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# Situation Assessment in Villa Nueva: Prospects for an Urban Disaster Risk Reduction Program in Guatemala City's Precarious Settlements

Rebekah Paci-Green

*Western Washington University*, [rebekah.paci-green@wwu.edu](mailto:rebekah.paci-green@wwu.edu)

Scott B. Miles

*Western Washington University*

Walter Svekla

*Western Washington University*

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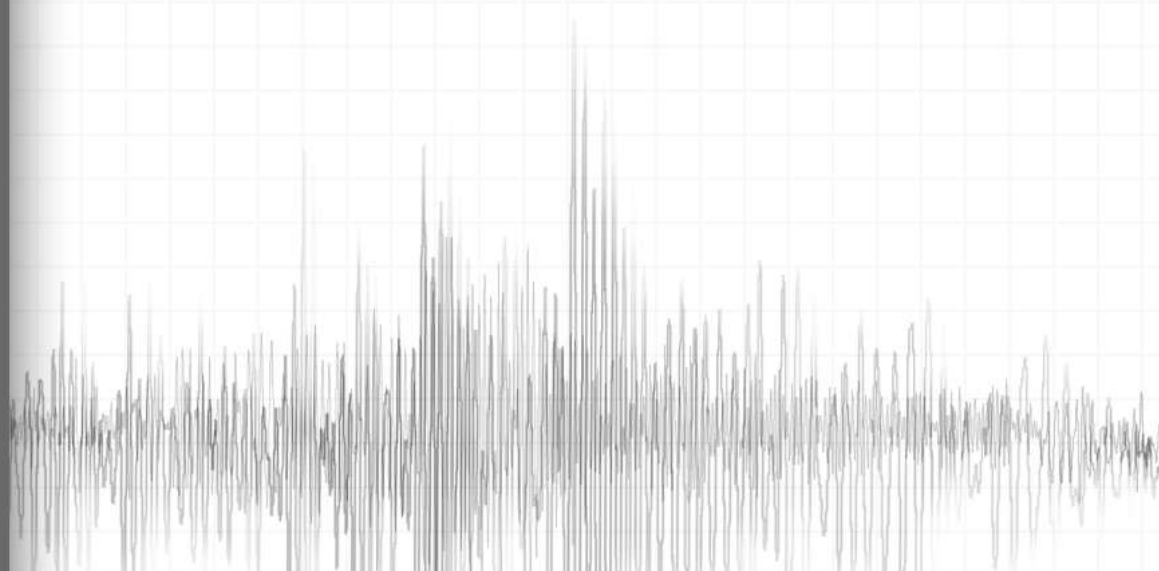
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# Situation Assessment in Villa Nueva

## Prospects for an Urban Disaster Risk Reduction Program in Guatemala City's Precarious Settlements

Dr. Rebekah Green  
Dr. Scott Miles  
Walter Svekla

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Western Washington University, 516 High Street,  
Bellingham WA 98225-9085 USA | +1 360.650.2707  
[www.wwu.edu/huxley/resilience](http://www.wwu.edu/huxley/resilience)



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## SUMMARY

In 2009, Oxfam-Great Britain in Guatemala asked The Resilience Institute of Western Washington University to conduct a situation assessment of two informal communities in the outskirts of Guatemala City, Guatemala. Oxfam sought to assess the potential for developing an urban disaster risk reduction program within the metropolitan's precarious settlements – informal settlements along the steep embankments of ravines. These settlements are often rapidly constructed overnight using temporary materials, with little possibility for considering the prevalent risk of landslides and seismic activity. Because residents build these squatter settlements without municipal approval, the settlements are considered illegal and often remain un-serviced for years.

The situation assessment took place in two pilot communities, located 16 kilometers south of the capital Guatemala City in the municipality Villa Nueva. More specifically they are located in the El Mezquital area and are called Las Brisas and Unidos 8 de Marzo. There, as elsewhere in the region, precarious squatter settlements experience seasonal landslides, heavy rains, and reoccurring damage to their property. The situation assessment included 65 household surveys, a physical risk assessment, community focus group discussions, and meetings with national emergency management representatives, local universities, research institutions, and municipal planning department. The situation assessment formed a basis on which the Resilience Institute has worked with Oxfam-Great Britain in Guatemala to formulate an initial disaster risk reduction framework. This framework is applicable for many communities in Guatemala and the rest of Latin America, and is elaborated on in a separate document.

The following section gives a brief overview of informal settlements in Guatemala, and in El Mezquital in particular. This is followed by a detailed analysis of the household survey, a summary of the focus group discussions, three case studies of settlement households, and a brief institutional analysis. The document concludes with a brief synthesis of the work, through a discussion of 4 emerging themes and a brief discussion about prospects for urban DRR in Guatemala City. Strategies for implementing a DRR program are more fully elaborated in the companion document – Urban DRR Framework for Guatemala's Precarious Settlements.

## INTRODUCTION AND BACKGROUND

Guatemala is located in Central America and is home to almost 13,000,000 people. It has high levels of inequality throughout the country and is ranked 121 out of 179 on the United Nation's Development Programme's Human Development Index (UNDP, 2008). Due to its high inequalities and poverty poorer residents have built many informal settlements, especially in and around Guatemala City. The metropolitan population in Guatemala City is 823,301 with 250,000 of those living in informal precarious settlements (Diaz et al. 2000).

Guatemala's unstable political history is an underlying factor which has contributed to an increased level of vulnerability for informal settlements. Years of social, economic, and political corruption and inequality has deteriorated the local community's trust and faith in the national level government. Guatemalan politics lack transparency and accountability and have repeatedly failed to provide support for its citizen's. The main source of the law is the constitution of 1985 which was amended in 1993. It is largely ineffectual. The lack of government influence in Guatemala has established it as one of the most violent countries in Latin America, with almost 6,000 people murdered there last year. That is 46 victims per 100,000 people, a rate eight times higher than in the United States (Rosenberg, 2008). The people of Guatemala have limited political rights. A high degree of corruption exists in the country, especially in the administrative, judiciary and corporate sectors. Efforts to promote transparency have made little progress.

The 1976 earthquake marks the beginnings of a class struggle that has heavily influenced Guatemalan society. The earthquake was a 7.5 magnitude centered in the Motagua Fault, about 160 km northeast of Guatemala City. Over 22,000 people lost their lives in the quake, especially those that were living in unsafe housing in the rural highlands and in informal squatter settlements. Those living in informal settlements, primarily Mayan Indians, suffered the highest mortality rate. Residents of middle class homes, which were better protected and more safely sited, experienced less destruction. Disproportionate recovery efforts further segregated the populations. "The earthquake tore open many holes in the social fabric which had already been stretched thin. The rich and those in power came out richer and the poor came out poorer, and the differences and inequalities became more visible" (Davis and Hodsden 1982, 15).

After the earthquake, years of civil war and genocide against the rural Mayan majority dominated the political context of the country, further breaking down the governmental organization established to ensure the livelihoods of their citizens. During this time, government soldiers herded hundreds of thousands of Mayans into new settlements; others took refuge in remote forested mountains. These population movements often involved marginalized people forced into marginal, precarious places.

The long civil wars and political unrest has undermined the ability of the central government to prevent or mitigate hazard events. The Guatemalan poor have been caught up in a vicious cycle where a lack of access to a means of social and self-protection has made them perpetually vulnerable to disaster after disaster (Wisner 2000, 9).

Currently, there is a serious lack of affordable housing in areas that are near places of steady employment. This political environment has established a situation that favors a migratory invasion tactic for those who live in conditions beyond their means. Populations are driven to settle in precarious areas susceptible to hazards. Most of the poorest housing exists in ravines and gorges which are highly susceptible to landslides.

The informal settlements are established by an invasion tactic often organized by a community leader. All on the same day, a population leaves the formalized housing areas to take over a plot of land. Many use the invasion to escape from oppressive and unaffordable conditions they experience in formal sector rentals. Others join the invasion opportunistically. The prospect of owning or occupying land informally is often too powerful to prevent settlements from establishing in highly vulnerable areas.

A study in 2009 of Knowledge, Attitudes and Practices of residents of informal settlements in the Guatemala Metropolitan Area showed that community leaders know that they choose to live in an area of high risk. They also know that they should not build houses larger than one story, and that their building increases the environmental degradation. However, they believe that due to their economic conditions they cannot aspire to live in a better place (KAP, 2008, 12). In most places there is no organization in the event of a disaster and no plan to evacuate in case of an emergency (KAP, 2008, 15, 32). Many community leaders have expressed interest in developing a local Integrated Emergency Plan (KAP, 2008, 73).

In informal settlements, houses are usually built incrementally over a number of years, with materials of diverse origin and quality, and not always following accepted techniques. These houses rarely comply with official safety standards and there are no controls in place to regulate safety. Standardized building materials for housing like concrete, bricks and steel, are scarce and expensive, which makes it very difficult for residents to properly reinforce their homes. Residents often resort to scavenging materials like corrugated metal sheeting and other scraps or discarded resources. This results in haphazard and unreliable construction. There are not many inflows of money into the informal settlements, thus residents have a serious lack of capital for making significant structural improvements. Infrastructure is limited and poorly maintained in the settlements. Residents often illegally tap electricity from more developed neighborhoods and water is in limited supply. Formalized garbage disposal is infrequent and often under-utilized; instead residents throw their garbage into the streets and the ravines.

The residents of El Mezquital describe the conditions of the terrain at the time of the invasion as “filthy and stripped of vegetation” (Diaz et al. 2000). The initial invasion by thousands of families aggravated these conditions. The lack of water, the discarded waste, the precarious dwellings, and overcrowding resulted in a very low quality of life as well as high levels of mortality and morbidity, particularly for children.

Since the initial invasions of El Mezquital however, there have been significant developments. After 15 years of community work, supported by external organizations, almost all the families in the settlement of El Mezquital have access to water. COIVEES, a government agency, supplies 2,537 water meters with clean, good quality water 365 days per year to El Mezquital, a much better service than most residential areas receive in the rest of the city, including middle- and upper-income areas. The cost of getting connected to the water system is 550 Quetzales for members of the Cooperative and 650 Quetzales for non-members. The cost of water supplied by COIVEES is relatively low compared to the other providers (Diaz et al. 2000). Ninety-five per cent of families have electricity in their homes (Diaz et al. 2000). The

entire population of El Mezquital, some 3,500 families, has sewers and rainwater drains in their areas (Diaz et al. 2000). Unfortunately, these drains are not properly maintained and often get clogged, worsening flooding hazard.

Those living in the settlements discussed landslides and flooding as the most significant hazards to which their community is susceptible. Eighty eight percent of Guatemala City is located in areas that have low to moderate risk of landslides, while 10% is at high risk and 2% at very high risk (Diaz et al. 2000). The winter months are a time of heightened level of vulnerability to hazards. Residents experience large amounts of rainfall, which often flood into the streets due to clogged drains and increases soil saturation, making the area more prone to landslides. Flooding and landslides combined repeatedly to devastate the already dilapidated housing as water flows into homes and dislodges them.

## I. HOUSEHOLD SURVEYS

Western Washington University, through its Institute for Global and Community Resilience, with the support of Oxfam, surveyed 64 households within two precarious settlements located in the municipality of Villa Nueva during the weekend of March 22-23, 2009. Both settlements are within the El Mezquital area of Villa Nueva, a municipality part of the Greater Metropolitan Area of Guatemala City.

The first settlement of Las Brisas, officially known as Brisas de Villa Lobos, consists of approximately 50 households spread primarily along a single path following a ridge finger. Several side paths lead down into the ravine with a minority of households on the more modest upper slopes of the ravine. Western Washington University researchers and three trained surveyors associated with Oxfam surveyed a total of 27 residents on Saturday, March 22, 2009. We were welcomed into the community by three women who were leaders in the Settlement Committee. They led us to each home and often introduced us to the residents before we started the survey. Figure 1 is a photograph of the Las Brisas community plan.



**Figure 1. Plan of Las Brisas.**

The second settlement of Unidos 8 de Marzo, also known as Anexo 8 de Marzo, is a settlement along a single wide face of a ravine. The community is made up of approximately 160 households. Multiple pathways, some paved, others simply dirty paths, lead down the ravine face and divide the settlement into sectors known as “manzanas”. Western Washington University researchers and the three trained surveyors surveyed a total of 37 households on Sunday, March 23, 2009. Before beginning our survey in Unidos 8 de Marzo, we met with three men and one woman, representatives of their Settlement Committee, to discuss our purpose and approach. We also discussed plans for a focus group discussion the following weekend and asked for their help recruiting five community leaders and five community members to participate in the focus group discussion to be held the following Saturday. A member of the Settlement Committee stayed with each survey team throughout the survey process, sometimes staying for the interview, other times sitting nearby or leaving and returning after we had completed the interview. Figure 2 is a photograph of the Unidos 8 de Marzo community plan.





