

Spatial & Temporal Dimensions of Urban Growth in Panama City
Maps of Historical Growth & A Case Study of Kuna Nega as Informal Settlement

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RESUMEN EJECUTIVO

Contexto

Urbanización rápida en todos los países en el mundo y particularmente América Latina por la mayor parte no ha sido planificado ni regulado. Como olas de personas migran desde regiones rurales a las ciudades en busca de trabajo, servicios, y educación, mucha gente encuentra que el mercado de vivienda formal no es accesible en términos del coste. En este caso, las personas recurren a construir casas ilegalmente de materiales recicladas sobre terreno que no es regulado, formando asentamientos informales desordenados en las periferias de la ciudad. Estas comunidades a menudo faltan servicios necesarios como agua potable, un sistema de agua negro, electricidad, recolección de basura, centro de salud, colegio primario y secundario y calles pavimentadas. Cuando una comunidad es aislada del pasto urbano y las instalaciones correspondientes (como la transportación pública), los residentes de los asentamientos informales sufren la desigualdad, exclusión social y marginación.

Objetivo de la Investigación

Hay una diferencia en información relacionada con las tendencias generales del crecimiento urbano histórico en la Ciudad de Panamá. Mientras las motivaciones detrás la formación de los asentamientos informales son generalmente bien conocidos, y las condiciones actuales han sido evaluadas, los procesos que llevan a la formación de los asentamientos informales y las condiciones de vida actuales son menos entendidos. Es decir, mientras el ‘por qué’ de los asentamientos informales, el ‘como’ del establecimiento informal no es tan claro. Este estudio debajo el Foro y Observatorio Urbano y Ariel Espino se enfoca en el crecimiento y desarrollo del paisaje urbano de la Ciudad de Panamá y los orígenes, que sean formales o informales, de cada barriada. El estudio es compuesto de dos partes complementarios: cartografía a gran escala del crecimiento urbano y un estudio de caso de un asentamiento informal. La comunidad del estudio, Kuna Nega, es un asentamiento informal a 15 kilómetros norte de la ciudad, y importantemente, está directamente frente al vertedero municipal, Cerro Patacón. El objetivo primero es explorar el crecimiento de ambos los asentamientos formales e informales por hacer mapas que demuestran la aparición de calles y barriadas con el tiempo en los años de 1960, 1972, 1980, 1998 y el presente. El objetivo segundo es explorar los orígenes, condiciones, y dinámicos sociales mediante el estudio de caso de un asentamiento particular proporcionando un contexto a los asentamientos informales de la ciudad.

Métodos

Datos espaciales incluyendo fotografías aéreas digitalizadas y georeferenciados fueron utilizados para crear mapas de los asentamientos urbanos y las calles de la gran área metropolitana de la Ciudad de Panamá en el Sistema de Información Geográfica Quantum (QGIS). Mapas de ambas las barriadas existentes (y su clasificación de formal o informal) y las calles fueron generados por cada año respectivo del 1960, 1972, 1980, y 1998. La clasificación de cada barriada fue hecho basado en los datos del Foro Urbano relacionados al estatus histórico

de la formalidad de cada barriada. Cuando no existía la información, la formalidad fue clasificada basada en el orden y regularidad de la separación de las casas y calles.

El estudio de Kuna Nega incluyó asistiendo la asamblea general, sacando entrevistas estructuradas y semiestructuradas con hogares y miembros importantes de las comunidades y además pasando tiempo en las comunidades. El proceso de entrevistas fue conducido de conformidad con el Protocolo en la Conducta Ética de Investigación de la Universidad McGill.

Resultados

Creamos dos conjuntos de mapas de la Ciudad de Panamá este de la zona del Canal: Un conjunto de las calles principales y los barrios clasificados por su estado de formalidad, y el otro de la red de calle entera, para cada año del estudio. Lo que encontramos es que mientras que la superficie urbana ha aumentada considerablemente desde 1960, la distribución de áreas formales y informales ha cambiado mucho también. Por ejemplo, entre 1960 y 1972, la superficie de barrios informales ha disminuido de casi 300 hectáreas, por la formalización de estos barrios.

En Kuna Nega, encontramos que las tres comunidades (La Paz, Kuna Nega, y El Valle de San Francisco) que forman parte de la zona de Kuna Nega en general tienen historias, orígenes étnicos, servicios (agua negra, agua potable, electricidad), y estructuras de gobernanza diferentes. La propia comunidad de Kuna Nega que fue establecida en 1980, tiene una organización interna fuerte, y pudo obtener reconocimiento formal y además servicios. Las dos otras comunidades fueron establecidas por el gobierno como áreas para gente desplazada de otra parte de la ciudad, pero había mucha migración informales que no tienen acceso a servicios. Finalmente, las comunidades de Kuna Nega están expuestas a riesgos del ambiente y de la salud, por la falta de agua, el tratamiento de agua negra, y la ubicación de Cerro Patacón.

