

Social Indicators and Measuring Sustainability -- DRAFT

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Introduction to the project

As part of the Southwest Consortium for Environmental Research and Policy's Border Institute, we have been tasked to discuss the connection between social indicators and sustainable development in the U.S.-Mexican border. This work is an interesting challenge as it allows us to use a quality of life for database for the border region we have been working on for a number of years in a new way. In accepting this challenge, we first moved to provide a definition for sustainable development. It is of course easiest to look to the definition developed by the World Commission on Development and Environment, in which sustainability is thinking about how current residents of a region can meet their needs without compromising the future (WCED 1987). This sounds reasonable enough but what does it really mean for the residents in the U.S.-Mexican border? In a region with biculturalism, binationalism, uniculturalism, migrants, long-term residents, and issues of sovereignty always looming overhead, how do we ascertain that those living in the region currently are not compromising the future of the region's residents?¹ Bell and Morse in their text, *Measuring Sustainability: Learning by Doing (2003)*, discuss one of the methods to judge the sustainability in a community is to understand the intricacies of the system. This is best done through a systematic analysis of the region by talking to the people who live in the community. Through the quality of life analysis we have been working on since the mid-2000s, the authors of this paper have been actively doing just this.

¹ For more information on the classification of border residents and crossers, see Paul Ganster and David E. Lorey's book *The U.S.-Mexican Border into the Twenty-First Century, 2nd ed.* Ganster and Lorey provide a nice, concise overview of these classifications based upon Oscar Martinez's work.

This paper will begin with an overview of our research project and discuss the relationship between quality of life analysis and sustainable development. In this front section, we will also define these two terms and their application in the border region. This will be done by evaluating a few of the writings and theories regarding both topics. As sustainable development and quality of life are related to public policy, the next section of this paper will look at the policy problems that are central to the topic. By doing so, we will set the stage for the analysis of the quality of life indicators and the relationship with sustainability. We begin our indicator analysis looking at the border region as a place, defined by objective data and how residents perceive their city as a place to live. The next set of indicators analyzed is the quality of life perception data. A multiple variable analysis is used to ascertain the homogeneity of the region and identify challenges to sustainable development. The data that is explored in this paper were chosen from a larger dataset in order to understand the human system in the border region to capture what sustainability means for the region. The final section of this paper discusses the application to sustainable development, the future possibilities for the border region, and the policies that would improve conditions.

The Connections between Quality of Life and Sustainability in the Border Region

Quality of life as a concept can be interpreted different by people. If you ask a room of individuals, what quality of life means to them, a variety of answers will emerge. Individuals put more importance on the issues that are closest to them. Young, single people might consider recreation facilities and nightlife an important component to their quality of life, but those with young children could put more emphasis on educational facilities and the levels of crime in a community. For these reasons, the focus many times is on the place as understood by subjective and objective indicators. For Myers, quality of life has come to mean “livability”, as community “quality of life is constructed of shared characteristics residents experience in places (for example, air and water quality, traffic or

recreational opportunities), and the subjective evaluations residents make of those conditions” (Meyers, 1987: 108-109).