**Figure 2. Plan of Unidos 8 de Marzo.**

Table 1 is a brief summary of the people interviewed for the 64 household surveys:

**Table 1. Number of surveys and average age of person surveyed, by sex.**

	Las Brisas		Unidos 8 de Marzo	
	Count	Average age	Count	Average age
Men	1	68	12	29
Women	26	36	25	34
<b>TOTAL</b>	<b>27</b>	<b>37</b>	<b>37</b>	<b>32</b>

## Response Summaries to Survey Questions

### Question 1. How many people live in your house?

The families surveyed were generally young couples with small children. Few families were made up of older men or women, or of households that included elderly parents. The average number of children, adults and elders per household, by sex, are described in Table 2 below.

**Table 2. Average household size and composition, by sex and age.**

	Las Brisas	Unidos 8 de Marzo
Girls (<15 yrs old)	1.2	1.5
Women	1.3	1.2
Elderly Women (>65 yrs old)	0.0	0.1
Boys (<15 yrs old)	1.4	1.1
Men	0.9	1.0
Elderly Men (>65 yrs old)	0.1	0.0
<b>AVERAGE HOUSEHOLD SIZE</b>	<b>4.9</b>	<b>4.8</b>

### Question 2. How many years have you lived in this settlement?

Both settlements were created by land invasions, and most lots were occupied within the first week of the invasion. As such, most households reported having lived in the settlement for a similar length of time, though some reported moving into the settlement to live with family or buying their lots from an original invader. From the responses, and from older satellite images, it appears that a few household existed in the area prior to the land invasion. Table 3 shows the median, minimum and maximum reported length of occupancy in each settlement.

**Table 3. Length of occupancy in settlement in years.**

	Las Brisas	Unidos 8 de Marzo
Median	6	8
Maximum	9	9
Minimum	0.5	1

**Question 3.** Why did you come to live in this settlement?

Table 4 illustrates the varied reasons respondents moved into the two settlements. When asked why they had come to live in the settlement, two thirds of the survey respondents spoke about renting elsewhere before invading the ravine. Most noted that rent was too expensive, that rent had increased, or that they had not paid rent and were evicted or pressured to leave. Some simply noted that they had been renting, learned of the invasion and came. Their answers implied that renting was not desirable, in comparison to “owning” a piece of land, even if it was not legally theirs.

About 14% of the respondents noted wanting or needing their own place to live as the primary reason for coming to the settlement. These respondents mentioned living with family, in other formal and informal settlements, and needing a space for a family of their own. For instance, one woman mentioned that there were no vacant lots in the informal settlement where her extended family lived. Some respondents mentioned that they moved to the settlement to not only eliminate rental costs, but because landlords did not want families with children to rent their apartments.

Four respondents, representing 6% of the total, had been displaced from other communities. Three of these had been displaced from coastal towns devastated by Hurricane Stan. With the destruction of their homes on the coast, they had come because of familial ties to someone already living in the settlements.

About 14% did not give a direct reason for moving to the settlement. Instead they mentioned that they learned of the invasion, saw it as an opportunity, and took it. Some came to join other family members; others simply saw signs of invasion or heard of it through family, neighbors, or community leaders. Two families mentioned that they came because they were having trouble raising their children in their previous location.

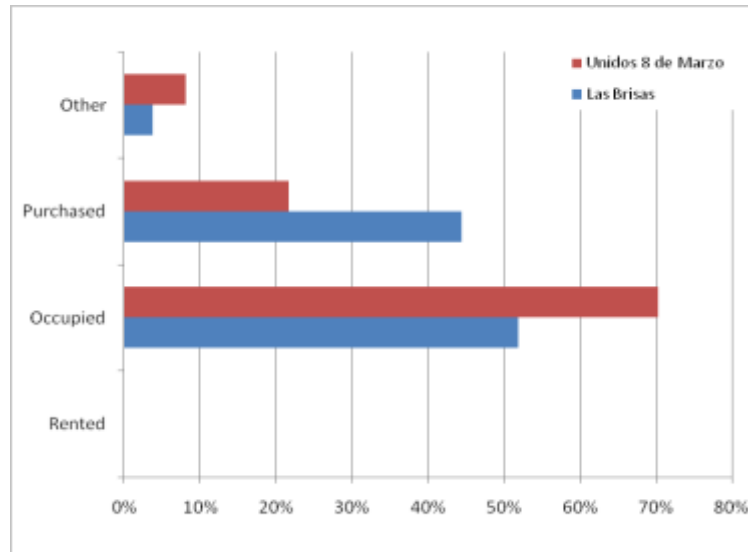
**Table 4. Reasons for coming to the settlement.**

	Las Brisas		Unidos 8 de Marzo		Both Settlements	
Rent	15	55%	27	73%	42	66%
Need own place to live	4	25%	5	14%	9	14%
Displacement	3	22%	1	3%	4	6%
Saw opportunity	5	18%	4	10%	9	14%
<b>TOTAL</b>	<b>27</b>	<b>100%</b>	<b>37</b>	<b>100%</b>	<b>64</b>	<b>100%</b>

**Question 4.** How did you come to obtain your lot?

When asked how they obtained their property, most interviewees responded that they purchased the land or simply obtained it through occupying the land. A few mentioned that they received the plot as a gift from a family member or from the settlement community. This latter option most likely refers to people who lived in the settlement previously, but lost their homes due to erosion and were resettled on a new land plot.

While not the focus of the survey, the results of this question suggest a different strategy for invasion between the two settlements. In Unidos 8 de Marzo, 70% the households surveyed stated they obtained land through direct invasion and occupancy, while less than a quarter stated that they had purchased the land. In contrast, 44% of the households surveyed in Las Brisas stated that they had purchased the land with 52% saying they had obtained it through direct invasion. It is possible that the purchase of land refers to the practice of community leaders organizing a land invasion and then “selling” the land to those who desire to invade. If so, it appears that this practice was more widespread in Las Brisas than in Unidos 8 de Marzo. Figure 3 illustrates how land acquisition varied among respondents.



**Figure 3. How residents obtained their lots in the precarious settlements.**

None of the residents interviewed in the two communities had a legal title deed to their property. When asked whether they were in the process of applying for a title deed, the vast majority stated that they were applying for a title deed to the national agency UDEVIPO, the Unit for Development of Popular Housing. Some said that they were applying to the settlement committee, which was submitting paperwork to UDEVIPO. Using the settlement committee as an intermediary seemed to occur when household members had limited capacity to read and fill in the application forms. Only one household in Las Brisas and two households in Unidos 8 de Marzo had not started the process of applying for land title.

**Question 5-6. How long has it taken to build your house? Of what material is it made?**

On average the households surveyed in Las Brisas have been living in the settlement for six years, as shown above in Table 3, and have been working on the construction of their present home for the last three years. Their homes are single story and have on average, two to three rooms. Walls are typically constructed of cinder block or are framed with wood studs and covered with corrugated metal, a material that offers poor insulation. Some houses have coverings of wood planks and/or other scrap material. Floors are predominantly compacted cement, with about one third of the homes still having earth floors. Almost all roofs are made from the same corrugated metal, and their susceptibility to being blown off during high winds is indicated by the use of stones and broken cinder blocks to weigh them down.

Residents in Unidos 8 de Marzo reported having lived in their settlement longer than those in Las Brisas, an average of 8 years. They also reported that they had been working on the construction of their present home for longer than Las Brisas residents, on average, six years. However, the homes in Unidos tended to be smaller and of less permanent material, than those of Las Brisas. Over half of the residents surveyed in Unidos had dirt floors and nearly three-quarters of the houses were made of wood frame and corrugated metal walls. All had corrugated metal roofs. Table 5 illustrates housing construction type in the two settlements.

**Table 5. Material composition of settlement houses.**

	Las Brisas		Unidos 8 de Marzo		Both Settlements	
	Count	%	Count	%	Count	%
<b>Floor Construction</b>						
Earth ( <i>tierra</i> )	9	33%	20	54%	29	45%
Compacted cement ( <i>torta de cemento</i> )	17	63%	17	46%	34	53%
Tile ( <i>ceramica</i> )	1	4%	0	0%	1	2%
<b>Wall Construction</b>						
Wood plank ( <i>madera</i> )	0	0%	0	0%	0	0%
Cinder block ( <i>block</i> )	7	27%	0	0%	7	11%
Corrugated metal ( <i>lámina</i> )	12	46%	27	73%	39	62%
Mixed materials ( <i>mezclado</i> )	7	27%	10	27%	17	27%
<b>Roof Construction</b>						
Corrugated metal ( <i>lámina</i> )	26	96%	35	97%	61	97%
Concrete ( <i>concreto</i> )	1	4%	1	3%	2	3%
Average number of rooms per house	2.3		1.7		2.0	
Average length of construction, in years	3.0		6.0		5.0	

**Question 7, 10, 12.** Do you have sanitation, electricity, phone and television?

Over 90% of residents in both settlements reported having electricity in their home. Despite being the newer settlement, 100% of those surveyed in Las Brisas had a toilet on their lot or in their house. A slightly smaller percentage, 94%, or residents in Unidos 8 de Marzo had a toilet. Television and cell phone ownership was over 80% for both settlements, though slightly lower for Unidos. Table 6 illustrates the percentage of respondents with electricity, phone and television.

**Table 6. Percent households with electricity, phone and television.**

	Las Brisas	Unidos 8 de Marzo
Toilet	100%	94%
Electricity	93%	92%
Phone or cell phone	93%	80%
Television	89%	81%

**Question 7a.** Who do you pay for electricity?

While over 90% of the residents surveyed had electricity, payment for that electricity varied. Table 7 shows respondents means of electricity acquisition. The majority paid the electric company or municipality. Because electricity was not metered at each individual lot, residents chipped in to cover the cost of the electricity for the entire community or for section of the settlement. Some residents reported taking electricity from a neighbor and paying them accordingly. A small percentage of respondents reported not paying at all, though community leaders suggested that the percentage of people in the community who did not regularly contribute to the electricity bill was actually quite high.

**Table 7. Electricity acquisition.**

	Las Brisas		Unidos 8 de Marzo		Both Settlements	
	Count	%	Count	%	Count	%
Electric company or municipality (Empresa de electricidad/municipio)	22	88%	19	56%	41	70%
Neighbor (un vecino)	2	8%	14	41%	16	27%
We do not pay (no pagamos)	1	4%	1	3%	2	3%
<b>TOTAL</b>	<b>25</b>	<b>100%</b>	<b>34</b>	<b>100%</b>	<b>59</b>	<b>100%</b>

**Question 8.** How do you get water?

All of the Las Brisas residents had piped water into their home or outdoor kitchen area. Only 60% of the residents surveyed in Unidos 8 de Marzo had piped water. Twenty-three percent bought water from a neighbor who did have piped water, and another 17% bought water through other means such as purchasing from a water truck in the legal neighborhood above or from a store, and rainwater catchment. Table 8 shows how respondents in the two communities access water.



**Table 8. Water acquisition.**

	Las Brisas		Unidos 8 de Marzo		Both Settlements	
	Count	%	Count	%	Count	%
Piped water system (Red/tuberia)	27	100%	11	30%	38	60%
Buy from neighbor (se la vende el vecino)	0	0%	15	40%	15	23%
Other (Otro)	0	0%	11	30%	11	17%
<b>TOTAL</b>	<b>27</b>	<b>100%</b>	<b>37</b>	<b>100%</b>	<b>64</b>	<b>100%</b>

**Question 9.** To where does your toilet drain?

All residents interviewed in Las Brisas had toilets or latrines on their property, while 94% of Unidos residents had toilets or latrines. None of the sewage from these toilets entered the municipal sewage treatment system. Rather, the overwhelming majority of sewage and waste water connected to an informal settlement drainage system that emptied into the ravine just below the lower edge of the settlement. A small fraction had sewage pits. Table 9 shows toilet and latrine access and drainage in the two settlements.

**Table 9. Toilet and latrine access and drainage.**

	Las Brisas		Unidos 8 de Marzo		Both Settlements	
	Count	%	Count	%	Count	%
Sewage drains to ravine ( barranco)	19	91%	31	83%	50	87%
Sewage drains to pit or septic (a flor de tierra, pozos ciegos)	2	9%	4	11%	6	10%
No toilet or latrine/Uses neighbors (Nada)	0	0%	2	6%	2	3%
<b>TOTAL</b>	<b>21</b>	<b>100%</b>	<b>37</b>	<b>100%</b>	<b>58</b>	<b>100%</b>

**Question 11.** How do you dispose of household waste?

About half of the residents of Las Brisas and about 40% of the residents of Unidos reported paying for trash collection, at a rate of about 35 Quetzales a month. However, anecdotal evidence suggests this may have been an over reporting. A community leader in Las Brisas and one of the respondents noted that only 5 households out of about 50 regularly paid for trash collection. Table 10 documents the responses regarding household waste disposal. About a quarter of respondents noted that they burned their trash. Twelve percent of Las Brisas respondents and nearly half of Unidos respondents said that they threw their trash into nearby trash piles, usually a pile at the edge or bottom of the ravine. It is likely that households engage in a multiplicity of trash management strategies simultaneously, and that throwing trash into the ravine increases when financial resources for trash collection or fuel for burning are limited.

