent communities before focusing on slow adoption regions.
- Long term (2+ years) benefits include government policy and investor relations. After establishing a robust mapping tool, layers can be turned on and off to establish a narrative for communicating strategic business growth decisions involving focus communities, investment returns, and future policy decisions.

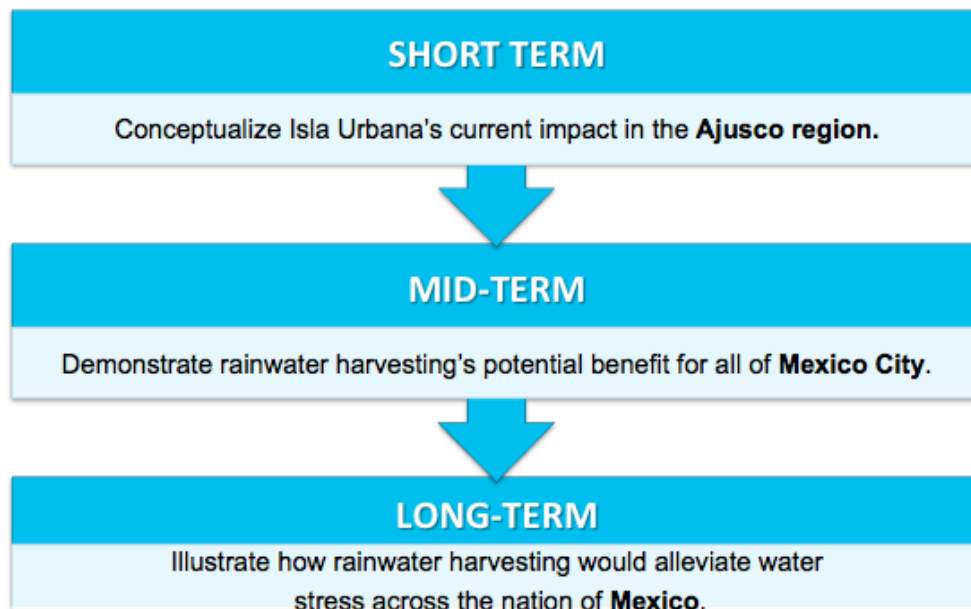


Fig. 1: Timeline of benefits for the mapping tool.

## What data was used for this tool?

Data sources for the basemap include the Mexican Instituto Nacional de Estadística y Geografía's (INEGI), and online Census Data. Columbia University's Digital Social Science Center (DSSC) was consulted as a secondary data source and for mapping technical assistance.

IU's primary database was consulted, but due to time constraints and formatting issues, it could not be included in the map at this time. However, we are providing IU with step-by-step instructions on how to upload their primary data into the GeoCommons platform. Since ultimately, we want to equip IU with the capacity to build the map over time as their work expands, this is a valuable skill for their team to learn.

We are also making recommendations of data that could be helpful for Isla Urbana to collect, since no such data is currently being collected or made available. Isla Urbana may want to consider surveying existing customers or a sample population to get information regarding: the number of times piped water is on/off per month, household private water truck & public water truck purchases/year, number of times the IU tank is empty/year, and other socioeconomic factors.

#### Methodology:

- Create base map of Ajusco area using ESRI resources through GeoCommons.
- Select attributes of interest including political boundaries, cities, roads and buildings.
- Insert water infrastructure data from INEGI database with aqueducts, canals and flumes. Allow for labeling of each element of infrastructure
- Create layers using filters of census data relevant to water delivery and usage. Organize symbology by census tract.
  - Demographic layers include: Total population, Total of homes, Average people per home
  - Water-related layers include: Private homes with water service network connected to the building, Private homes without sanitary service, Private homes with sewer connected to a septic hole, river, lake, sea
- Add Isla Urbana dataset with coordinates of completed installations
- Suggest digitization of Isla Urbana records & recommend future data policies

#### How does the mapping tool work?

The map is hosted on the website GeoCommons and password protected. After logging on, users can view the map's current contents, add new content, and analyze the map's geodata.

Data layers can be viewed separately, together, or within user-defined boundaries. Users can select and adjust the symbology to represent data, from colors to shapes to data distribution. Intentional rendering can illustrate important information at a glance to map viewers.