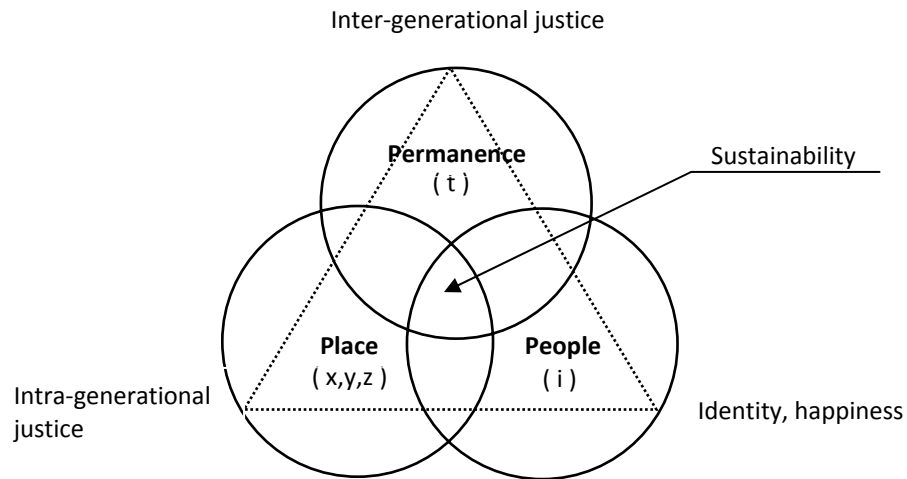
In order to effectively measure the quality of life of communities in the U.S.-Mexican border a longitudinal analysis is required using both subjective and objective data. The subjective and objective coordinates of quality of life can trace different conditions or levels of livability of places. The method is similar to what has been discussed by theorists (Liu 1976; Dissert and Deller 2000; Szalai and Andrews 1980) as well as practitioners (Morrison Institute). For this current study, a total of 3,686 surveys was collected through a random sample over a period of four years.² The cities included in this study are San Diego and Calexico in California; the Tijuana metropolitan area and Mexicali in Baja California; San Luis/Somerton in Arizona; San Luis Río Colorado in Sonora; El Paso, Texas; and Ciudad Juárez, Chihuahua. The data were collected on a nine-point Likert scale but this has since been modified to assist in interpretation.

The connection between sustainable development and quality of life are clear. Sustainable development is seen as a way to improve quality of life (Torjman 2000, Seghezzeo 2009). In the same context, measuring quality of life can help understand what sustainability means to a community and how to develop policies that more adequately addresses it (Seghezzeo 2009; Bell and Morse 2003). Through a more integrated approach to development that looks at the totality of the place (environment, social conditions, and economic viability), the people, and issues of permanence. This of course stresses the need for cooperation between the governing institutions and in policymaking, which as we will discuss in the next section has not been sufficient.

² The quality of life data collected for this paper was done in collaboration with a number of colleagues from many different border research institutions. In particular, Sergio Peña at El Colegio de la Frontera Norte, Ciudad Juarez; Paul Ganster at San Diego State University, and colleagues at Arizona State University, Subhrajit Guhathkurta, Edward Sedalla, and David Pijawka. The research was funded through the Southwest Consortium for Environmental Research and Policy as part of the U.S. EPA’s work in the border region.

In this paper we will pull from Lucas Seghezze's definition of sustainability, which focuses on the place, people, and permanence (2009). As shown in figure 1, Seghezze provides the interaction between place, people and permanence, in which sustainability is the connector among them all.

Figure 1: Sustainability Triangle
(Adapted from Seghezze 2009)



Place: the three dimensions of space (x,y and z); Permanence: the fourth dimension of time (t); People: the fifth, human dimension (i)