**Table 10. Disposal of household waste.**

	Las Brisas		Unidos 8 de Marzo		Both Settlements	
	Count	%	Count	%	Count	%
Pay for trash collection (cuentan servicio de recoleccion)	13	50%	12	32%	25	39%
Burn it (la quemamos)	10	38%	8	22%	18	29%
Throw it in a trash pile nearby (la tiramos en algun lugar cerca)	3	12%	17	46%	20	32%
<b>TOTAL</b>	<b>26</b>	<b>100%</b>	<b>37</b>	<b>100%</b>	<b>63</b>	<b>100%</b>

**Question 13.** In your opinion, what is the biggest problem in your settlement?

Table 11 illustrates respondents’ perceptions of problems in their community. Half of the respondents mentioned rain and water related problems as the biggest problem in their settlement. Most respondents saw rain as a serious problem because of ineffective and inadequate drainage. Rainwater and overflowing sewage water regularly ran down the pathways and through homes in the winter. As one Las Brisas women stated, “When it rains the water can clog the drains. All the water comes and floods houses.” Others noted that rain water from the roofs and eaves of one house often poured water onto downhill neighbors, flooding their insides, collapsing the downhill house or destroying precarious retaining walls between lots. Many mentioned that litter clogged drains, exacerbating the drainage problem during heavy downpours.

**Table 11. Respondents’ major concerns about their settlement.**

	Las Brisas		Unidos 8 de Marzo		Both Settlements	
	Count	%	Count	%	Count	%
Drainage	13	48%	21	57%	34	53%
Landslides and housing collapse	12	41%	10	27%	22	33%
Other Problems	3	11%	6	16%	9	14%
TOTAL	27	100%	37	100%	64	100%

A third, 33% of the respondents, mentioned problems related to landslides and housing collapses. When discussing problems in their settlements, these respondents were concerned about landslides that resulted from living on the steep slopes of the ravine. Respondents explained that these landslides caused the regular collapse of housing and retaining walls in the settlements. Others mentioned concerns about being near the eroding edge of the ravine, fearing the collapse or loss of land that came with heavy winter rains. Rain was also mentioned in terms of saturation of the soil and heightening the risk of landslides throughout the settlement, but especially at the ravine edges. As one resident of Unidos 8 de Marzo stated, the landslides meant that at any moment they were at risk of sliding down the ravine. “We can all go” in a landslide. Others noted that they feared landslides most because “they had lived [them] in the flesh.” It was not a theoretical hazard, but a daily reality. Many other residents were concerned about the effects landslides had on their land. They noted that landslides reduced their lot sizes, especially for those at the bottom of the ravine. A few simply noted that they were scared of living in the ravine, especially near the bottom, but did not specifically mention the issue of landslides.

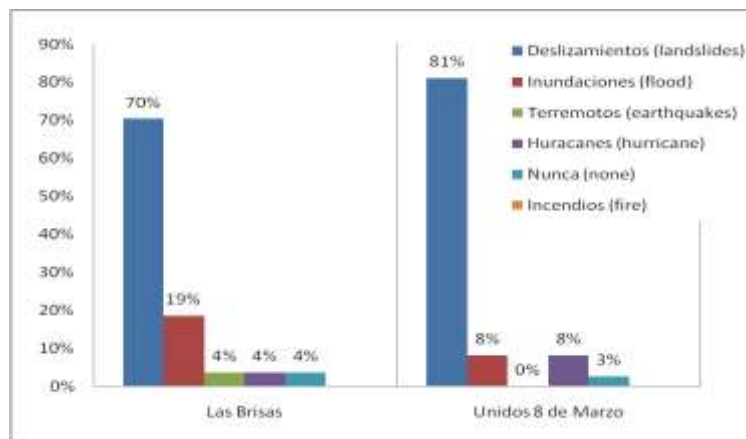
Considering the two most mentioned themes of drainage problems and landslide and housing collapse problems together, it is clear residents believed that heavy rains triggered the primary problems they had in their settlement. Heavy rain resulted in overflowing drains and household flooding, and it, along with vegetation clearing and higher intensity land use may contribute to slope destabilization and lead to loss of land and housing collapse.

A small percentage of the respondents listed other problems with their community. These included litter, garbage, lack of roads, and problems with neighbors.

**Question 14.** In your neighborhood, there are many risks from landslides, fires, earthquakes, floods, and hurricanes. What hazard concerns you most and why?

When asked which natural hazard affecting their community was the most serious, respondents overwhelmingly chose landslides over fire, earthquake, flood, hurricane and none. As noted in Figure 4, over three-quarters of the residents were most concerned about landslides. Of these, a third spoke about landslides in connection with the weather patterns of the region. Respondents reported that heavy rains in the winter, combined with sandy soil, resulted in unstable ground. They stated that they felt the constant threat of landslides when it rained.

Three residents of Unidos and one Las Brisas resident did not see the threat of landslides as only a result of heavy rains. Rather, they mentioned issues of poor drainage and trash clogging the drains. One resident of Unidos explained that “There is a lot of trash up there [in the formal settlement] and the drains overflow and the water falls into our homes.” Another woman noted that “when it rained, water went everywhere.” The heavy rains overflowed the drains, ran through their homes, and soaked into the soil. Thus, landslide risk was understood by settlement residents as linked to issues of urban planning associated with drainage and the inadequate handling of rubbish.



**Figure 4. Natural hazard about which respondents were most concerned.**

A minority of respondents, 12% of all surveyed, said they were most concerned about flood events. They reported that rain water got everywhere, causing mud, clogging drains and pooling in ways that respondents believed resulted in health hazards. One resident also mentioned that excess water engorged the river below the settlement. Those that mentioned hurricanes, about 6% of respondents, noted that the heavy winds and rains pulled off corrugated tin roofs and forced the evacuation of their families or neighbors. Others mentioned that hurricanes resulted in the flooding and landslides which concerned other residents. Only one resident mentioned earthquakes as a major concern. He was most concerned about this hazard because he viewed it as an act of God that no human could control.

**Question 14b.** Is there anything that makes this hazard worse?

When asked whether any actions made risk to landslide, flood, fire, earthquake, and hurricane worse, a little less than a quarter of the respondents did not believe that anything made these risks worse. A little more than a quarter indicated ecological triggers such as heavy rains as making risk worse. However, over half of the respondents, 54%, saw human action as a trigger for natural hazard risk. Most predominantly, residents mentioned trash and litter as a significant human-induced trigger to landslide and flood risk in particular. Residents noted that this trash fell into gutters and drainage systems, causing them to overflow. The overflowing water then directly caused flooding in homes and settlement paths, while they believed it also saturated the soil and increased the risk of landslide. As one woman in Las Brisas explained, “People have no awareness about litter.” Another woman explained, “They throw garbage on the street, it covers the drainage system and affects us all, as only 5 [households] pay for garbage collection.” A resident of Unidos 8 de Marzo commented, “People do not cooperate, they throw garbage on the street and that makes the water run.” Inadequate household waste disposal and inadequate awareness of the effects of littering were, therefore, perceived as an underlying cause for much of the natural hazard vulnerability experienced in these settlements.

**Table 12. Triggers that worsen hazard of concern.**

	Respondents	% Respondents
Did not know	12	19%
Ecological triggers	17	27%
Human-induced triggers	34	54%
Trash and litter in gutters	15	24%
Inadequate drainage	14	22%
Other human triggers: burning, poor construction	5	8%
Total	63	100%

A slightly smaller number of residents only mentioned inadequate drainage without connecting this to concerns about litter. Five residents mentioned other human-induced triggers of natural hazard risk. Poor construction and ongoing poverty were mentioned; burning of firewood to deal with household waste and to cook on open air grills was also mentioned. This last trigger may have been seen as being related to loss of slope vegetation. Table 12 illustrates the triggers affecting respondents’ risk.

**Question 15.** What measures have you taken to reduce risk to your house and family from the risk that concerns you most? Have these measures been effective?

When residents were asked if they had tried any mitigation measures to reduce the risk of natural hazards to their household, 52 responded that they had, while 12 responded that they had not. Table 13 shows the mitigation measures that respondents reported to have done. Of those who had tried mitigation measures, the most frequently mentioned mitigation measure was some form of ground alteration. This consisted of creating drainage troughs, clearing drains of litter and paving exposed soil with cement caps or cement pathways to reduce erosion. Respondents also frequently mentioned constructing retaining walls, called *muros*. Construction of retaining walls accounted for 29% of mitigation measures mentioned as a strategy for reducing risk to natural hazards. Residents mentioned constructing *muros* from sandbags about half the time, corrugated sheet metal in a little more than a quarter of the instances, and an unspecified material a little less than a quarter of the time. Other mitigation actions mentioned included planting vegetation and properly disposing of trash.

**Table 13. Mitigation measures respondents took to address hazard of most concern.**

	Response Count	% of Subcategory	% All Responses
Ground Alterations	26	100%	36%
Creating drainage troughs	11	42%	15%
Clearing drains	9	35%	13%
Cement and paths	6	23%	8%
Building Retaining Walls	21	100%	29%
Sand bags	10	48%	14%
Sheet Metal	6	29%	8%
Other or unspecified materials	5	21%	7%
Other Mitigation Actions	13	100%	17%
Planting and vegetating	6	46%	8%
Proper waste disposal	5	39%	7%
Fasten roof	1	7%	1%

Awareness of conditions	1	7%	1%
Engaged in No Mitigation Actions	12	100%	17%
TOTAL MITIGATION MEASURES DESCRIBED BY RESPONDENTS *	72	100%	100%

\*Total is higher than survey count of 64 because some residents mentioned trying more than one type of mitigation measure.

When asked if their mitigation measures had been effective, 78% of respondents who stated they had done mitigation said that it was effective. The remaining 22% said that their efforts had not been effective. Some of the reasons respondents thought their mitigation efforts were not effective were: walls and drainage paths created were not strong enough and thus were washed away by the rain or that their neighbors were not able to do the same mitigation, thereby undermining their own efforts.

**Question 16.** What more [mitigation] would you like to do?

Table 14 lists mitigation measures that respondents indicated they would like to perform in the future. When asked what more they would like to do to reduce their risk, about half of the residents mentioned wanting to build or improve their retaining walls. About a quarter wanted to improve housing construction, including improve foundations, walls and roofing. A smaller percentage was interested in improving drainage and troughs while only a few mentioned other mitigation measures, including trash disposal and dealing with community communication and conflict. Two respondents claimed they could not engage in more mitigation because they lacked time, one stated their household did not have authorization; the remainder, 83%, said that the reason they had not engaged in these activities was because they lacked the financial resources to do so.



**Table 14. Further mitigation measures respondents wanted to personally take.**

	Response Count	% All Responses
Re/building retaining walls	39	48%
Improve Construction	18	22%
Improve/build drainage or trough	17	20%
Other Mitigation or Improvements	8	10%
<b>TOTAL</b>	<b>82</b>	<b>100%</b>

\*Total is higher than survey count of 64 because some residents mentioned trying more than one type of mitigation measure.

**Question 17.** What has the municipality and / or public institutions implemented to reduce risk to your home and neighborhood?

When asked what the municipality or public institutions had done to mitigate the settlement’s risk to natural hazards, 31 respondents, 48%, answered that the municipality and other public institutions have done nothing to reduce risk. The remaining 52% answered that public institutions had helped their settlement mitigate their risks to landslides and flooding. Answers were generally evenly split between stating that public institutions provided construction materials for walls and houses and that public institutions improved settlement infrastructure such as drains and pathways. A small number of respondents mentioned help with obtaining utilities such as water, electricity and public lighting.

**Table 15. Mitigation measures implemented by public institutions.**

	Response Count	% of Subcategory	% All Responses
Public institutions have not supported mitigation	31	100%	48%
Public institutions have supported mitigation	33	100%	52%
Provide construction materials (walls and houses)	19	57%*	29%
Improved settlement infrastructure (paths and drainage)	16	48%*	25%
Utilities (water, electricity, public lighting)	7	21%*	11%
TOTAL	64		100%

\*Subcategory percentages do not total to 100% because some respondents mentioned public institutional support for more than one category of activity.

Despite the wording of this question, it is important to note that many respondents readily distinguish between the municipality and other institutions like UDEVIPO and DAVHI, and respondents in general perceived differences in their relative contribution to the community. For example, a not uncommon reply was that the municipality has done nothing but that UDEVIPO has contributed materials for the construction of retaining walls.