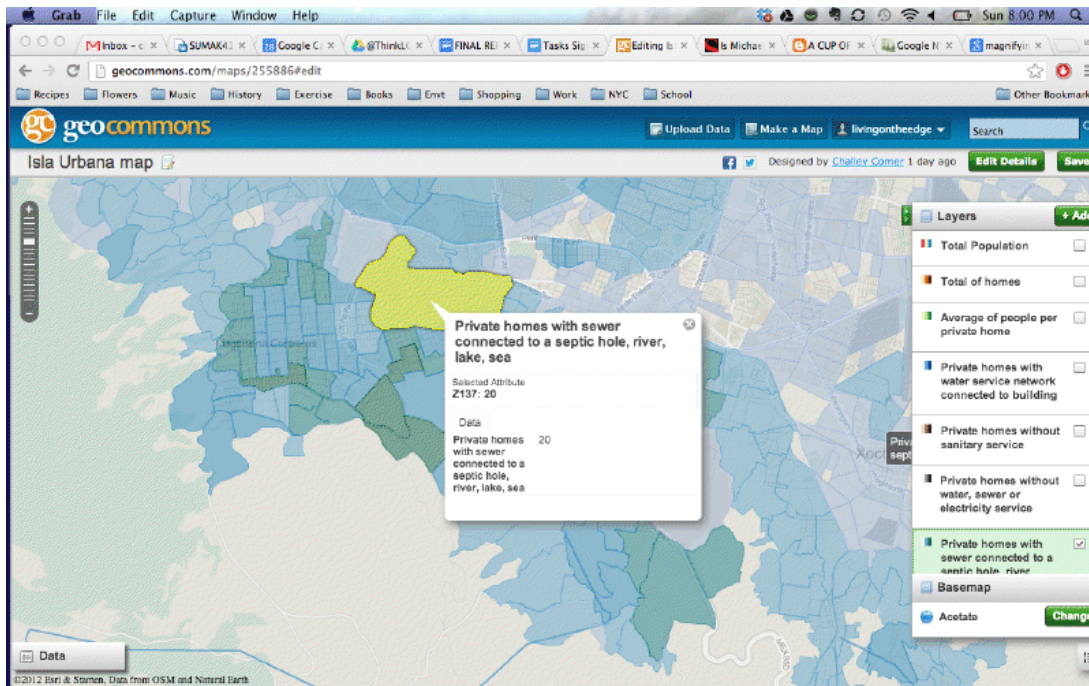


Fig. 2: Each layer contains call-outs detailing the information shown within the boundaries of this census tract.

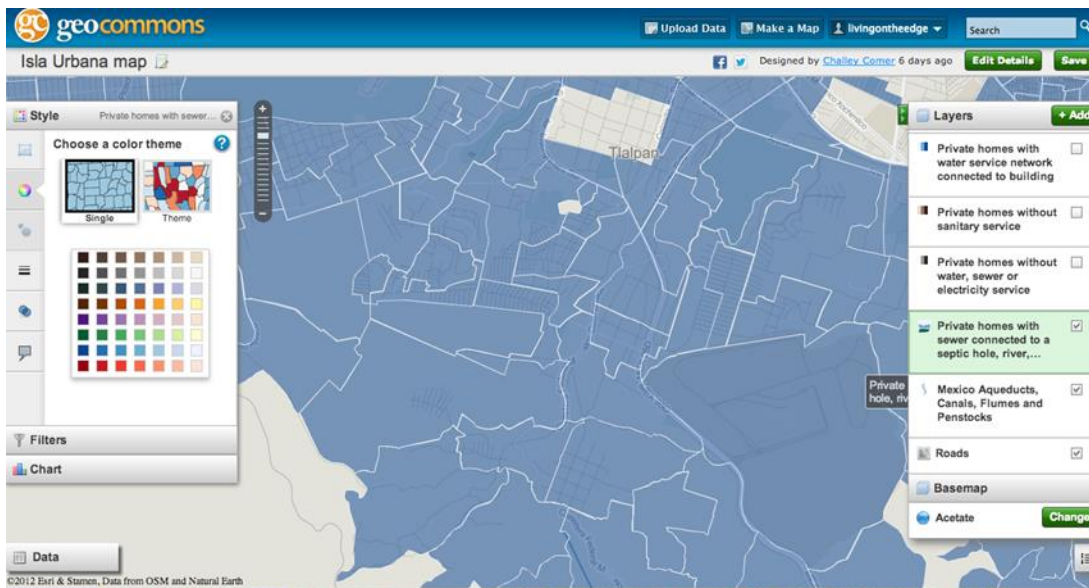


Fig. 3: Symbology options allow users to customize the way data is illustrated.

Isla Urbana can add new data, including its own, by uploading it to GeoCommons. We have provided directions for converting their master database into a format that can be added to the map, as well as suggestions for future data points to collect from clients. As additional installations are added to the mapping database, aggregate data is automatically updated to reflect changes. Isla Urbana could even create a layer to show community impact if all houses utilized rainwater harvesting.



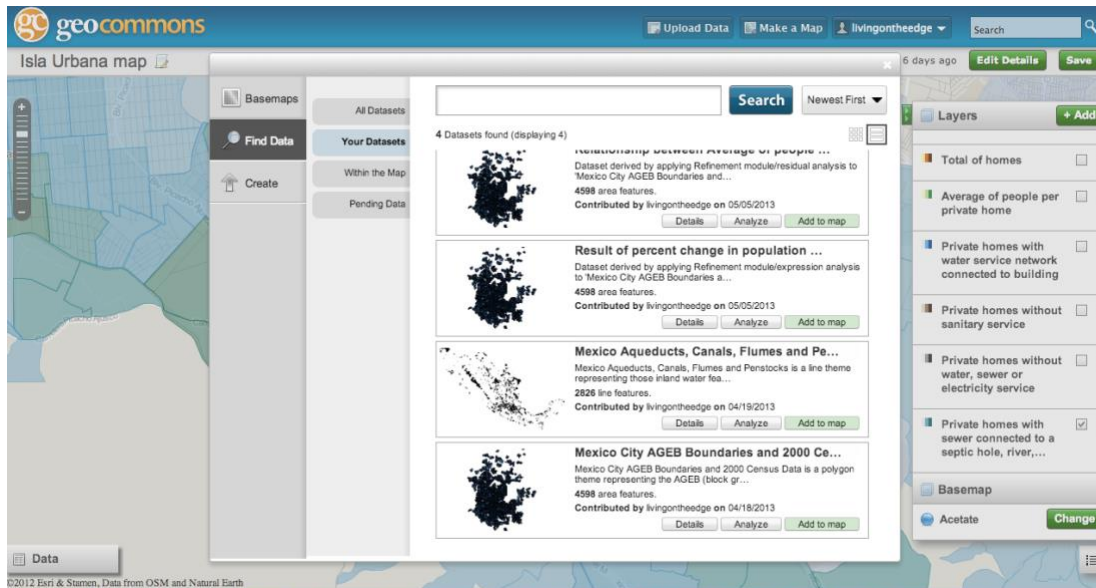


Fig. 4: Layers of geodata are uploaded into the map.

There are a number of analytical tools to help process data, identify relationships, and calculate quantities. Layers can be merged, clipped, filtered by distance, and manipulated with user-defined equations.