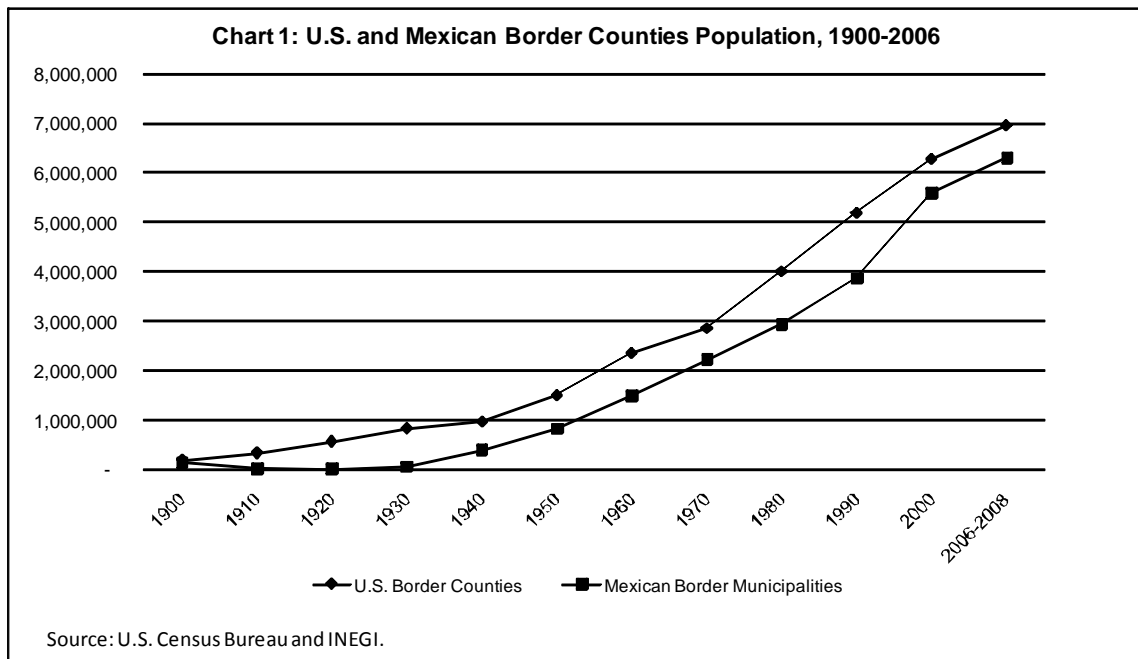
Place is an important concept in the border region for it is defined by human activity as well as the physical location (Masuda and Garvin 2008). The actual limitations of the border speak to levels of crime, the trust in police, access to public services, government regulation, and for some defining who you are. If we return once again to the categories of Oscar Martinez regarding the “Borderlander”, what makes each category special is related to the place understood as the U.S-Mexican border region. It does not matter if one considers themselves as part of only one culture, either U.S. or Mexican, what is important is that their culture is based on the notion of the border and that they do not interact with “the other side”.

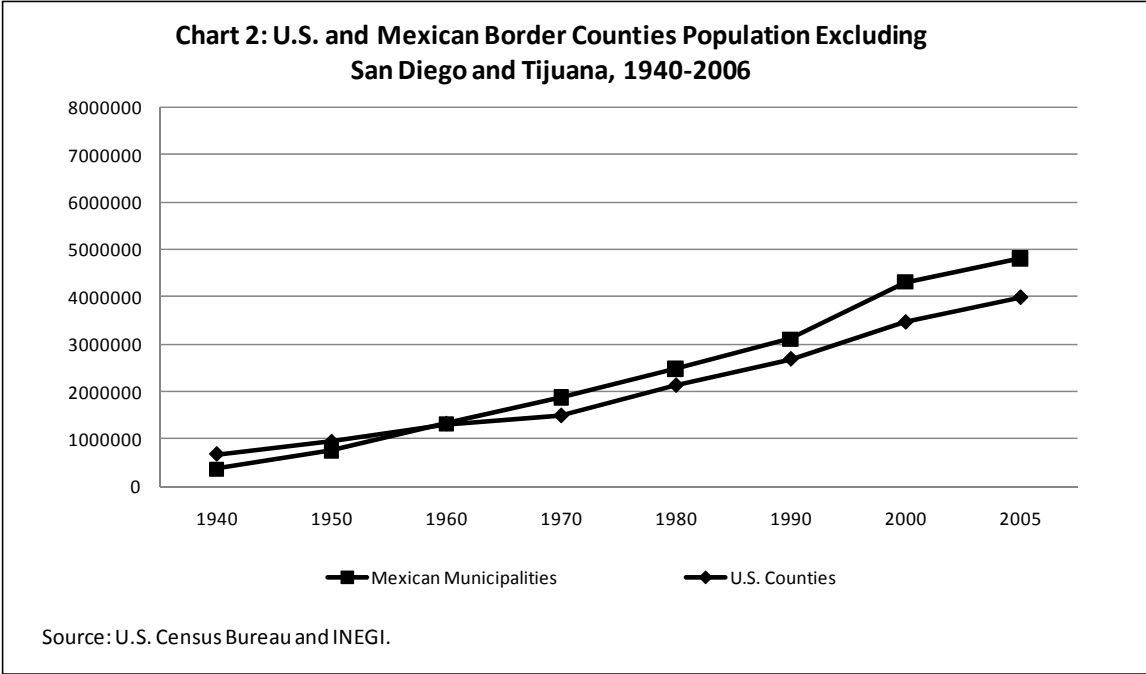
The idea of permanence is also extremely important in the context of the border region for there has been little discussion regarding the future of the region but more of how to correct today's problems or the problems generated in past activities. This is an important concept to move into the policy discussion for development in the region. The majority of the conversations do not seem to be focused on the future development of the region as a common space. Public policies in the border region have primarily focused on expanding international trade, immigration, security issues related to drug trafficking and other crimes, and environmental issues. National domestic policies dominate as seen with the focus of the U.S. public policy since September 2001 on border enforcement (against security and immigration), but continuing the trade linkages. These policies can be seen in the border crossing data provided by the Bureau of Transportation Statistics (BTS). In looking at data for the whole border, in 1995, 2.86 million trucks and 32.8 million pedestrians crossed north. These numbers changed to 4.4 million trucks and 50.3 million pedestrians in 2002, and 4.9 million trucks in 2008 and 44.8 million pedestrians in 2008 (www.bts.gov). Since 2002, the number of trucks has continued to increase (500,000 in a recessionary economy), while the number of pedestrians has decreased (5.7 million).