For the most part, when measures have been taken they are considered to have been effective. Of the over half of residents who responded to this question, 63% said that the measures taken by public institutions had been effective. One resident did point out how a constructed retaining wall failed because it did not allow for the adequate drainage of water.

**Question 18.** What more could the municipality or other institutions be doing?

Over 50% of the responses indicated the respondents’ desire to see the municipality and other public institutions improve settlement infrastructure like paths and alleys, drainage, and retaining walls. Outside of these specific infrastructural improvements, over 10% of the responses articulated a desire for assistance in obtaining construction materials; however, respondents were not specific in saying whether these materials would be utilized for house, wall, path or drainage construction. Along the same lines, respondents noted they would like to just receive more attention and help in general as someone commented that "others need to come and see the danger under which we live." In stark contrast to the majority of respondents that express a desire for direct aid for improving local living conditions and to mitigate risks, two respondents mentioned resettlement somewhere else as a potential mitigation measure the municipality or other public institutions could take.

**Table 16. Further mitigation measures respondents wanted public institutions to take.**

	Response Count*	% All Responses
Improve settlement infrastructure (paths, drainage, walls)	45	52%
Assistance in obtaining construction materials	10	11%
Attention and help	9	10%
Utilities and services (water, lights, garbage)	9	10%
Don't know	5	6%
Other	7	8%
Resettle somewhere else	2	2%
<b>TOTAL</b>	<b>87</b>	<b>100%</b>

\*Total is higher than survey count of 64 because some residents mentioned trying more than one type of mitigation measure.

**Question 19.** What have community organizations done to reduce risk in your home and neighborhood?

The diversity and quantity of measures instituted by community organizations gives a strong indication that community organizations are relatively active in the settlements and that their work does not go unnoticed. A good deal of the responses, over 60%, indicate the dedication of efforts toward formalizing these land occupations in terms of providing lifeline services like water and electricity (28%), improving settlement infrastructure like walls and paths (21%), and initiating processes to secure legal ownership of lots by their residents (15%). In these very direct ways community organizations have worked to raise standards of living and to ease some of the discomforts of constructing homes on at the edges and within ravines. Community organizations, according to responses and not surprisingly, also seem to provide some managerial and technical expertise outside of construction practices. They are seen to provide expertise for the management of supplies and materials and for negotiating politics and policy and making solicitations on behalf of the settlements to the municipality and other entities of interest. Community organizations mentioned include UDEVIPO, FOGUAVI, COIVIEES, and the settlement Committees.

**Table 17. Mitigation measures implemented by community organizations.**

	Response Count*	% All Responses
Utilities (water and electricity)	28	28%
Improve settlement infrastructure (walls and paths)	21	21%
Assist with securing land title	15	15%
Help, support, management, supplies, materials	12	12%
Make official requests on behalf of settlement	10	10%
Other (programming for kids, community center, bolsa solidaria)	9	9%
Don't know	5	5%
Nothing	1	1%
<b>TOTAL</b>	<b>101</b>	<b>100%</b>

Almost all of the respondents feel that measures implemented by community organizations have been effective.

**Question 20.** What else could community organizations do?

When asked what more could be done by community organizations, responses were similar to earlier questions: respondents in the settlement wanted community organizations to support further improvement of settlement infrastructure, solicit more aid or assistance, or assist with securing land title. However, it is interesting to note that almost one-fifth of the responses, 19%, express a desire for these organizations to work toward and encourage more unity and solidarity among settlement residents. In this way, respondents do not view themselves as individuals or individual households struggling in isolation from one another. They are aware of a settlement unity created by shared geography and the associated exposure to hazards, as well as their legal status. This idea also manifested itself in question 18 above when a respondent commented that the municipality and other institutions should be assisting all residents and not just some of them.

**Table 18. Further mitigation measures respondents wanted.**

	Response Count	% All Responses
Solicit more aid/assistance	26	36%
Assistance soliciting land title and utilities	18	25%
Foment more community organization/solidarity/consensus	14	19%
Improve settlement infrastructure (paths, drainage, walls)	11	15%
Don't know	4	5%
<b>TOTAL</b>	<b>73</b>	<b>100</b>

\*Total is higher than survey count of 64 because some residents mentioned trying more than one type of mitigation measure.

**Question 21.** What other institutions could or should add support to prevent damage from risks to your property?

Respondents were asked what other institutions could or should be lending support in regard to the hazards that they and their communities face. National government and institutions topped the list at 32%. These responses included "the government" as well as more specific answers like the congress and the first lady. National institutions with which the residents were already familiar due to past assistance – institutions like UDEVIPO, FOGUAVI, FONAPAZ and EMPAGUA - were also mentioned. The municipality and foreign assistance tied for second place at 18% each. The idea of the municipality is relatively straightforward; however, some confusion arose when trying to pin down whether a particular settlement is located within the municipality of Villa Nueva or Guatemala City. Foreign assistance includes other countries, international organizations, and foreigners also were mentioned in 18% of the responses. CONRED as the National Coordinator for the Reduction of Disaster was mentioned in 13% of the responses. It should also be noted that three responses alluded to and recognized the ability of residents to help themselves.

**Table 19. Institutions respondents believe should support mitigation in settlements.**

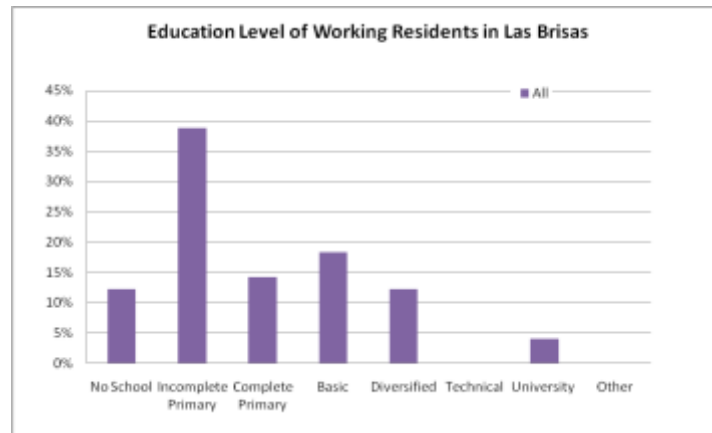
	Response Count	% All Responses
National government/institutions	30	32%
Municipality	17	18%
Foreign assistance	17	18%
Don't know	13	14%
CONRED	12	13%
Help ourselves/settlement committee	3	3%
Other	3	3%
<b>TOTAL</b>	<b>95</b>	<b>100</b>

\*Total is higher than survey count of 64 because some residents mentioned trying more than one type of mitigation measure.

**Question 22.** Who works in your household, in what sector, and what is their level of educational attainment?

About half of the working residents interviewed in Las Brisas had incomplete primary schooling or no formal education. About half, 49% had a primary education or higher, as shown in Figure 5. The education pattern was similar in Unidos 8 de Marzo, as shown in Figure 6. In Unidos 8 de Marzo, 35% of the working residents surveyed reported no school or incomplete primary school. Just over half, 52%, reported having completed primary school or higher.

In Unidos 8 de Marzo, there was sufficient gender parity in survey numbers to assess education levels by gender. This is shown in Figure 6. While slightly more men had incomplete primary education or no schooling, overall, men had more and higher levels of educational attainment. Very few women had basic, diversified, or technical education.



**Figure 5.** Education level of working residents in Las Brisas.

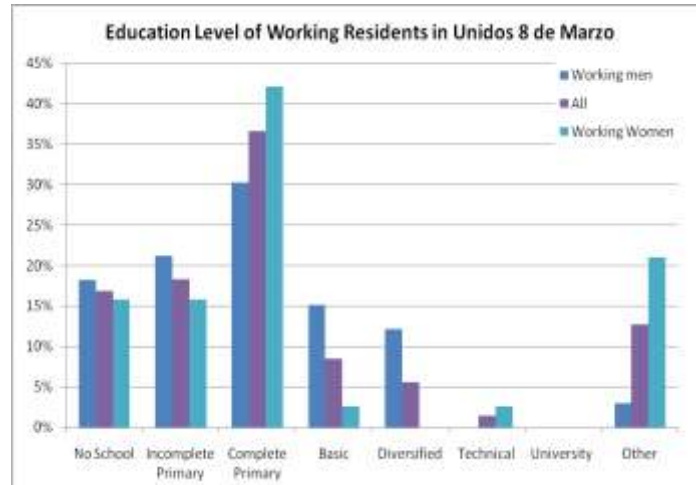


Figure 6. Education level of working residents in Unidos 8 de Marzo.

**Question 26.** Do you receive remittance?

When asked if the household received remittance for relatives or friends abroad, only one family in Las Brisas replied that they did receive remittance. Two other households in Las Brisas and two households in Unidos 8 de Marzo chose not to answer this question. While remittance is an important part of the Guatemalan economy for many households, it appears that the vast majority of households surveyed in these two precarious settlements do not have access to remittance as a supplement to their own income. Since remittance is often used for large, one-time expenses such as housing construction and infrastructure upgrading, these informal settlement residents appear to have few personal resources for capital intensive community improvements.

**Question 27.** How much per month do you spend on rent or payment for the land, light and water, transportation, school fees, and food/sustenance?

Table 15 shows the average household and per person monthly spending for respondents in both communities. Las Brisas residents reported spending about a 15% more on rent, light, transportation, school fees, food and water than those of Unidos 8 de Marzo. On average, residents said they spent approximately 400 Quetzals a month per person. This is roughly equivalent to 50 USD or about \$1.60 a day on basic needs. Large, one time purchases were not considered in this calculation.



**Table 20. Average monthly expenses by settlement.**

	Average Household Monthly Expenses	Average Household Monthly Expenses per Person
Las Brisas	1,870 Quetzales	419 Quetzales (Min:132, Max:840)
Unidos 8 de Marzo	1,593 Quetzales	363 Quetzales (Min: 100, Max:733)
AVERAGE	1,707 Quetzales	386 Quetzales (Min: 100, Max:840)

## Synthesis and Discussion

After compiling, organizing and analyzing the data collected from the surveys, several key themes became apparent. These themes include how and why people came to live in these settlements, connections between demographics and the physical site, the relationship between hazards and mitigation efforts, and a comparison of mitigation measures taken, effectiveness and what further measures should be taken by each social organizational level.

The majority of people living in both communities chose to live there because they did not want to or could not afford to pay rent where they were previously living. Owning their own land and not having to pay rent was so desirable that 44% of the households in Las Brisas informally purchased their land; 52% simply occupied the land. . Even though a significant percentage of people bought their land in Las Brisas, not a single household responded yes to having a land title. In Unidos 8 de Marzo, 70% obtained their lot by occupying it and only 22% informally purchased land in the settlement. When asked what more could be done by the community organizations to assist the community, 25% suggested that the organization with the legislative process to obtain land titles.

On average, each household is made up of approximately five people. In Las Brisas, these five people live in two to three bedroom homes than took on average three years to build. In Unidos 8 de Marzo, the same average of five people live in a one room dwelling unit that took six years to build.

Landslides were selected as the as the greatest risk to the settlement by 77% of respondents from both neighborhoods. Sixty nine percent stated that landslides are caused by ecological triggers such as steep terrain, poor soil, and notably, rain. An even larger percentage, 54%, believed that human triggers like trash and inadequate drainage exacerbated landslide hazards. A large percentage, 36%, had implemented informally drainage management as a strategy for reducing household risk. Only 20% wanted to implement future drainage management to further reduce risk. Half of the residents simply wanted to build more retaining walls, however, the overwhelming majority of households (86%) lack the funds to implement mitigation measures. The survey results suggest that the current insufficiency of

disaster prevention measures is not an oversight by the community, but a result of limited access to resources. Only a few respondents claimed that they did not have enough time for mitigation or lacked authorization. As such, most of the residents would have time to assist in the building of drainages and other mitigation measures, if the resources were. and 24% saw the excess litter resulting from the high percentage of households without trash collection as a contributor to landslides. Only a few residents list proper waste disposal as a potential future risk reduction tool. In order to implement garbage clean up and disposal management practices as risk reduction tool, public education and awareness will be vital. If people do not understand the importance of waste management, then they will be less likely to want to participate in pilot programs that promote garbage clean-up.

Households, public institutions and community organizations all pursued different methods of hazard mitigation; however, there are a few commonalities between these various organizations. Both households and public institutions also worked to create drainage systems as risk reduction measures. When asked what they were doing to reduce risk, about 36% of individual households worked to create drainages, while 25% of respondents mentioned public institutions construct drainages. Since many of the respondents list rain as the cause of landslides, it makes sense that building drainages was mentioned often as a common tool used to mitigate natural hazard risk. Walls and other forms of retaining systems were mentioned about as often as drainage as a common mitigation measure. Twenty-nine percent stated they had constructed retaining walls as a household mitigation strategy, 29% said public institutions had, and 21% said community organizations had. It is clear that a major community concern is for the creation of retaining walls to mitigate landslides. A third tool used to reduce risk is re-planting the slopes. This method is only implemented by individual households and is not assisted by public institutions or community organizations. Re-planting is a valuable tool for slope stabilization that only 8% of residents use. This type of mitigation method has room of a lot of growth in these settlements.