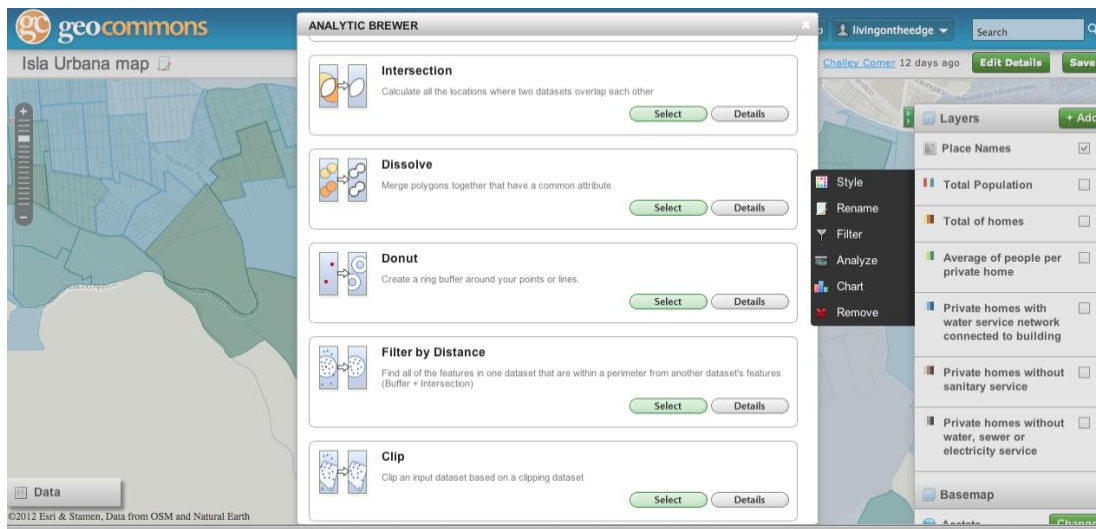


Fig. 5: The main menu for GeoCommon's Analyze feature, displaying some of the actions available.

We are recommending that IU begin to collect data at regular intervals so that seasonal patterns can be observed, too. In the future, this could lead to a series of maps indicating water delivery, water expenses, and water scarcity, and perhaps be illustrated by a month-by-month slideshow. Although information about household finances can be personal, it will be important for IU to start collecting this data as well, in order to demonstrate customer costs and savings via the map. Customers could be a primary source for information regarding the water truck delivery system, should that data be difficult to obtain as well.



Potential data points for future mapping include:

- Water quantity demanded (population x average daily use)
- Potential water quantity supplied by rainwater (rainfall x average roof area)
- Seasonal scarcity of water supply by district/neighborhood
- Average amount of municipal water delivered per year
  - Truck delivery (number of operational trucks)
  - Pipe infrastructure delivery
- Average cost of municipal water supply systems
- Percentage of independence from municipal grid of IU system users

The data points comprising each layer describe a water use narrative for each of IU's installations. Each installation will display potential water quantity demanded, potential water quantity supplied, percentage of demand offset, and date of system install when clicked.

## Mapping tool links:

GeoCommons Map:

<http://geocommons.com/maps/255886>

Prezi: <http://prezi.com/chgac37-fhtt/columbia-lotec-mapping-strategy/?kw=view-chgac37-fhtt&rc=ref-40243153>

## A Communications Strategy for the Isla Urbana Mapping Tool:

There are three audiences for this tool: policymakers, investors, and customers. All three audiences will benefit from a mapping tool because of its ability to visualize, query, and quantify data simultaneously. A layered, interactive GIS map allows Isla Urbana to illustrate and calculate the current and future water system of Mexico City, and how rainwater harvesting can effectively supplement the municipal water supply.

Isla Urbana aspires to make rainwater harvesting a government-sanctioned technology to supply Mexico City's domestic water needs. A mapping tool will provide tangible support for rainwater harvesting in a number of ways. In the short term, it will be able to illustrate Isla Urbana's current impact in the Ajusco region, providing a sample for the technology's potential. By quantifying rainwater harvesting's impact in Ajusco, IU can identify similar areas of high need and project IU's benefit in that community. In the long term, an interactive map can illustrate the severity of Mexico's water scarcity by identifying areas where water is unaffordable or unavailable. Mapping will be a valuable tool for IU to show the spatial advantages of a decentralized water system.

## **Cross-client value of mapping tool:**

The importance of visual communication is acknowledged by all of the client partners. Sistema Biobolsa and Yansa are both interested in visualizing the benefits they are creating through improved community development. Mapping as a tool allows for the visualizing of metrics that track population, education, and employment among other indicators. Mapping through color gradations will illustrate the growth or decline of these metrics, and show where benefits are accumulating and areas where more work is required. This will be a powerful tool in developing strategies for growth and communicating visually the social benefits provided by each client to local communities and to governmental policy bodies.

Yansa's wind farm social benefits can be mapped to show community development projects funded. This will allow the tracking of the various areas of development being promoted to allow for a balanced allocation of funds. Sistema Biobolsa has also indicated an interest in tracking the location of installed systems against those systems that were installed, but are not being used and need to be reclaimed. Mapping will help all partners to step back and strategically understand where the most benefit is needed as opposed to those areas where sufficiency of business objectives have been achieved.

Another benefit of a mapping tool across all partners is the integration of a Customer Relationship Management (CRM) database. This database would be populated along the backend and be composed of the datasets that will be visually represented on the map.