Finally, understanding the happiness of local residents provides insight into the connections of the residents with society. Happiness has been related to "autonomy, freedom, achievement, and the development of deep interpersonal relationships" (Kahneman and Sugden 2005, 176; taken from Seghezzeo 2009, 550). It is important to develop policy for sustainable development considering all the environment, economic development, and people living in the system. After a brief discussion on the sources of the policy problems, the discussion will lead us to looking at life for those living in the region through the quality of life analysis.

What is the problem we are trying to address?

The U.S.-Mexican region has experienced tremendous growth over the past 100 years or so. In 1900, there were approximately 350,000 people living along both sides of the border. By the mid-2000s there were approximately 13.3 million people living in the region. As chart 1 shows the population growth in border counties and municipalities has increased similarly. If you were to take out the San Diego-Tijuana metropolitan region (chart 2), the population on the Mexican side of the border surpassed the U.S. side in 1960 and has continued to grow. As many people move and live on either side of the border, it is difficult to track the exact movement of the people in region. Services, commercial activities, and educational opportunities, as examples, are all accessed on both sides of the border. More specifically, it is not unheard of for a family to move to the U.S. side of the border as they want their children to learn the English language in the United States and then return to Mexico after their child has graduated.





The economic pull to the region has come primarily from the Mexican side with the development of assembly plants or in-bond manufacturing facilities called *Maquiladoras*. In 1965, multinational firms began to establish a presence in Mexico’s northern border with the implementation of the Mexican policy of the Border Industrialization Program (BIP). The BIP was employed partly for Mexico to deal with a growing unemployed population along the northern border when the United States cancelled the Bracero Program, which was established in wartime to increase the number of manual laborers in the United States, particularly agricultural workers. These policy actions were taken in the 1960s, a time when population growth began to take off. This brief scenario is indicative of how policymaking has generally not been coordinated for the border region by the two nations. Policymaking in the border region is generally driven by domestic issues within each nation as seen in the previous example of U.S. security and international trade policies. For Mexico, economic development and job creation are serious issues for the nation but are less so in the northern border region. Problems of sovereignty and nationalism in both countries have made it difficult for full binational cooperation in a number of issues. For example, planning and development are major issues

that have never been appropriately dealt with in the binational context though in some communities, the will and the personnel are there. The main inhibitors to action are the governmental institutions and financial resources.

Public policy in the border region

There are instances of collaboration between both nations on policies to improve conditions for those living in the region. With the implementation of the North American Free Trade Agreement, the Border Environmental Cooperation Commission (BECC) and the North American Development Bank (NADBank) were established as binational organizations to invest in wastewater and water infrastructure. Since its inception the BECC has certified 115 projects with a total investment of US\$2.665 billion (Manning-Gbogbo 2005). The BECC and NadBank are not perfect institutions (few are) and there have been real problems with the funding mechanisms developed (as it is generally cheaper for U.S. municipalities to borrow money through bonds rates, and in Mexico, municipalities have only recently had the right to borrow funds). But this example shows that when the countries cooperate, there can be real results that improve the quality of individuals' lives.