Interestingly only 17% of households reported that they had taken no mitigation measures and only 6% of respondents thought that the community organizations had done nothing or did not know of any activities. These numbers are extremely minimal compared to the 48% of respondents who thought that the city and other public institutions had done nothing. It appears that in these settlements that the lower levels of organizations, households and community organizations, are more effective at implementing mitigation measures than the higher levels, the city government and public institutions. Of the measures actually taken by each group, the majority of respondents thought that the mitigation efforts were. People thought that the efforts of the community organizations were the most effective, 96% compared to 78% of households and 63% of public institutions. This may relate to the fact that 28% of the community organizations' activities were providing utilities such as plumbing and water. Such activities do not directly mitigate hazards such as landslides and flooding, but are present in daily life. Since residents use their plumbing and electricity in day to day activities, it makes sense that these actions are thought of as the most effective.



Even though retaining walls were among the most common type of mitigation technique actually taken, it was also the most commonly suggested as a future mitigation tool. Building projects such as walls, drainage, and better construction were suggested for households 80% of the time. The remaining suggestions can be classified as legislative assistance with obtaining land titles, requesting more assistance or general improvements such as managing garbage, creating parks, maintaining roads, and fixing the edge of the cliff. This survey points to a heightened level of concern in relation to landslides and slope stabilization and the residents' desire to make their settlement a safer living environment, primarily through improved construction practices.

## II. HOUSEHOLD CASE STUDIES

Three case studies of households in the settlement are included in this section to better illustrate the compounding effects of poverty and vulnerability in precarious settlements.

### Young Mother at Ravine Edge

Marieta<sup>1</sup> looks young for her 27 years of age. She and her husband and their two young children have been living in the settlement for six years. Marieta was able to go to primary school for three years, but then her mother died and she could no longer go. At nineteen she got married, using it as a way to get away from a step-mother she never got a long with. For a few years, they lived in Zone Six of Guatemala City with people her husband worked with, but the cost was exhorbinent and they were unable to keep up with the rent. When they heard of a land invasion in Villa Nueva from a friend, they came too. By the time they arrived, there was no land left at the hill crest and they laid out their plot on the hillside down in the ravine.



**Figure 7. Children looking over the edge of the ravine in Las Brisas.**

That first night in the settlement Marieta cried. There was no light, no water, and their home was pieced together with scrapes of lumber and plastic. For years, she cried herself to sleep, wishing she did not have to live in the settlement and fearing the steep ravine below their makeshift home.

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<sup>1</sup> All names in case studies are pseudonyms.

They began building their home four years ago, bit by bit. Today it is a cement-packed floor, three rooms and corrugated metal walls and roofs. While the metal is hot in the summer, it offers more protection than their previous makeshift home. They have electricity from the communal meter, and piped in water to a concrete kitchen sink in the back yard, and a toilet with a pipe running down to the edge of the ravine.

With improvements to their home, Marietta now feels attached to her little home. She has placed plastic grating up along the edge of the ravine as a fence and has planted geraniums in old oil tins. But she is still scared of the ravine and is worried that her children may slip and fall over the edge. She lives at the bottom of the settlement where rain and sewage water rush down the hillside in the winter, eroding the soil and bringing the edge of the ravine alarmingly closer to her house each year. She estimates that the ravine edge is two meters closer each year and that within the next two years, it will have eroded to her doorstep.

When it rains, the water and sewage flood her living room and wash through the house. Last year they had to evacuate for eight days during the heaviest flooding. When rain is at its heaviest, she knows that the storm gutters will clog with litter – plastic bottles and discharged chips bags. When they overflow, it will be her house and her neighbours at the bottom of the settlement that will be most impacted. Yet she feels she has little ability to change the situation.

Last rainy season, she went to the top of the hill, to the legal houses that overlook her squatter house. In the rain, she tried to unclog the storm drains and pull the plastic out. But the residents of the legal houses yelled at her, telling her that as a squatter, she had no right to touch anything. As she wryly noted, “those above us do not mind, but it is us down here who are affected, and they act like we are going after them.” Yet people from the legal neighbourhoods come down to toss their garbage into the ravine or around their homes. She cannot stop them, though she knows it will worsen the flooding the next time it rains.

Marietta and her husband have applied to the national government for resettlement. They know that they will have to purchase any resettlement site, but they are willing and eager to have someplace more secure than their home at the ravine’s edge. They have not heard of their petition being accepted and it is likely that their house will collapse from rain and landslides before any resettlement is actualized. On 2100 Quetzals a month, a little over \$260 a month for the four of them, saving enough to purchase land or even rent in a more secure neighbourhood will be a challenge.



## Large Family

Carlos, age 17 lives with his mother, two grown sisters, baby niece and 5 younger siblings. Only having lived in the settlement for five years, they are newcomers. They bought their lot from the previous squatter and hold an informal “title” to their land from that sale. When they arrived, there was no house, as the previous squatter took him home with him. The family set about building their home and it now has two large rooms with three sides having corrugated metal walls. In the corner of one room, they have a cement sink and toilet, with a piece of plastic draped around it for privacy.

They have run an electrical wire from their neighbor’s lot and pay the neighbor for that electricity. They pay for water, but it is intermittent and had not been on for five days when we visited. Often it is on only for a few hours and then is cut off again, forcing everyone to fill their sinks and use and carefully reuse it until piped water is available again. They don’t have any trash collection, but simply throw their garbage over the edge of the ravine, just below their house.

They struggle simply keeping their house standing. During the rainy season, water poured into their two rooms from the un-guttered roof top of their uphill neighbor. It caused some of their walls to collapse and created large mud puddles in their home. They fear that they will be the next lot to erode away in the winter. Carlos’ family wants to build a high wall between their home and their neighbor’s to stop the hillside from eroding in the rain. Thus far, they have not found money enough to build a wall. They also wish there was a way to fix the storm water ditches throughout the settlement so that there was less water reaching their lot at the bottom of the ravine.

Carlos had to stop schooling after the third grade. He now works as a mechanic’s assistant while his mother and sister, who have no schooling, wash clothes. Together they are able to make enough to cover monthly expenses of about 2000 Quetzals, or 240 dollars a month for the ten-person household, or only 80 cents a day a person.

### Construction Worker and His Elderly Mother

Juan Lopez, a resident of Unidos 8 de Marzo, lives with his elderly mother. Mr. Lopez is 36, his mother 65. They have lived together in Unidos for about 8 years, in a house constructed of wood planks and corrugated metal. He works for a private auto mechanic and his mother stays at home. He had four years of education before he had to quit, though he wants to continue his schooling some day. His mother has no schooling and cannot read or write. Their home is located near the bottom of the settlement, in close proximity to the edge of the ravine. The older woman has an obvious limp to her step, which makes climbing the stairs to the upper portions of the settlement difficult.



Prior to living in Unidos, Juan Lopez rented a place in Santa Fe (Zone 13), approximately three kilometers from the airport. There he paid rent, but when Juan Lopez was told about the land invasion, he decided to join. Initially, the living conditions were very poor, even compared to the current quality of life. Housing materials are expensive, making it difficult to add significant structural contributions to the house.



Their primary concerns are landslides, as they live very near the edge, as well as the water that floods houses every winter. Though landslides are first on his mind, Juan is also concerned with the numerous dogs present, as many of them carry fleas and possibly diseases. Living at the bottom of the ravine, near where residents toss their garbage, they deal with the smell of the garbage, the flies, and the occasional dead cat or dog thrown into the heap. The large rats that scavenge in the dump also come up to their yard. Juan believes that poor trash management is a compounding factor to all of these problems, especially to the inundations of water-run off from clogged drainages plaguing his community. Juan also recognizes the community efforts to plant trees and dig drainage ditches, but the problems persist.

Mr. Lopez's home lacks any formal concrete structure, and the floor is hard-packed dirt. The home does not have electricity or a direct phone line, though Mr. Lopez does own a cell phone. There is sanitary plumbing, but it is not connected to municipal waste manage. Instead, sewage is emptied directly into the ravine. Garbage accumulated by Mr. Lopez and his mother is burned, rather than being collected by a service. Monthly expenses accrue to almost 1500 Quetzal, 1200 of which is spent on food. This translates to about 40 Quetzal a day for food, or approximately five U.S. Dollars. The remainder goes to the cost of utilities and transportation. Mr. Lopez does not hold title to his property, nor is the title being processed.



### III. FOCUS GROUPS

During the final weekend of the situation assessment, on March 29, 2009, we conducted a focus group discussion with the two settlements surveyed. Five community leaders and five representative residents from each of the communities participated in the 2.5 hour discussion. The focus group participants along with Western Washington University representatives Rebekah Green, Scott Miles, and affiliate Walter Svekla discussed problems facing the settlements and identified primary areas of risk. Discussions and prepared questions were centered on survey results collected earlier in the week, as well as risk mapping exercises for each settlement. Proceedings began with introductions by IGCR members and a short explanation of purpose. Participating community members stood up individually and introduced themselves, and discussion began.

#### Outline of Community Issues

The first focus group discussion began with two questions to help outline community issues. Each question began with a voting exercise, followed by discussion facilitated by Rebekah Green.

#### Major Problems

The first question was based on responses to the household survey question regarding respondents' perception of the greatest problem in their settlement. Prior to the focus group, the survey responses to this question were tallied and 6 major themes identified.

**Table 21. Tally of dot voting for major problems.**

Problem	Votes
A- Living near the edge of the ravine	20
B- Garbage clogging the drains	10
C- Water flowing into people's houses	4
D- Landslides/Cracking or crumbling walls	14
E- Roads/Pathways	11
F- Houses collapsing and affecting other houses	11

From these main themes, focus group participants were asked to vote on which problems were of greatest importance. Everyone was given three dots. An individual could choose to place all three dots on one category, indicating extreme importance, or split up their votes to indicate that multiple

problems needed strong consideration. Tabulated results showed that living near the edge of the ravine (20 votes), and landslides/cracking or crumbling walls (14 votes) were the main issues. Although the top two issues were clear, the next three received almost equal consideration. Roads and housing collapse received 11 votes each, and garbage clogging the drains receiving 10 votes. The issue of water was marked only four times, clearly being of least importance relative to other issues.



**Figure 9. Dot voting for major problems in neighborhood.**

When asked about these problems, focus group participants focused on slope stability and the structural integrity of walls. One person in particular expressed frustration with the poor quality of construction for walls, specifically that masons would not build the foundations deep enough- despite the fact that residents said the walls being constructed would not hold. This person stated that 20,000 Quetzales would be charged for construction, but only half of that would go to labor and materials. 10,000 would be pocketed directly by the mason.

Many others noted problems of slope stability. Residents of Las Brisas noted the sandy and unstable composition of their soil. Garbage was said to be a complicating factor in this- too much garbage buried under the already sandy slope material aggravates the problem of stability.

After this comment was made, more people began discussing the problem of garbage and drainages. One resident recognized that dealing with garbage is a community effort, and cannot be left up to a minority. In their opinion, if everyone took care of their garbage properly, the drainages would not be clogged.

Various people also stated that people living lower down on the slope are strongly affected by people living above them. Insufficient drainage higher up was said to be one of the sources of flooding in lower portions of the settlement.

### **Major Risks**

The participants were then asked to identify the major risks to their communities, based upon five environmental hazards. The same voting system from question one was used.

**Table 22. Tally of votes for major risks.**

Risk	Votes
A- Landslides	36
B- Fires	9
C- Earthquakes	5
D- Floods	16
E- Hurricanes	3

Landslides, with 36 votes, were the main risk identified. This is understandable, considering that both communities are situated on the edge of steep slopes, and commentary from the previous question focused on issues of slide activity. Community members expressed concern that landslides were a danger to everyone. As one person stated, “If a landslide takes place we all fall.” Although landslides were said to effect the community as a whole, those living near the edge of the ravine where seen as having greater risk.

Although water running through people’s houses was not rated highly in the first question, flooding received the second highest vote count in question two. Discussion regarding this issue was heavily focused on how flooding was related to garbage. Residents frequently cited that garbage clogging storm water drainages aggravated flooding, ultimately causing water to run through homes.

The discussion of fires was linked with people burning their garbage as a means of disposal. Strong gusts of wind could carry pieces of burning garbage outside of burn barrels and start fires along the ravine. One resident cited fire as being a community problem: “we have to come together to help the person whose house was burnt, because the fire-fighters can’t reach the place easily.”