These data sets would include, but not be limited to:

- Family names of participants
- Location (address and longitude/latitude)
- Size of installations
- Date of Installations
- Household size
- Building typology
- Education resources
- Healthcare resources
- Employment resources
- Adoption rates

## The Yansa Group - Dynamic Metrics Tool:

### **Background on client:**

The Yansa group partners with communities to facilitate their direct participation in the just transition to renewable energy while ensuring that the communities retain control over their resources (<http://www.yansa.org>). Yansa provides the technology, capital, training and management required to develop and maintain community controlled wind farms. The generated energy is sold to the national grid and profits are reinvested in initiatives set by the community that improve quality of life, including but not limited to the advancement of opportunities in higher education with consideration to gender equality, enhanced access to public water, electricity and waste management services, accumulation of pension funds for retirement security, and improved healthcare services (<http://www.yansa.org>).

Yansa is currently developing Mexico's first wind farm in Ixtepec, Oaxaca, one of the most wind-rich regions in the world (News National Geographic, 2013). The revenue from the farm will be divided to support community led development programs in Ixtepec and to invest in future wind farms in other areas of Mexico. To gain trust where wind farms in other parts of the state have traditionally come with big promise but little benefit to locals, Yansa has successfully put a tremendous amount of effort into its relationship with the residents of Ixtepec. For example, they developed a business plan unique to wind farms that will provide tangible social value to Ixtepec. They have held a series of community meetings to communicate this plan, and built a website to describe the project.

Yansa also conducted surveys to understand what Ixtepec residents considered the most critical needs for their prosperity and resilience. We categorized these needs into five areas: Education & Values, Economy & Employment, Well-Being, Environment, and Community & Leisure. The following are some examples that emphasize specific needs within these areas. In terms of education, 38% of adults surveyed had not finished high school (Yansa, Consulta de Prioridades de Ixtepec, 2012). Regarding the economy, although the unemployment rate is only 2.7%, the quality of jobs is poor, and 15% earns less than the minimum salary set by the government of Mexico (<http://www.inegi.org.mx>), (Yansa, Perfil sociodemográfico, 2012). In the area of well-being, a majority of the illnesses reported are preventable, such as respiratory, diarrhea, urinary, hypertension, and diabetes (Yansa, Consulta de Prioridades de Ixtepec, 2012). In terms of environment, river pollution, deforestation, and garbage disposal cause concern in Ixtepec (Yansa, Consulta de Prioridades de Ixtepec, 2012). According to Yansa, Ixtepec is a community with a rich heritage and culture. This community attribute is being threatened by the migration that is occurring due to lack of employment opportunities in the area. Figure 6 lists these critical areas. The pyramid illustrates how education is the foundation for all the areas. It also shows how the additional areas of economy, well-being, and environment support community & leisure. This will be explained in more detail.

Yansa's planned wind farm has not yet been built. Therefore, we have identified their biggest challenge is to effectively communicate the potential impacts of their project that will create positive change in line with the community's self-defined values. To help Yansa identify the most essential impacts and

programs that address the community's most critical needs, we outlined a community-led social impact strategy for Yansa.



Figure 6: Areas Most Critical To Ixtepec's Prosperity And Resilience

### What is the tool and how does it work?

This community-led impact strategy involves continuously assessing residents' changing needs, perceptions, and values. It is intended to guide the implementation of community led projects to create positive social impact in Ixtepec. This is important because their needs will change over time. The strategy also ensures that the impacts of these projects are relevant to the community, and are quantified before and after implementation in order to communicate progress. It also ensures that appropriate and varying timelines are taken into consideration. In this strategy, data collection will be conducted directly with residents using quantitative, visual and oral methods. This 'on-the-ground' approach measures the most relevant impacts to the community. Utilizing multiple metrics also allows Yansa to selectively frame their message to different stakeholders. Stakeholders may include government, community residents, landowners, investors, supporting NGOs, etc. Although the specific needs and metrics may be different, the methodology of this strategy is transferable to other communities. Figure 7 illustrates the cycle of our strategy which includes the following steps: 1) Assess Community Needs, 2) Define Metrics and Targets, 3) Set an Impact Timeline, 4) Obtain community baseline data, 5) Implement programs, and 6) Quantify improvements. More detailed descriptions of each step follows. After this last step, the cycle should start again to ensure that programs and metrics are adapted as the community's needs change.



**Figure 7: Community Impact Strategy**

**Assess Community Needs:** Yansa recognizes Ixtepec’s most critical needs, which are shown in Figure 6. We recommend gaining a deeper understanding of these needs. Traditional tools such as surveys and focus groups may be conducted, but we also recommend more interactive tools such as games, narrative interviews, and PhotoVoice. These tools accommodate participation among different age groups, education levels, and genders, which enhances collaboration and engages the entire community. For example, PhotoVoice is a photography and digital storytelling method through which individuals can identify, represent, and impact their communities. Participants are asked to express their point of view in the community by taking photographs, discussing them together, developing narratives to accompany their photos, and conducting outreach. PhotoVoice has already enabled women in rural China to influence the policies and programs that affect them (Team Lab USC).

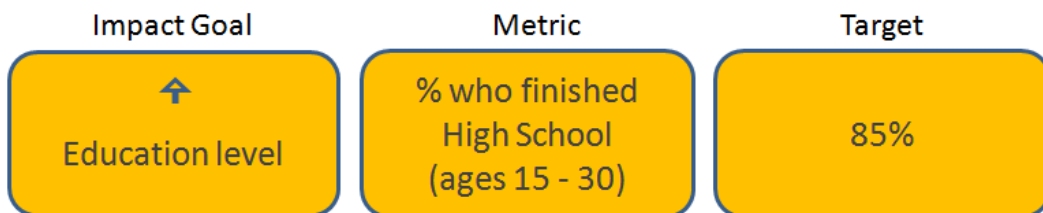
**Define Metrics and Targets:** After specific community needs are established, a set of representative indicators must be developed for each need. Within each of the 5 areas, we have established sub-categories, goals, the need each goal addresses, and example questions. This is a starting framework from

which Yansa can build a more robust list of need-based goals, and a set of metrics associated with those goals. The following table shows the proposed sub-categories within each major area.