In developing public policy solutions to challenges and problems, an intricate understanding of the underlying problem is mandatory. If the problem is never truly understood, any policies or plans developed to improve the situation will never really work as they will never address the real issue. This is a difficult proposition in any situation, much less a binational region with diverse economies and styles of governance. This does not mean that it is useless to try and improve the lives of those living in the region it just takes additional time and energy to analyze the situation.

Quality of life data that speaks to sustainability in the border region

The U.S.-Mexican border as a geographical area is a complex system, with a multitude of interactions between socio-economic factors, politics, and culture based in two separate, sovereign nations. This results in a region with integrated places or cities, with specific livability conditions. Does this mean we can consider the border region as having a homogeneous quality of life? Should we consider Mexican and U.S. cities' livability as separate areas from the perception of residents? Part of the objective of this paper is to look at the similarity and differences of the responses of individuals living in the region regarding different aspects of quality of life and compare them to what the objective data tell us. The last part of this section of the paper will address this issue but first data for the "place" known as the border will be explored.

Returning to Seghezzi's three points, place, people, and permanence, this next section looks at the data collected to understand quality of life in the context of this model. This exercise provides a method by which to understand how quality of life indicators or social indicators can help to analyze sustainability in the U.S.-Mexican border region. Place is best analyzed by the individual cities or communities in the region since there are variances within the region. As stated earlier, the cities that are looked at in this paper are San Diego (SD) and the metropolitan region of Tijuana, Tecate, and Rosarito (TJ); Calexico (CX) and Mexicali (MX); San Luis/Somerton (AZ) and San Luis Rio Colorado (SL); and El Paso (EP) and Ciudad Juarez (CJ). Though it is unfortunate we don't have data for all of the communities in the region, the sample we do have provides great insight. It is hoped that quality of life data for the whole region will be collected soon, and currently we are in search of funds to help collect the perception data.

To begin looking at place, objective data which describes conditions in different cities along the border and perceptions of individuals living in those cities were analyzed. The data for the following tables was taken from various years during the early 2000s using the primary sources available, U.S.

Census Bureau, the National Institute for Geography and Statistics (INEGI by its Spanish initials). Table 1 provides a profile of the communities, looking at the demographic; housing; security; health; poverty; education; and economic statistics. We have also provided the percentage of residents that indicated they were completely satisfied living in their city or place. Table 2 converts this data into a 5-point scale, with one being the lowest and five the highest. As seen from this second table, San Diego consistently ranks the highest of the all of the cities surveyed. The two issues in this city where the rankings were lower were housing security and the percentage of individuals completely satisfied with living in the place. In comparison, Tijuana had some of the lowest rankings for all of the categories analyzed. The U.S. communities had higher rankings than there Mexican counterparts, with the greatest disparities found between San Diego-Tijuana and El Paso-Ciudad Juarez. Calexico-Mexicali and San Luis/Somerton-San Luis Rio Colorado had a less significant divide. If we consider the total number of points a city could receive is 60, only San Diego, El Paso, and San Luis-Somerton had totals, 52, 41, and 37 respectively, that can be seen positively. The rest of the cities were around 50% or below of the total points possible.

Table 1: Comparative Analysis of Social Indicators for Selected Locations Along the U.S.-Mexican Border