**Figure 10. Voting for major risks in neighborhood.**

Earthquakes and Hurricanes received recognition as the most severe events that could take place, but residents indicated that there was little or no way to anticipate or prepare. The physical effects of both earthquakes and hurricanes were tied to more common events like landslides and flooding. Residents discussed the fact that tremors and heavy rain could trigger landslides, and that garbage was yet again an exacerbating factor.

## Community Mapping of Issues

After voting on and discussing questions one and two, the participants split off into two groups, one of Las Brisas residents, and one of Unidos 8 de Marzo residents. The two groups mapped out their respective neighborhoods and marked three specific problems: pathways, drainage, and walls. Color coded dots were used to indicate each problem. Pink dots were used to indicate locations needing better walls; yellow dots were used to indicate locations needing better pathways; green dots were used to indicate locations needing better drainage.

Each participant was given two dots for each problem and asked to place them on the map to indicate where their settlement’s greatest need was for walls, drainage, and pathways in turn. After voting for each, the group discussed why they had placed their dots in various areas. Then, a final vote was performed. Each participant was told to select two additional dots to represent the two biggest problems in their settlement. They then placed these dots, marked with a black X, where they saw the greatest and most immediate community need, whether it is a need for a new wall, a need for better drainage, or a need for pathway improvement. Some chose two dots of the same color; some chose two dots of different colors.

Scott Miles facilitated the discussion with Unidos 8 de Marzo residents, Rebekah Green facilitated discussion with Las Brisas residents, and Walter Svekla recorded video and took photos of the activities. The three women who had performed the household surveys assisted with both group’s activities.

### *Las Brisas Community Mapping*

The ten Las Brisas participants were all women, mostly middle aged. Five were part of the settlement community committee and were vocal and active members of their settlement. Five others were not committee member, but did show strong familiarity with the committee members. Two of the non-committee members were younger women with young children.

The facilitator showed the participants the hand-drawn schematic of the Las Brisas plan. She asked if anyone could recognize and explain the map. One community leader stepped forward and began to consider the map, but struggled with orienting herself. The facilitator then pointed out the entrance to the settlement on the right hand side, showing the steps that led down from the formal settlement above Las Brisas. With this orientation, the community leader began pointing out the entrance and

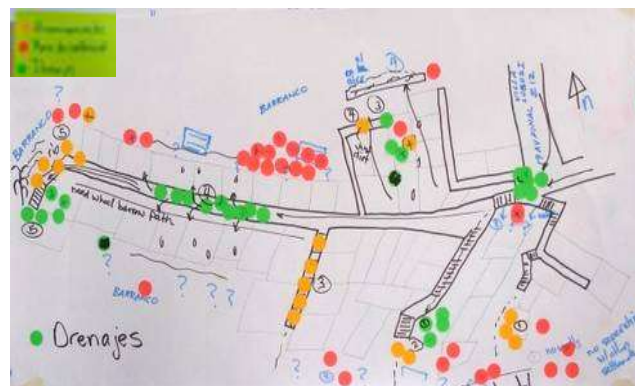


Figure 11. Community map of Las Brisas.

tracing down the main pathway. Again she became confused and the facilitator then pointed out the edge of the ravine, a leader's house, a corn field at the end of the settlement and the location of the drainage pipe and garbage pit. She also pointed out two path termination points, and pointing out where two of the focus group participants lived. With this guidance, a lively discussion ensued. Participants discussed and pointed out the each other's lots and became familiar with the schematic. One leader then began pointing to the map and explaining locations of the ravine. Another pointed out a location of a municipal wall in the formal settlement, a wall that had collapsed and spilled sewage on several houses the previous winter. As the participants explained their region of the settlement schematic, the facilitator jotted down pictures or words to indicate what was being described and to document the landmarks the participants wanted represented. It was clear that viewing their community through schematic was initially difficult, but with facilitator support all were able to eventually understand the schematic and take ownership of it.

After participants had oriented themselves, the facilitator explained that they would be using three colors of dots to describe problems in their settlement: green for drainage, yellow for pathways, and pink for retaining walls. At this explanation, one participant noted that "These three options [walls, drainage, and pathways] are very important for us in Las Brisas. If we address all three, then we address some very important things in Las Brisas."

Participants were first given two green dots representing drainage. The facilitator explained that they should place their two green dots where the issue of drainage was most severe in their settlement. The facilitator demonstrated placing dots in two hypothetical locations of "terrible drainage" and then told participants they could discuss where to place dots, but that each person got to make a decision for themselves. After placing the green dots, the facilitator pointed to a few locations where many people had placed green drainage dots. She asked the participants to explain what the drainage problem was in each of these locations.

When discussing where to place drainage dots, the women debated placing dots at the top where water entered the community or at the bottom where much of the water ended up. They also began discussing the need for paths at this bottom location and the facilitator had to reassure participants that pathways and walls would be discussed next. (This discussion may suggest that problems were often viewed in terms of integrated problems based upon location, rather than in terms of settlement drainage, pathway and wall systems.) The participants noted that without drainage, the water eroded the soil and that if they did not deal with sewage, they would "all be dragged down" the ravine. They placed many drainage dots near the entrance of the settlement, noting that at the entrance much water flowed into the settlement. This water came from the formal settlements, Colonia, above them and in the winter it flowed through several houses. They noted that there was only one sewage (storm water) drain and that it was often clogged with litter (point one), causing the overflow into their houses. At the western end of the settlement (point two), participants also placed dots and noted that water flowed down the steps and then into their lots. They thought that two ditches could be used to divert the water

and direct it down to the sewage pipe at the southern end of the community. At the southern end of the community a participant noted that water from the pathways, overflowed drains and lack of roof gutters also eroded their soil and threatened collapse of housing and leaving houses “just hanging in the air”. Another noted that they were connected to the sewage system, but it gets clogged and needed to be bigger to effectively deal with storm water.

The facilitator then passed out two yellow dots each to represent pathways. A participant asked if pathways included ditches, and the facilitator noted that she wanted them to only think about paths and stairs because ditches were similar to drainage. (In retrospect, it seems that participants consider drainage to refer most strongly to sewage system pipes, while ditches alongside pathways were seen as a separate issue.) Several participants noted that they didn’t think there were any pathway problems. The facilitator drew a box at the bottom of the map and told participants that they could stick their yellow dots down in the box if they did not feel there was a location where pathway improvement was needed. Participants again discussed pathway issues among themselves and then placed their two dots where do they felt there were serious pathway insufficiencies.

When the facilitator asked why yellow pathway dots had been placed in various locations, slight division emerged. Those who lived down the ravine slope often had incomplete steep stairs or dirt paths. They wanted pathways to reduce mud and to make climbing in and out the ravine easier. They stated that they placed their dots in places where the existing concrete paths ended but needed to be extended to reach residents on the lower slopes. However, some residents who lived at the western terminus votes for new paths along the ridge top where a completely paved and continuous path already existed. When asked why this area needed a new path, these residents noted that they wanted ramps added in the few places where stairs existed so they could wheel construction material along the path without having to navigate stairways.

Participants were then given two pink dots to represent areas where there were significant problems with retaining walls. Walls, shown with pink dots, were considered an acute issue. Placement of pink wall dots resulted in the most discussion and some contention. Areas along the edge of the ravine received concentrated groupings of votes for wall improvements. Residents vocalized the need for better built concrete walls. One community member elaborated on how her neighbor’s plot was being divided by slope movement and erosion, and that a joint wall would help her and everyone else in the immediate area. Some people were using tin sheets braced with wooden beams as an improvised barrier, but they were insufficient and collapsed during the winter season. Participants also debated whether to place their dots near their homes where the soil was collapsing, or to place it up near the entrance where water was infiltrating the soil and contributing to the landslide risk.

Several community members discussed a recent municipal wall constructed to reduce erosion at the edge of the formal settlement to the east of the Las Brisas entrance. During a heavy rainfall, water pooled behind the wall, and the wall collapsed. Sewage, mud and rainwater rushed down the hillside (towards point one on the map), causing at least one house to collapse.

Struggling to balance loyalties to friends, neighbors and community leaders with personal need was evident in voting about location of greatest need for walls. When asked to place two pink dots near the area where new walls were most needed in their settlement, the women participating in the focus group began a group discussion about walls, erosion, and community need. They discussed whether the greatest need was on the north side of the ridge lots (above and slightly to the right of point four) or whether other areas were in greater need. When the voting was completed, one of the leaders looked at the dots placed further from her house and jokingly asked whether the other women “really loved” her. A similar process occurred regarding drainage near point four. Such internal tensions and loyalties would be important to address openly and discuss with community members in any future development activities.

**Table 23. Vote tally for greatest problem, Las Brisas.**

Issue	Initial Dots	Greatest Problem Dots
Pathways	16	2
Walls	19	9
Drainages	15	8

When participants were asked to place two dots of any color as their final vote for the settlement’s two greatest problems, walls received nine votes and drainage received eight. Pathways were viewed as a must less important issue, with only two people out of 10 selecting them as the “highest need”.

### ***Unidos 8 de Marzo Community Mapping***

The makeup of the eight participants from Unidos 8 de Marzo was in contrast to those from Las Brisas. Except for two, participants were young (under about 20 years old) and included three males. Another significant aspect of the group makeup was residence location; about half of the group lived in the “J” section of the Unidos 8 de Marzo. Thus, the prominent group dynamic was that of the male participants and the women from the “J” section.

The exercise began with an overview of what participants would be asked to do. Participants were shown the hand-traced schematic of their community and asked if they recognized it. Spatial understanding of the schematic by the participants was proven by their request to be able to label the schematic with the community sections labels (“B” through “K” were drawn on the schematic by participants). We had intended to label the schematic with the sections prior to the workshop. However, having participants do the labeling served the dual purpose of evaluating their spatial understanding and

building ownership of the schematic. Once labeled, participants gave permission to continue with the exercise.

Participants were first asked to place yellow pathway dots on the schematic. Placement of the dots and the associated discussion revealed the prominence of residents from the “J” section. Upon seeing the many dots along the “J” section (and witnessing a group of participants have a conversation), the facilitator asked where people lived. That said, there seemed to be some agreement across the entire group that the “J” section has the worst alley (pathway) in the community. There was a common sentiment that the pathway needed a handrail or some other safety measure for getting up and down the hill.

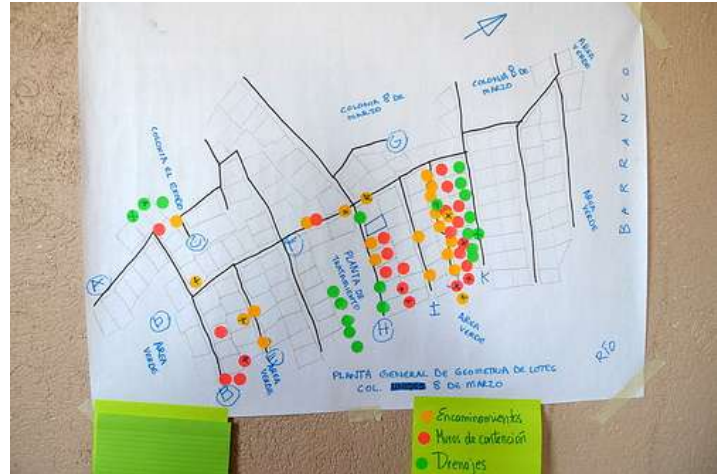


Figure 12. Community map of Unidos 8 de Marzo.

The issues surrounding the pathways in the community were largely the same (regardless of the prominence of “J” section resident). During the rainy season, water flows down the pathways, making it unsafe to walk and causing severe erosion. This results in pathways having to be repaired. (It was unclear whether they attempt to repair the pathways after each event or after each rainy season.)

Table 24. Vote tally for greatest problem, Unidos.

Issue	Initial Dots	Greatest Problem Dots
Pathways	14	6
Walls	17	6
Drainages	15	4

The bulk of the conversation surrounding the pathways in fact had to do with drainage. Participants pointed out that the pathway flooding issue was a problem primarily of clogged drains above or inadequate drainpipes. When water flows down the pathways, residents have to go up (and often into the neighboring community) to unclog drains. Participants noted that drainpipes needed to be larger throughout the entire community. (It’s unclear whether they meant that their pipe was too small or not.) Residents of “J” section noted that they had to buy their own pipe.



The placement of the green drain dots was done last in this exercise but will be discussed second because of the strong association participants made to the pathway issue. The most significant reason behind placement of pathway dots was drainage of the pathway. Except for one reason, participants did not have much to add from their pathway discussion regarding drainage problems after placing the green drain dots. In other words, participants, showing the strong association of the two issues, largely conflated the issue of pathway and drainage. The non-conflated reasons given were safety for the pathways, and the sewage treatment plant for the drainages.