**Table 1: Impact Goals for Social Development in Ixtepec**

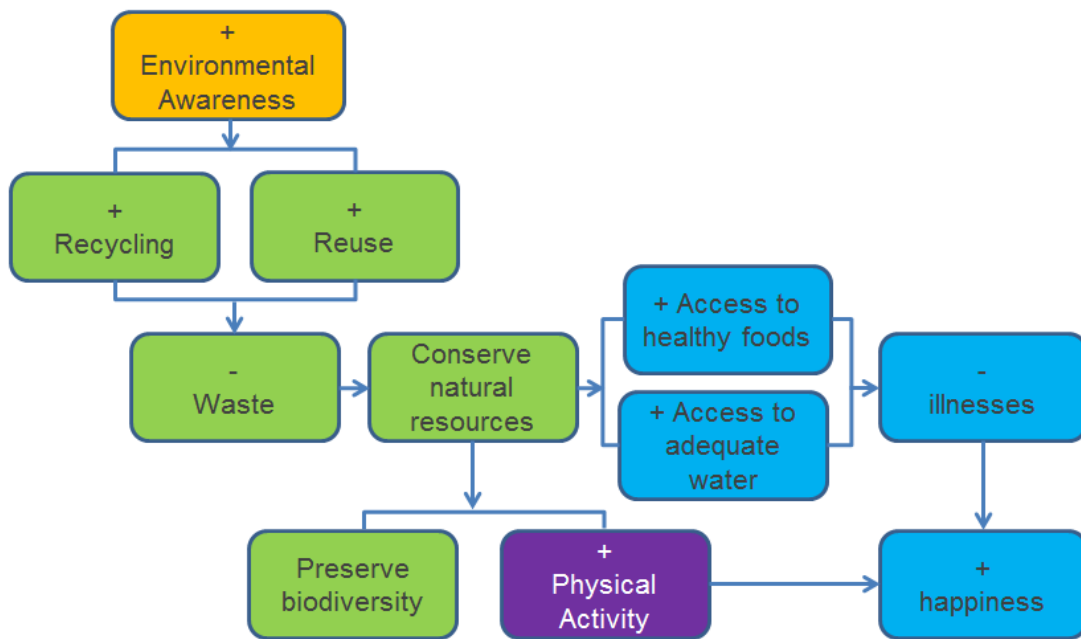
Education & Values	Economy & Employment	Well-Being	Environment	Community & Leisure
Increase academic level of education	Improve local economy	Increase happiness	Conserve natural resources	Maintain community involvement
Increase literacy rates	Decrease economic vulnerability	Decrease illnesses	Preserve biodiversity	Increase free time
Increase skill knowledge	Increase productivity rate	Increase reproductive health	Reduce waste	Increase physical activity
Increase healthy behavior awareness	Increase employment opportunities	Increase access to healthy food	Increase reuse	Increase recreation
Increase environmental awareness	Improve employment satisfaction	Increase access to healthy water	Increase recycling	Preserve identity

Different impacts will be important to different stakeholders, so multiple metrics should be developed for each area. These metrics should be quantifiable, to assess progress over time. It is important for Yansa and the community to define what they want to measure, and also the associated measurable improvements they want to see. Setting measurable targets ensures Yansa's ability to demonstrate its social impact achievements to its stakeholders. Figure 8 depicts an example Metric and Target for the Goal to increase education level.



**Figure 8: Goal – Metric – Target Example**

**Set Impact Timeline:** The next step is to set an impact timeline. The targets set in the previous step require planning a schedule indicating when each should be achieved. Some impacts can be measured over the short term, while others require longer periods of time to see results. Still other impacts can be measured with varying goals across multiple time periods. Yansa must also recognize that each area is very complex and that all areas have connections to each other. An impact in one area may affect another area at a different time. For example, an improvement in the area of Education may in turn impact the area of Environment at a later point in time. Figure 9 illustrates this point. This step also reveals the importance of first identifying everything that needs to be measured before any intervention is put in place.



**Figure 9: Impact Area Connectivity Example**

**Baseline Community Data:** All of the ‘existing conditions’ data must be gathered at the beginning, before any programs are established. This data serves as the community baseline for these metrics. Measuring the same data after programs are implemented will show the changes that occur as a result of those programs. Qualitative tools such as photographs can also be used to document this baseline.

**Implement Programs:** The people of Ixtepec can suggest programs to meet the goals and targets that were set in earlier steps. Yansa can continue to collaborate with the community, and should also utilize additional external resources to develop program implementation strategies. The programs implemented should draw from all available resources in the community. For instance, in Figure 10 the image on the left appears to be an under-utilized public space. As conceptualized on the right, the simple addition of a permanent cover would provide shade, transforming this space into a known cultural center, or an area for



local people to sell their crafts or food products. Solar panels on the roof could provide electricity to keep the space lit at night, extending the hours of use per day. This example would impact the areas of Economy & Employment as well as Community & Leisure.



**Figure 10: Existing Community Assets Improvement Example**

**Quantify Improvements:** After community programs have become established, the metrics identified earlier should be measured again, and results should be compared to the baseline. Photographs can also be used if a baseline photo was recorded. After community improvements are quantified, the entire cycle begins again to determine how their needs have evolved. An investor may be more interested in graphs and data tables, with summarized improvements. Community members may find photographs or locally tangible examples more appealing or easier to understand. Government or public interest organizations may prefer to see community-wide improvement indicators that directly relate to government funding or societal contribution.

### **How does it benefit our client?**

Our client benefits from this dynamic framework because it measures impacts over different lengths of time, adapts to a changing community and varying stakeholder interests, and can be applied to other communities in future projects. This allows Yansa to customize their message for each audience. By following the strategy we have outlined, Yansa can successfully plan and implement its programs for social improvements in Ixtepec. This will allow them to present the positive results to many different stakeholders in ways that will accommodate the interests of each. Yansa can use these results to help governments, investors, and other communities understand the benefits of these wind farms and how they can address the unique and ever-changing needs of any community they may serve.