SOCIAL INDICATORS		SD	TJ	CX	MX	AZ	SL	EP	CJ
DEMOGRAPHIC	Pop. In thousands	2,965.94	1,575.03	160.60	855.96	189.68	157.08	731.50	1,313.34
	Annual pop. Growth	0.01	0.05	0.03	0.02	0.04	0.03	0.01	0.04
HOUSING	% Owner occupied	56.67	68.28	54.01	78.34	70.08	76.00	65.18	72.53
SECURITY	# Murder*10,000res	0.05	0.68	0.12	1.04	0.11	1.40	0.03	0.94
	# Robery *10,000 res	25.13	20.58	60.77	27.95	49.24	37.05	16.69	10.64
HEALTH	# Doctor*10,000 res	27.80	6.20	8.40	8.00	10.60	4.70	11.20	2.30
	Infant mortality rate	5.90	18.10	4.70	17.90	5.30	20.90	4.40	2.70
WELLBEING	% res completely satisfied living in place	0.32	0.29	0.25	0.29	0.55	0.37	0.34	0.29
POVERTY	% res under pov line	11.0	7.2	19.5	10.3	17.6	41.1	22.2	33.4
EDUCATION	High school % (25 +)	85.1	29.2	63	31.3	72.1	23.8	70.3	25.5
	Higher education (25 +)	33.8	14.1	11.2	17.7	12.6	10.7	18.9	13.9
ECONOMIC	Per capita GSP (dls)	47688.0	8281.0	20207.0	11855.0	20652.0	10152.0	28694.0	12970.3

Note: The data is for varying years during the first decade of the 2000s.

Source: U.S. Census Bureau, American Community Survey; INEGI Censo 2000 and 2005; Federal Bureau of Investigation; Pan American Health Organization; QoL survey; Bureau of Economic Analysis

Table 2: Five Point Comparative Analysis of Social Indicators for Selected Locations Along the U.S.-Mexican Border

SOCIAL INDICATOR		SD	TJ	CX	MX	AZ	SL	EP	CJ
DEMOGRAPHIC	Pop. In thousands	5	3	1	2	1	1	2	3
	Annual pop. Growth	5	1	3	4	2	3	5	2
HOUSING	% Owner occupied	1	3	1	5	4	5	3	4
SECURITY	# Murder*10,000res	5	3	5	2	5	1	5	2
	# Robery *10,000 res	4	5	1	4	2	3	5	5
HEALTH	# Doctor*10,000 res	5	1	2	2	2	1	2	1
	Infant mortality rate	5	1	5	1	5	1	5	5
WELLBEING	% res completely satisfied living in place	2	1	1	1	5	3	2	1
	% res under pov line	5	5	4	4	4	1	3	2
EDUCATION	High school % (25 +)	5	1	4	1	4	1	4	1
	Higher education (25 +)	5	1	1	2	1	1	2	1
ECONOMIC	Per capita GSP (dls)	5	1	2	1	2	1	3	1
TOTAL		52	26	30	29	37	22	41	28

Source: Authors' calculations from Table 1.

Turning to the people of the region, the next exploration of the quality of life data we conducted looked at the perceptions of the residents in the region. As discussed previously, a nine-point Likert scale was used in the main survey framework making it possible to use quantitative methods to analyze qualitative data. An important question for this analysis is to understand the homogeneity of the region. Therefore, multiple correspondence analysis³ (MCA) was applied, allowing for the exploration of multiple categorical variables and to distinguish the various typologies of border residents' perceptions. In conducting this analysis, the data was transferred to a five-point scale, using categories equivalent to excellent, good, medium, poor, and very poor.

As seen in Figure 2, the responses fall into six different typologies. The first is the “worried” border resident (12.80% of total), in which 82.57% of this group has a lot of trouble sleeping, feel unhappy or depressed very often, and the cost of housing is a great burden for them. Yet, they are completely satisfied with city services (parks, the fire department, trash collection, street lighting) and feel completely satisfied living in the city and the life they live. This group is considered “worried” as the cost of living (particularly housing) is of great concern for them. The residents of San Luis-Somerton

³Multiple correspondence analysis is a descriptive/exploratory technique designed to analyze multi-variable tables containing some measure of correlation between the rows and columns. The results provide information that explores the structure of categorical variables and assigns coordinates to relate the different categories to each other — based on the distance between them — to construct typologies, groups of individual who have similar answers (for more information see Moscoloni, 2005).

(72.33% of the responses from this city), Ciudad Juarez (36.78% of the responses from this city), and El Paso (38.27% of the responses from this city) fall into this category.