A long discussion ensued after placing the green drainage dots about the unfinished sewage treatment plant in the central area of the community. Participants said “all water flows” through the sewage treatment plant. They noted that the sewage creates a bad smell, attracts mosquitoes, and has gotten children in the community sick. Participants were particularly frustrated by this issue because the sewage doesn’t come from their community it comes from the five or so neighborhoods above them in the Mezquital. They note that the sewage treatment plant was never finished and doesn’t have the capacity to deal with the actual flow, resulting in sewage flowing overland. Participants also observed that uphill neighbors (outside their community) often plug the sewage drains and pipes with trash, which also lead to overland flow of sewage.

On the issue of retaining walls there were two themes: retaining walls are needed to protect paths and the “J” section is the most lacking for both path and residential retaining walls. Participants noted that UDEVIPO constructed retaining walls for the community, but those walls were built to provide better protection for houses. UDEVIPO did not construct retaining walls to help protect pathways. According to participants, the community has also been unable to adequately protect pathways. Thus, a strong community desire was to have more retaining walls designed to increase pathway safety and integrity.

Resident of “J” section claimed that their area has the biggest problem with retaining walls in the entire community. There seemed to be some agreement on this point by residents of other sections. The “J” section has had no permanent walls in the nine years the community has existed. The walls are all built by residents out of sand bags and wood. These temporary walls get damaged or fail every rainy season, requiring repairs each dry season.

After participants had placed dots associated with pathways, drainages, and retaining walls, as well as participated in discussion of each, they were asked to choose two dots of any of the three colors in order to vote for the issue (and location) they thought was most important in their community. Six dots were placed for pathways, six for retaining walls, and six for drainages. At first glance this would suggest that participants felt that pathway and retaining wall issues were of equal importance. However, one could interpret the results as prioritizing drainage issues, based on the conflation of reasons for placing pathway and drainage dots. (This might also provide insight into answers to the Question 1: Major Problems, discussed in the previous section. One could argue that there is overlap in at least some participant’s interpretation of Answers B, C, and E, meaning they feel drainage issues are more

important the retaining walls. This overlap is likely more pronounced for Unidos 8 de Marzo residents than for Las Brisas residents, where most pathways were more permanent.)

### Joint Discussion

After each of the two groups finished their individual mapping, everyone combined to discuss the similarities and differences between the two communities. Representatives from each group briefly described the challenges facing their community. Representatives from both Las Brisas and Unidos stressed the importance of drainage, and how badly everyone is affected during the rainy season. Representatives from Las Brisas noted more issues with underground drainage problems - for instance drainage pipes ending short of the ravine's edge, which increases soil saturation and decreases slope stability. Representatives from Unidos focused more on over-ground drainage problems, such as their water treatment facility overflowing onto pathways because drainages are either clogged or insufficient. When asked how their problems were similar or different, four individuals discussed how both communities face comparable issues, but no one vocalized any differences.

### Interest in Additional Knowledge

In conclusion, WWU representatives noted that many of the problems discussed required three resources to be addressed: time, materials/financial resources, and knowledge. They then asked a final question regarding knowledge resources. Each participant was asked to vote on what they would like to know more about. Choices ranged from how to construct better houses to how to build better drainage systems. One community leader from Las Brisas asked that an additional item be added to the list: conflict resolution. This was added as to the list as 'Improved Community Organization' and each participant was given three dots with which to vote. Again, participants were reminded that they could place all dots on a single item to indicate extreme interest, or one to two dots on multiple items to indicate moderate interest in more than one item.

**Table 25. Tally of dot votes for additional knowledge.**

Additional Knowledge	Votes
Constructing better houses	10
Constructing better drainages	15
Constructing better pathways	7
Constructing better walls	25
Improved community organization	3



Participants voted for learning how to construct better walls as their top choice, at 25 votes. Building better drainage and better houses followed with 15 and 10 votes respectively. Pathways received fewer votes at seven, and improved community organization received three votes.

The focus group discussion was concluded by thanking the participants, photographs, and a meal prepared by Las Brisas residents.

#### **IV. ORGANIZATIONAL ANALYSIS**

We conducted an analysis of significant institutions and organizations with respect to disaster risk reduction of the Villa Nueva case study settlements. This serves to put the household survey described above into context, with respect to horizontal and vertical relationships of residents with other important actors. The analysis is from the perspective of the residents of the settlements (particularly the case study settlements) on the issue of disaster risk reduction of their community. That is, institutions and relationships not deemed significant from these perspectives were left out.

Data collection for the analysis primarily consisted of interviews and focus groups meetings with several representatives from Oxfam GB (Guatemala City office), CONRED, Villa Nueva Municipality, and San Carlos University. This dataset should eventually be augmented with interviews with additional organizations, as well as compilation of government documents. Analysis focused on identifying important actors and relationships.

Following, are two sections; the former enumerating the results of the analysis and the latter discussing the significance of the results in the context of the household survey. The results section first provides an overview and then analyses three specific types of actors identified in this context.

##### **Institutional Analysis Results**

Data analysis resulted in identifying three important types of actors within the context of settlement disaster risk reduction in Villa Nueva (and by extension the Guatemala Metropolitan Region): government, non-government and residents. Important government actors are the central government of Guatemala and the municipal government (in this case) of Villa Nueva. The regional and district governments do not for the most part play a significant role in the development of precarious settlements. And while the Guatemala Metropolitan region is constitutionally required to have a governance structure coordinating municipalities, such an institution remains unrealized. Residents can be usefully categorized with respect to the legal status of their home. There is a vast array of social relationships between residents, as well as neighborhoods/settlements in various states along the way to legalization. However, for the purpose of this analysis a binary of precarious settlements versus legal neighborhoods is most useful. Lastly, important non-government actors include NGOs (international non-profits and community-based organizations), the private sector, and the informal sector. For this analysis, we focus primarily, but not exclusively, on Oxfam GB, as representative of NGO actors. A deep analysis of the informal and private sector are beyond the scope of this work, but are included because of the important relationships they provide with respect to precarious settlement disaster risk reduction.

In addition to identifying three types of actors, the analysis resulted in identification of three significant types of horizontal and vertical relationships between actors: financial, oversight, and service. That is, the majority of relationships described by the collected data can be classified as one of these types of

relationships. How a particular relationship is manifested can vary significantly, depending on the actors involved. Financial relationships include federal appropriations, taxes, grants, donations, wages, and remittance, among others. Oversight relationships include laws, regulations, formal rules, contracts, and cultural or social norms. Services are the most wide ranging type of relationship and can include everything from labor, consulting, utilities, provision of materials, training, and so on.

An overview of the institutional analysis results is depicted in Figure X1. This figure lists the three major types of actors and the relationships currently in place between actors of each type. The figure highlights what relationships are or are not available to each actor for promoting disaster risk reduction in precarious settlements. What is immediately apparent is that there is little in the way of direct financial relationships and no oversight relationships between precarious settlement residents and all other actors. Instead, the direct relationships between actors and precarious settlement residents are services.

Of the minimal financial relationships with outside actors, the majority is associated with the purchase of electricity and water services from the public or private sector. (There are also similar internal financial relationships with neighbors.) Money is also spent on building materials from the private or informal sectors. Financial relationships resulting in money flowing into the settlements consist primarily of wage labor in the private and informal sector. Technically, there are oversight relationships between government and precarious settlements, such as taxes and land use restrictions, as with legal neighborhoods, but they are rarely enforced. There are oversight relationships within the settlements between leaders/landlords and settlers/tenants, as well as typical structures of domination (gender, age, tenure, etc.).

As mentioned previously, residents provide external services in the form of wage labor; this labor likely is primarily service work, but also includes construction and industrial occupations. The other significant external service provided by residents is voting, both for federal and municipal elected officials. Informally, this service can be exchanged for inflowing services, such as infrastructure construction. Another service by the precarious settlement residents is lobbying the central government for legalization. This is an unusual service because it can be performed for settlement leaders, but interfaces government actors. The same service can often be provide by proxy of NGOs; that is, an NGO serves as an intermediary—someone who does not distort an actor’s interests. It is unclear whether there are other intermediaries for the precarious settlement residents. Certainly, both the federal and municipal governments provide services for precarious settlement residents, but the interests behind these services are difficult to determine. The most common services provided to the precarious settlement residents are infrastructure construction, construction materials, and utility services. It appears that any type of actor can provide each of these types of services. This results in a wide variety of alternatives of varying quality and efficacy, in addition to frequent instances of cross-purposes. In contrast, the precarious settlement residents have a very unique set of service relationships with

abutting legal neighborhoods. These include limited access to the precarious settlement and downstream issues such as disposed garbage and sewage overflow (a disservice).

Relationships between actors not including precarious settlement residents (and the informal sector) are primarily financial. Quite literally, money flows around the precarious settlements, but not directly into them. The most significant financial relationship is most likely that between the central government and municipal government. Twelve percent of the national budget is appropriated to municipalities; this is the primary funding source for municipal operating and capital budgets. Special project funding, for example for settlement improvement projects, can be requested and is evaluated on a case-by-case basis by the national planning institute SEGEPLAN. The central government, via CIV (Ministry of Communications, Infrastructure, and Housing), procures services and infrastructures for precarious settlements from NGOs and the private sector. CIV contains the agencies UDEVIPO, FOUGAVI, and DAHVI, which provide various services to precarious settlements, such as utilities and infrastructure. Similarly NGOs might procure services and infrastructure for precarious settlements through the private sector. CONRED often procures risk assessment services from private sector consultants, which are used as the basis for legalization decisions and special project funding. Money is brought into the institutional networks via international donors (to local NGOs), international development banks, international aid, and federal taxes.

There is very little oversight or coordination between the central government and other actors, most importantly municipalities. Municipalities have relative autonomy with respect to the central government. There are land use regulations handed down to the municipalities, but these are often difficult for any actor to enforce.

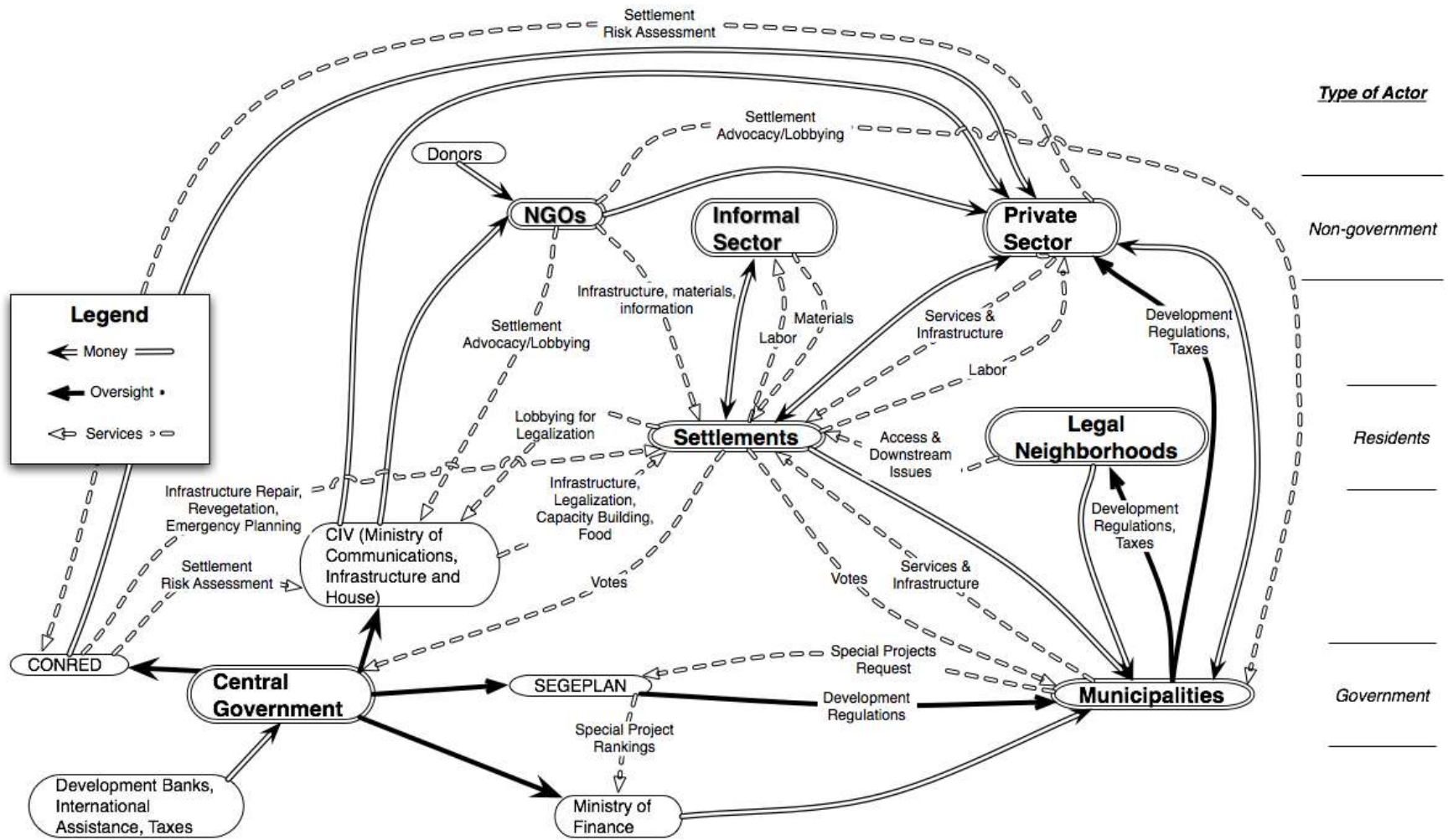


Figure 13. Overview diagram summarizing institutional analysis.