Finally, this strategy also illustrates how other community intervention programs could address the varying social needs of any community, as well as how its impacts could be measured and communicated to different stakeholders.

We realize that the social impacts strategy process alone is a very arduous undertaking. Yansa's efforts to-date in their community involvement and business plan are commendable and will continue to demand significant time and energy. Therefore, we recommend drawing from the following additional resources to help develop and facilitate this strategy.

## **Recommended future resources:**

**Projects and Programs:** An abundance of community impact programs have already been developed in Ixtepec and around the world. These could include existing Ixtepec community programs, and non-government organization programs. Yansa may be able to utilize these programs without modification to benefit the community. Revenues from the wind farm could simply be spent on these programs and initiatives, rather than duplicating the effort of developing a program with similar goals. We have identified the following types of programs as good "as-is" resources with program investment potential.

Understandably, Yansa does not want the primary focus of funding to support the standard needs that government should provide to the community. However, we recommend Yansa consider allocating a portion of its improvement programs to supplement publicly-provided systems. Supplementary infrastructure programs will save residents money and time, and will also improve the environment, health, and resilience for each household and the community as a whole.

Decentralized infrastructure projects like Isla Urbana's rainwater catchment systems and Sistema Biobolsa's biodigesters are extremely applicable to Ixtepec. These systems appropriately address many needs that the government may never be able to sufficiently provide. Examples of the many benefits to these supplementary systems are:

- Reduced or eliminated trips to and from the river or other source for water collection, resulting in hours of time saved daily. This time could be spent in an educational setting or engaging in productive or profitable activities.
- Reduced need to purchase resources resulting in large sums of annual savings on cooking fuel, fertilizer, water, etc.
- Increased use of local resources resulting in reduced waste, increased availability of resources, and increased efficiency in obtaining those resources.
- Reduced river pollution due to farm animal waste being diverted to create biogas and fertilizer.
- Improved soil productivity due to the use of more natural fertilizers.

**Local resources:** To maximize efficiency in each step throughout the social impact strategy, Yansa should seek experts to help plan the structure, development, and implementation of the data collection and community programs. We have identified the individuals and groups listed below as valuable resources that contributed to our understanding of the issues and solutions presented in this report. Individuals listed have agreed to their inclusion in our report, and may be contacted at Yansa's discretion.

Juquila González has a PhD degree in Sociology from the Autonomous University of Puebla. She is currently Research Professor at the Universidad del Istmo en Ixtepec, Oaxaca.

Universidad del Istmo is already in Yansa's plans for future collaboration with professor Juquila Gonzalez. University students will be invaluable in helping develop the Impact Strategy metrics and timeline, and in data collection and analysis.

Alba Sánchez obtained a MSc. in Manufacturing Systems and Mechanical Engineering. She collaborated in the development of sustainability indicators and action plans for industrial operations with BioRegional's One Planet Companies© accreditation model in Mexico.

The Ixtepec Community is already collaborating with Yansa's research to identify community needs and gather baseline data. In addition, the community has started collaborating with Juquila Gonzalez in starting a PhotoVoice project.

**Non-local Resources:** Our research uncovered several resources that will be useful to Yansa. Some are people or groups who have worked extensively in this capacity; others can provide low- or no-cost support for certain steps in the strategy. These resources are valuable because they can offer objective insight to the needs and possible impacts of a community, as well as a broader scope for implementation in other communities. Individuals listed have agreed to their inclusion in our report, and may be contacted at Yansa's discretion.

Diana Hernández (PhD, Columbia University) focuses her work on issues of social inequality with particular emphasis on racial and socioeconomic stratification and structural causes of disadvantage. Her bio is available online at <http://www.mailman.columbia.edu/our-faculty/profile?uni=dh2494>

The Earth Institute, Columbia University is another current resource with which we recommend continued engagement. Another capstone team in the MSc Sustainability Management program could conduct a follow-up project that would refine or further develop the strategy, building off of what we provided here, during this capstone project.

Rhode Island School of Design (RISD) could provide additional artistic support for visuals that would enhance Yansa's presentation of program results information. Perhaps a class or individual project could be utilized to generate these types of materials.

Existing Social Metrics Systems can furnish a basis for developing the goals and metrics included in Yansa's impact strategy for Ixtepec. The relevant portions of these in-place systems can be applied, and additional collaboration with others (both within and outside the community) can further tailor the metrics to Ixtepec. A similar approach could be used for other communities in the future. Two examples of useful resources are the Gross National Happiness Index and several ICLEI publications including tools for resilient cities.

Our Capstone Archive includes all the documents and sources we researched during the first 6 weeks of the project. This information will also be provided to the Yansa team, and can be distributed or used as needed throughout strategy development and in collaboration with other individuals or groups.

**Next steps:** Some additional attention should be given to some elements of the impact strategy that Yansa has already begun to develop. Following the strategy, several items must be completed prior to determining or assessing impacts.

Revising survey content and adding other baseline data collection methods will enhance the ability to assess the community's needs, which will enable Yansa to move toward identifying the associated goals, metrics, and targets. The questions asked must be determined and refined based on the goals and targets that are set. Those we provided in the spreadsheet are merely suggestions based on our own ideas of what might be measurable within each needs category. Drawing from other resources to develop these questions ahead of time will make the assessment more robust and meaningful.

The same is true for developing the available responses and scoring for any quantifiable data obtained. For any qualitative data, while it is more free-form due to the individual nature of information gathering, some level of planning is still required. Consider the PhotoVoice example: any specific location or object that needs to be assessed in multiple time periods should have the same reference point, and these points should be tracked for ease in future access.