The second group is categorized as “everything is wrong”. This group consists of 8.49% of the total responses. The issues for this category include the lack of good health care services (facilities and physicians); low satisfaction of government services; highly concerned about air quality and its impact on their health; cost of living is getting more expensive; the cost of housing is a great burden; they have a lot of trouble sleeping; they generally feel very unsafe walking in their neighborhoods; find the city to be a poor place to raise children; and they are not satisfied living in the city. Residents in Ciudad Juarez (16.35% of the respondents in this city) and in San Luis Rio Colorado (13.07% of the respondents from this city) were found in this grouping. These residents are very unsatisfied with their city and their lives.

The third category of residents is the “everything is wonderful but it is getting more expensive”. A third of both the San Diego (33.37%) and San Luis Rio Colorado (30.65%) residents surveyed fell into this group. A total of 18.04% of the total respondents fell into this category. The individuals in this group are happy with the health services, housing, with their lives, the city, and are completely happy. They are not concerned with the quality of the air or the impact on them and have been long term residents (80.48% have lived in the city nine year or more). They are currently satisfied with the housing costs but see the cost of living as getting very expensive.

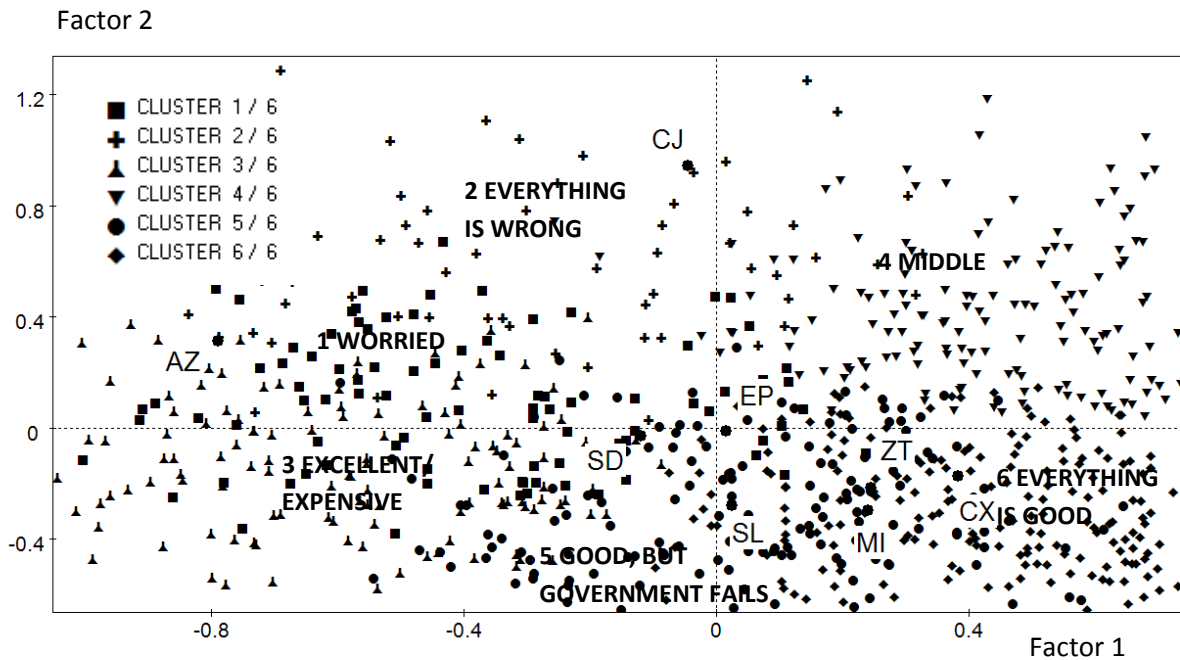
The fourth category is “in the middle”. This includes 17.21% of the total respondents surveyed, who are found mainly in Tijuana (22.49% of the respondents from this city) and Ciudad Juarez (27.40% from this city). These residents are in the middle as they are not really satisfied or dissatisfied by their lives. They are not satisfied with city services and do not trust the local police departments. They are moderately concerned about the current economic situation, cost of housing, and air/water quality on their health. In regards to their satisfaction in living in the city and personal quality of life, they are in

the middle, neither unsatisfied or satisfied. They are also in the middle about the city being a good place to raise children and regard the people living in the city as unfriendly.