## Institutional Analysis Discussion

The results of the institutional analysis highlight several themes with respect to disaster risk reduction of precarious settlements in Villa Nueva, and arguably by extension the Guatemala Metropolitan Region. The first and most promising theme is that many actors have identified the need for disaster risk reduction in the precarious settlements; a loose institutional network is beginning to form around the issue. As part of this formation, actors are starting to identify the interests of precarious settlement residents with respect to disaster risk reduction. It is possible however that some actors are co-opting the interests of the precarious settlements for their own gain (e.g., using disaster risk reduction efforts as a means to gain votes).

There is not a lot of evidence that actors understand their role well, nor the role of other organizations and institutions. Some of this can be attributed to a high degree of turnover in both federal and municipal governments. As a result, there is not a lot of communication, coordination, cooperation, or collaboration on disaster risk reduction for precarious settlements.

A troublesome theme related to the lack of roles and, in turn, lack of communication, coordination, cooperation, and collaboration are a range of efforts and initiatives that tend to have cross-purposes. The highly decentralized network that precarious settlement residents can leverage for obtaining services and infrastructure exacerbates this. For example, the federal government may have land use regulation preventing development, a municipality or private sector business may provide infrastructure that encourages inhabitation.

Combine the nascent network with lack of coordination and network instability results. While many actors have identified the problem of disaster risk reduction in precarious settlements, it is likely that a relatively small change in context (e.g., political turnover, economic shift, public sentiment, etc.) could result in the network collapsing. This creates a negative feedback loop where it is difficult to attract investment and build momentum in disaster risk reduction because of the uncertainty associated with future support or involvement of all actors currently involved.

The observation that there are not many inflows of money into the precarious settlements is not entirely related to disaster risk reduction. It is a general observation that these residents do not have significant access to income. However, increased income would result in a greater capacity for residents to reduce their own risk. It is also an observation related to the themes of co-optation and network instability. That is, there are minimal opportunities provided by external actors to precarious settlement residents to influence the allocation of funds used in improving the settlements. Similar to having greater income, residents could use this influence to more directly reduce their disaster risk, while avoiding cooptation.

The last important theme relates to obligatory points of passage – particular actors in a network that another actor is required to interact with to meet the latter actor's interests. The two obviously





obligatory points of passage for precarious settlement residents are CIV and adjacent legal neighborhoods. These points of passage are considerably different. CIV is the ministry in the central government that control legalization of settlements. Settlement leaders, some residents, municipalities, and NGOs may all interact with CIV for the same purpose. As a result, CIV has the potential to shape development and practices in precarious settlement to promote disaster risk reduction via incentives and legalization criteria. This might also be the reason the residents feel that central government, more than other actors, needs to do more to help them with disaster risk reduction. Conversely, adjacent legal neighborhoods have little potential to influence development and practices within the precarious settlements. However, their physical role as both entrance and being uphill sets up a power dynamic between legal neighborhood residents and precarious settlement residents. Thus, for example a mediator (e.g., government) likely has to step in to incentivize (e.g., subsidized garbage collection) or restrict activities such as clogging drains with garbage.

## V. EMERGING THEMES

A third of Guatemala Metropolitan Region residents or more live in informal squatter settlements, many in steep ravines with heightened landslide risk. Settlement residents receive little help from the government, which generally believes that the market should be the primary economic actor in development. Residents attempt to manage landslide, flood, and hurricane risk with limited resources and awareness of innovative socio-technical solutions. Residents express a strong desire for help in community development that reduced vulnerability to natural hazards. The following are five interrelated themes that emerged from this situation assessment.

### Flooding and Inadequate Drainage

When residents were questioned about the biggest problems in their settlement (not restricted to natural hazards), water management and flooding, and a desire for solutions to these issues, was a dominant issue. Over 50% of the household survey respondents said that drainage was the biggest problem. In contrast, landslide and housing collapse was a major concern in only 33% of the responses to the question about overall problems in the settlement. During the community mapping exercises, focus group participants also placed high priority on improving drainage. Eight out of 19 and 10 out of 16 “greatest priority dots” for Las Brisas and Unidos 8 de Marzo respectively, were chosen to represent the need for improved drainage and improved pathways.



**Figure 14. Trash accumulation in drainage ditches.**

Survey respondents and focus group participants strongly believed that the current drainage ditch infrastructure and black water pipe systems (both those servicing their community and the formal settlements above them) were highly inadequate. Residents believed that the pipes and ditches were too small and that this was one of the main factors in frequent overflows. When waste and storm water overflowed the ditches and pipes, it washed through the informal settlement homes. Residents explained that this caused their retaining walls to collapse, their house walls to lean, and created rivers of mud through their homes. Several residents showed black water pipe connections that leaked during heavy precipitation and caused sewage to flow into their homes.

Informal settlement residents also were very concerned about inadequate roof gutters. Some homes had improvised gutter systems to collect rainwater off the edges of roofs and funnel it into underground storm water and sewage collection systems that emptied out into the ravine at the bottom of the settlement. Other homes had no gutter system. Residents pointed out that lack of gutters or inadequate gutters resulted in streams of water falling off roof edges onto the retaining walls, yards or roofs of their neighbors. This had caused retaining wall collapse, housing collapse and general misery for those nearby.

### **Slope Instability and Residents' Perception of Flooding and Refuse Management**

When asked directly about natural hazard risk, the overwhelming majority of informal settlement residents were most concerned about landslide risk, in contrast to flooding, earthquakes, fires, and hurricanes. Seventy percent of those surveyed in Las Brisas and 81% of those surveyed in Unidos 8 de Marzo. Landslides also received the second highest number of dots in a snap poll during focus group discussions. Many people showed us areas of considerable erosion on the edges of the ravine, and spoke about being afraid of their homes sliding down the ravine. Slope stability was also a strong concern when residents were asked to discuss and map areas in need of improvement in their settlements. The placement of new retaining walls was the most hotly debated improvement, as it was seen as a matter of life and death, in a way that drainage was not.

What emerged from the situation assessment in the two informal settlements was a widespread belief that landslides were rooted in problems of water and refuse management. When asked what made landslide risk greater, most focus group respondents stated that human actions triggered or increased landslide risk. Trash and litter in the gutters was seen as a primary cause, along with inadequate drainage. Respondents also drew links between landslides and drainage when they stated that ground alterations (drainage ditches, clearing drains, and building cement paths) were mitigation actions they had taken. During the focus group discussion, respondents also drew links between slope stability, trash buried in the ground, and the fact that litter clogged drains and caused them to overflow.

Many residents stated that litter on the ground and in the drainage ditches caused water to overflow sewage and storm water systems during heavy precipitation. This overflow was seen as causing retaining wall collapse, soil to quickly wash away, loss of land, the undermining of housing walls, in addition to the general misery of having water run through their houses. Residents also discussed the noticeable loss of land during the rainy season from precipitation directly on soil and from overflowing storm water runoff.

Of course, these are perceptions of residents about what increases the slope failure potential in an already hazardous situation. The terrain on which the settlements have been built is extremely steep (greater than 45 degrees in most locations). Soil in the area is relatively cohesionless and thus very susceptible to reduction in shear strength from increase ground water saturation and flow during the rainy season.

The residents showed a strong desire to find better solutions for constructing walls to stop landslides in their community and ways to better manage rainwater. In ranking exercises with the focus group participants, overwhelming ranked “receiving training on better wall construction” as a top priority, followed by “receiving training on better drainage construction.”

### **Conflicts between Formal and Informal Settlements**

Another significant theme we see emerging from the situation assessment is the considerable tension between the informal settlements and their immediate formal settlement neighbors. Multiple times during household interviews and during the focus group discussions, these tensions were acknowledged and discussed. It was clear that informal residents did not feel that formal settlement residents trusted them and that informal residents felt that they were impacted by decision and practices in the formal settlements. While the situation assessment did not allow us to hear the perspectives of formal settlement residents, it appeared that both the formal and informal residents begrudged having to live side-by-side. As Elias notes in his figurative model of established and marginalized people “[M]ere residential permanence in that place, with all it implies, may generate a degree of group cohesion, collective identification and common rules, adequate to generate in some people the gratifying euphoria linked to the sense of belonging to a superior group and the concomitant contempt for other groups. Thus, marginalized exclusion and stigmatization become powerful weapons if used by established people to maintain their identity and reaffirm their superiority so as to firmly keep others in their place” (Scheinsohn, 2009).

Both informal settlements were impacted by inadequate or faulty infrastructure projects completed in the formal settlement. Las Brisas residents pointed out a retaining wall built in the edge of the formal settlement, right above their homes, as a major source of problems. The municipality had built the wall inadequately; during the rainy season, water pressure built up behind the wall and it failed, sending a shower of black water, trash, and mud flooding down onto several homes. In Unidos 8 de Marzo, residents claimed land around a sewage treatment plant on the ravine slope built for the formal settlement. The small treatment plant is not currently not monitored or managed by the municipality and being inadequate in size, it often overflows. The open storage tanks attracted flies and mosquitoes. In both cases, the informal



settlement residents were not eligible for municipal services themselves, but contended with the affects of having settled near infrastructure designed for formal settlements.

### **Competing Jurisdictions and Missions**

An institutional analysis of relationships between settlements, government agencies, and NGOs shows that there is little in the way of direct financial relationships and no oversight relationships between precarious settlement residents and all other agencies or entities. While technically, there should be an oversight relationship between the settlements and the municipal relationship, this is rarely enforced. Instead, land tenure for informal settlements is provided at the national level, while local municipalities set zoning limits, authorize building permits, and provide public services such as water, sewage, and electricity either through direct distribution or through private businesses with municipal contracts. This had led to an untenable situation in municipalities like Villa Nueva whereby they may designate zones for agricultural or non-residential use, only to have the land invaded and developed informally. Settlers apply and receive land tenure, often only after years of legal review. The municipality is then in a difficult position of providing services to areas believed to be of too high risk for residential use, often with added costs associated with ex-post service provision. While the situations is less than ideal, those we spoke to in governmental positions realized that precarious settlements would indeed be legalized and that there was a crucial need for managing, and if possible, reducing natural hazard risks within these settlements.

## **VI. PROSPECTS FOR AN URBAN DISASTER RISK REDUCTION PROGRAM**

The Multisectoral meeting, the focus groups, and the participatory voting and mapping exercises were all attempts to directly involve stakeholders, especially informal settlement residents, in our work of information gathering and in envisioning future programming and a DRR framework. The Multisectoral meeting provided us with an opportunity to more fully introduce ourselves and discuss the intentions behind our work and to promote an open and two-way exchange between ourselves and concerned community members. The participatory mapping and voting exercises, besides serving a purpose of providing us with critical information, also functioned as a mechanism for residents to learn from each other. Despite the relative small size of these settlement communities, rough geography and other aspects often contribute to neighbors not knowing each other well on a personal level, let alone their thoughts about risks and mitigations. The mapping and voting exercises were designed to give participants an individual voice as well as to visually present a "collective" or aggregate perspective on the critical issues. Idea presentation, discussion, and analysis are critical elements of consensus building needed for individual and household level buy-in for community-led collective action. This situation assessment was a first step in developing a consensus on and strategy for an urban disaster risk reduction in Guatemala's urban areas.



The assessment shows that community leaders and residents in the squatter settlement strongly agreed that outside supporters like Oxfam should help them develop their communities in ways that reduced vulnerability to future hazards. They were also keen on applying collaborative decision making strategies to a range of economic, social, physical, and political issues.

The interest in urban DRR in the precarious settlements extends beyond settlement residents. Within the municipal and national government, planners and emergency management officers were initiating activities that focused on community early warning systems, understanding social vulnerability, and an integrated disaster risk reduction and urban land use planning strategy. It is indeed promising that a loose institutional network is beginning to form around risk reduction. Clearly, urban disaster risk reduction is not only needed in the precarious settlements, but strongly desired by residents, community organizations, and municipal actors alike.

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