All aspects of the community impact strategy should be reviewed when embarking on the next assessment phase in the same community, or when another community is to be assessed. The dynamic nature of the strategy we provided allows for this flexibility and adaptability, but it still requires up-front planning for successful implementation.

### **Discussion on cross-client value of strategy:**

This strategy illustrates how other community intervention programs could address the varying social needs of any community, as well as how its impacts could be measured and communicated to different stakeholders. Therefore, it could also be applicable for our other two clients, Isla Urbana and Sistema Biobolsa.

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### **References for Yansa:**

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<http://www.inegi.org.mx>. (n.d.).

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## Sistema Biobolsa - Integrated Communications Strategy:

### Background on client:

Sistema Biobolsa provides small-scale farmers and families with biodigesters for fertilizer and methane gas for cooking. They design, build and service the systems they sell. And they work with micro-finance experts at Kiva to make sure farmers are able to afford the system.

### What is the tool and how will it benefit client?

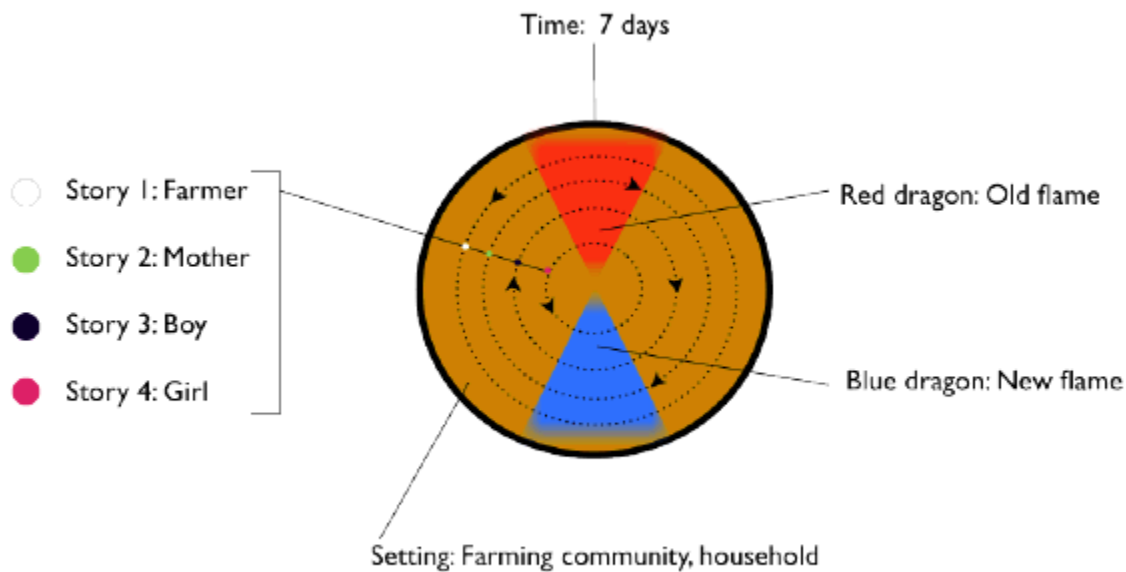
Our tool is actually a series of tools that fill out the basis for a communication strategy across temporal scales of short, medium, and long-term to aid in the process of normalization for the technology and brand name of Sistema Biobolsa. The core of our recommendations will focus on the short to medium-term applications, and each strategy will be clearly described in its intended use and potential benefit. Specifically, each tool will identify the following (although not all this information is included here for the sake of brevity in our summary of the tools):

- Explain what the tool is
- Give the rationale for the tool (The Why) as explained through the precedents and cases
- Always integrate an explanation of how it aids in normalization highlighted by using indicators and metrics
- Explain who is the target audience
- Identify what technology is needed in accomplishing success with the tool- Explain how each tool can be tailored and scaled depending on the applications of the target audience's available technology
- Assign a value to the suggestion based on estimated costs and added benefits

### Short Term- 6 Months to 1 Year

### Illustrated Guide/Design Brief:

The [new] Legend of the New Flame is here presented as a series of first encounter events told from several different perspectives and viewpoints. Our recommendations are adaptations of an existing story that Sistema Biobolsa has been working on. The following graphic element represents our proposed basic story structure. At the core is a series of stories within a larger story that follows a type of time loop narrative structure.



**Figure A5 Time loops of [6] characters over a fictional 7-day period.**

The diagram shows both the red and blue dragons in opposition. It also depicts (in an abstract sense) and how individual perspectives (arrows and dotted lines) can serve to reveal a "truthful" account of events—in this case, the discovery of the new Biobolsa flame and, more importantly, how the lives of a community change when it arrives.

The outermost ring represents time with the smaller inner circles symbolizing character journeys occurring within this time period. Each character has their own familiar relationship with the old (red) flame and must serve as narrator or witness as they recall their own first encounter with the new (blue) flame.

First encounters and reinforcing loops

The first time a person hears, discovers and interacts with something new is usually highly subjective. When several of these perspectives are combined, a potentially powerful composite image can emerge to reveal “the truth” about a particular event, person or object. By generating such a narrative structure Sistema Biobolsa can invent important “reinforcing loops” aimed at normalization. For example, we know that time spent collecting firewood may cause many personal and social changes. Therefore, accurately depicting the journey of discovery that a wood collector takes from first encounter, through a period of mixed reports and fuzzy knowledge to full support of the technology and its benefits, could serve to educate and later animate both existing and potential users.

Goals:

- Create an opportunity for different iterations of the same story
- Inspire horizontal communication
- Integrate realistic prototype characters from community to create relatability for readers

## Facebook and Social media campaign:

The use of social media to aid in the process of normalization of Sistema Biobolsa systems is something that can take relatively little additional effort and cost, while potentially enhancing the understanding and acceptance of SB systems across diverse demographic groups. Even if these campaigns do not immediately reach potential customers, the spread of the awareness of SB and their work can offer ancillary benefits that ultimately work towards the spread and adoption of systems in the long-term.