The next category includes mainly respondents from Tijuana (49.70% of the residents and 17.46% of the total respondents) and is titled “good but the government is failing”. People in this category are generally completely happy, do not have any problems sleeping, are rarely depressed, enjoy their activities and are satisfied with their lives. Their economic situation and the availability of jobs are getting better but the cost of living is getting more expensive. A few were concerned with air and water contamination and they are generally satisfied with living in the city as there are good health care facilities and doctors; trash collection, street lights, parks, schools, the fire department, and piped water is good. They feel very unsafe with crime in their neighborhoods, do not trust the police, and traffic congestion is a problem, leading to a general dissatisfaction with the local government.

The final and sixth category accounts for 26% of the total respondents and is classified as “everything is good”. The respondents in this category are in San Diego (37.93% of the residents surveyed), San Luis Rio Colorado (47.49% of the residents), Mexicali (47.70%), and Calexico (47.42%). It is the largest category and the most diverse. These residents enjoy their lives and the city they live in. They are completely satisfied with city services, the economic situation is good, housing costs are not really a burden for them, and they are not concerned about crime. It is interesting to look at this large group of respondents in comparison to the rankings of the border region as found in tables 1 and 2. There is a definite disconnect between residents’ perceptions and what the data says about the border region as a place. At this point more data collection and analysis needs to be done to better ascertain why this difference exists.

Figure 2: Typology of Responses and the Projection of Cities in the Quality of Life Responses of Select U.S.-Mexican Border Cities (Authors' Calculations)



What does this long categorization and analysis say about the border region as a whole? Well, it obviously is not a homogeneous region, since there are six different categories in which the opinions of the residents vary greatly. Particular problems in border region are related specifically to cities or sub-regions and need to be addressed as such instead of in global policies that look at the border as a whole. Considering the current policymaking framework in the region, this suggestion is even more ambitious than the general call for more consistency and coordination in policymaking by the United States and Mexico.

Future prospects and where we need to go from here

Permanence is an important component in the discussion of sustainability of a region. It sets in the conversation the importance of understanding how policy decisions made today will impact the lives of the future residents of the region. Looking at past policies and programs and the condition of the border cities today, there is room for improvement in this arena. If population growth continues at

similar rates, putting additional burden on the local infrastructure, and there is not a concerted effort by the binational governments and society to work together, it is highly probable that life on the border will get worse, not better. Therefore, policies need to be made today to improve quality of life issues. Ciudad Juarez and Tijuana tell us much of how the future for the entire border could be as both of these cities experienced the largest amount of population growth, have high rates of crime, insufficient infrastructure, and the most dissatisfaction from residents. San Luis Rio Colorado can also be grouped in this example, but at least this is a much smaller city with the possibility to make things right easier.

In the development of joint policies that will not only resolve current issues but that also address future population growth, it is crucial to view the border communities' system. The border is a system which is made up of a number of subsystems or communities that need specific attention to take care of the local issues. As we see from the data is not completely homogeneous but through an understanding of the particularities of the region, better policies can be made.

As the "place" known as the border region is understood further, it is clear that with coordinated, cohesive decision making by the various actors in the region, the quality of life and the sustainability of the development can be improved. This is seen with the programs that were implemented by the BECC and NadBank to improve water quality in the border region. Therefore, an agency that can develop policies and programs, which covers more than just environmental challenges, should be established. A new vision of economic development and the future of the border communities along with a plan on how to reach their vision needs to be developed. A binational agency with regional stakeholders could lead the charge. It should be an agency with sufficient resources and the authority to complete projects and programs that move toward a more sustainable path. This is not a new idea or concept but one that needs implementation in order to deal with the complex problems in the region. It can not be stressed enough that the communities along the border do share the fact that they are located within the border zone and policies are made by the individual governments to respond

to some of the challenges facing the region but shared policymaking has not been done comprehensively or with consistency. This again leads us to believe that many of the problems came with the negative externalities of market forces and government policies. The obvious response then is the community, government and members of society, should work together in a formal situation to improve the conditions for those living in the region today and tomorrow.

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