The content generated for the illustrated guide/narrative could form the basis of multiple branding and information campaigns. This can also be used in combination with contests that build off of the illustrated guide, and other creative marketing campaigns that are carried out through social media platforms. Consideration of replication of information is important.

### Goals:

- Utilize content from illustrated guide/dragon story
- Raise Awareness of Sistema Biobolsa and the work they do
- Make people more familiar with the benefits of biogas systems
- Activate engagement from online users
- Lay the groundwork to penetrate new markets

### Medium- 1-2 years

## Mobile Communications

In an effort to set fluid communication portals between Sistema Biobolsa and their users, mobile communications running on SMS can be a very effective method to address a variety of issues. Pictured in the diagram above is an illustration of how the communications network could work in practice. In the center is a database for Sistema Biobolsa that acts as a stock of information. Information flows in a loop from SB to the farmers, and from the farmers to SB. The information exchange in this loop can lead to data collection that is then conveyed as impact information to policy setters, grant funders, and potential users of the systems.

There are several strong SMS communication platforms already developed for interfacing with rural farmers that have cell phone technology but no internet connection. SB could either partner with or contract some of these platform providers to address their needs. In addition to using the SMS communication platform for technical assistance, reminders for system maintenance, and data collection, there is the possibility of using it to aid the farmers lives by providing offering other information including but not limited to weather, general health recommendations, crop prices, agricultural tips, and so on. For illiterate users, there are certain voice service programs that might allow them to still utilize the same platform.



Goals:

- Establish an open two-way communication line between SB and farmers with installed systems
- Create a means for SB to collect information directly from farmers that can then be aggregated and presented to interested parties
- Provide technical assistance to SB system users without needing to make site visits
- Manage reminders to SB system users to make sure they are using and maintaining their systems properly
- Garner opportunities for Grant funding

### **Sistema Biobolsa Online Community on SB website**

The prospect of developing an online community that functions out of the Sistema Biobolsa website offers several benefits: creating a dynamic website, increasing web traffic, offering feedback to novice system users from experienced systems users worldwide, etc. There are several options that can be pursued in the creation of this online community, each with respective strengths and weaknesses.

Goals:

- Attract users to the SB site
- Make the SB site more dynamic and increase its relevance
- Cement SB as a global thought leader in the world of biogas digestion

### **A checklist or a payback tracking system:**

Finding effective means to demonstrate the value derived from the installation of Sistema Biobolsa systems is integral in both their increased adoption and for system advocacy by existing customers. Creating an effective and simple means to engage the farmers and their families in this process is challenging, but the idea of incorporating the aspects of a game might make it more likely to be utilized.

There are a variety of different approaches that may be pursued, with discrete and overlapping constraints to be overcome with each. The limitations of creating a hard copy payback tracking system, such as built-in assumptions about fuel and fertilizer prices, must be clearly articulated in order to prevent false understandings about the payback rate.

Goals:

- Using visual communication to demonstrate SB system's value to customers
- Incorporate whole household in the tracking process
- Create accuracy and accountability in the payback process

Long Term 2-3 years

## The Enhanced Map and The Corresponding Virtual Tour:

The use of a virtual tour could bring a user anywhere in the world to see the work that has been accomplished by Sistema Biobolsa in the many different countries in which they operate. This aids in the process of standardization of their systems by increasing digital exposure to systems that are otherwise difficult to reach in person.

There are a number of precedents from which Sistema Biobolsa can follow in the crafting of their virtual tour strategy.

### Goals:

- Aid in the process of normalization
- Provide access to systems for interested parties that can not make it to the systems in person
- Feature the stories of the farmers who benefit from the systems

### Explorations

Our explorations section was a brainstorming session on how Sistema Biobolsa might find creative new ways of conducting their business moving forward. The inspiration came from the idea that farmers could sell their excess fertilizer to greenhouses on a credit system through which Sistema Biobolsa would ultimately reimburse the farmers. Some of the thoughts focused on alternative currencies that could be used, points and credit systems, and incentive structures that are less traditional than the norm.

#### **What data are we using for this tool?**

The data we used for the Integrated Communications Strategy came from a wide swath of resources. The original work done by the Communications Team in the first half of the semester provided a substantial amount of the necessary research in the forming of this strategy package. In text citations and links are provided for the client where appropriate.

#### **How does the tool work?**

The tool is meant to act as a conversation starter, not as a ready-made turnkey implementation package. The hope is that each component of the Integrated Communication Strategy will be reviewed in full by our client, and discussed with the leadership of the company to see what areas they would first like to try deploy.

#### **A link to the functioning tool:**

[https://drive.google.com/?tab=mo&authuser=0#folders/0B\\_uS8g3OABM3MFpWM2tHZWpTQVE](https://drive.google.com/?tab=mo&authuser=0#folders/0B_uS8g3OABM3MFpWM2tHZWpTQVE)

#### **Communication Strategy for the tool:**

Written reports explaining each component.

**Discussion on cross-client value of tool:**

The cross-client value for each component of our Integrated Communications Strategy is fairly intuitive. Those not familiar with each client's respective situations may not be able to perceive the overlapping applicability of these tools so here is one example:

The Visual Narrative and Design Brief is the cornerstone from which many of our other tools take content for branding, build issue recognition, and integrate the community. Both Yansa and Isla Urbana could benefit from having illustrated stories about how the lives of typical community members benefit from their respective interventions (community wind and rainwater collection).

These stories can then be broadcast to build support in the same way as they are hoped to do with Sistema Biobolsa.

Please visit <http://lotecapstone.wix.com/mexico> for more information and follow us on Twitter @ThinkLOTEC