Conclusiones

Este estudio muestra la manera en que los asentamientos informales han sido un fenómeno persistente en el crecimiento de la Ciudad de Panamá a través del tiempo. Por eso, hay que haber políticas de desarrollo urbano inclusivos de los asentamientos informales, y que tienen un objetivo del mejoramiento de las condiciones de vida de la gente que vive allí hoy en día. Un enfoque sobre la organización y la acción comunitaria puede ser útil también: la organización política de Kuna Nega que se describe en este estudio podría servir como un modelo para las comunidades informales que deseen auto-organizarse.

Es necesario reconocer que los asentamientos informales seguirán proliferando si el mercado de asentamiento formal no es accesible a una mayor parte de la población. Políticas integrales tienen que incorporar la planificación de viviendas asequibles en zonas donde de otro modo serían áreas informales. Además, estas políticas serán importantes para mejorar las condiciones de vida de la gente, y promover la sostenibilidad y la cohesión social de una manera eficiente.

EXECUTIVE SUMMARY

Context

Rapid urbanization in countries throughout the world and particularly Latin America has been largely unplanned and unregulated. As waves of people migrate from rural areas to cities in search of jobs, services, and higher education, many people find the formal housing market to be inaccessible in terms of cost. In this case people most often resort to illegally building homes on unregulated land out of second hand or recycled materials, forming haphazard and unplanned informal settlements on the peripheries of cities. These communities are often lacking in necessary services such as potable water, sewage and sanitation systems, electricity, trash collection, health centers, schools, and adequate road networks. When isolated from the urban landscape and its corresponding amenities (such as public transportation), residents of informal settlements experience inequalities, social exclusion and marginalization.

Panama City is the main urban centre of Panama, with more than two-thirds of the country's population in the greater metropolitan area. The UN Human Settlements Programme reports that more than 20% of the residents of Panama City live in slum conditions, and as such are lacking in one or more essential services. Slum conditions are closely tied to informal settlements, and it is therefore important to understand how these settlements come about, where and when they appear, and the realities of the people living there.

Research Aim

There is a gap in information relating to the overall patterns of historical urban growth in Panama City. While the drivers and motivations behind the formation of informal settlements are generally well known, and current conditions have been assessed, the processes that lead to the formation of informal settlements, and current living conditions are less understood. In other words, while the 'why' of informal settlements is known, the 'how' of informal settlement establishment is less clear. This study under the Foro y Observatorio Urbano and Dr. Ariel Espino is focused on the growth and development of the urban landscape of Panama City and the origins, whether formal or informal, of each new neighborhood. This study is made up of two complementary components: large-scale (city-wide) mapping and a case study in one informal settlement. The first objective is to explore the growth of both formal and informal settlements in Panama City through mapping the apparition of streets and neighborhoods over the years of 1960, 1972, 1980, 1998 and the present. The second is to explore the origins, conditions, and social dynamics through a case study of a particular informal settlement providing context to informal settlements of Panama City. The community to be studied, Kuna Nega, is an informal settlement about 15 kilometres north of the city, and importantly, is directly across from the main municipal landfill, Cerro Patacón.

Methodology

Spatial data including digitized and geo-referenced aerial photographs was used to create maps of urban settlements and roads of the greater metropolitan area of Panama City on

Quantum Geographic Information Systems (QGIS). Maps of both the existing neighborhoods (and their classification as formal or informal) and streets were generated for each respective year of 1960, 1972, 1980, y 1998. Classification of each neighbourhood was done based on data from the Foro Urbano regarding the historic status of formality of each neighborhood. The formality of the neighborhoods for which this data was not available was classified based on order and regularity of the spacing of the houses and the roads.

The case study in Greater Kuna Nega included attending community assemblies, conducting structured and semi-structured interviews with households and key community members, as well as spending time in the community. All interviews were conducted in compliance with the McGill University Protocol on the Ethical Conduct of Research.

Results

We created two sets of maps of Panama City east of the Canal Zone: one set of the neighbourhoods (classified by formality) and main roads, and another of the entire road network of each year. We found that while total urban area has increased significantly since 1960, the distribution of formal to informal neighbourhoods has been shifting, sometimes drastically. For example, between 1960 and 1972, the area of informal neighbourhoods in the zone studied actually decreased by almost 300 hectares. This is ostensibly due to the formalization and legitimization of these neighbourhoods.

In Kuna Nega, we found that the three communities that compose the greater area of Kuna Nega (La Paz, Kuna Nega proper, and El Valle de San Francisco) have very different origins, ethnic backgrounds, available services (such as sanitation services, potable or running water, electricity), and governance structures. Kuna Nega proper, a 18.5 hectare parcel of land that was formally established in 1980, has very strong internal organization, and as such has been able to organize and obtain formal recognition, as well as better services. The other two communities, though first established by the government as an “escape valve” for displaced people, became areas that drew in informal settlers, for which no services are provided. Finally, the communities of Kuna Nega are subject to health and environmental risks, due to both the lack of sanitation and water, as well as the location of Cerro Patacón.

Conclusions

This study highlights how informal settlements have been a persistent and sustained phenomenon in the growth of Panama City through time. As such, there is a need for overarching policy that is inclusive and that aims to improve the conditions of the informal settlements that exist today. There may be room for community-based action as well: the political organization of Kuna Nega proper described in this study may serve as a model for informal settlements to self-organize. It is necessary to be cognizant of the fact that informal settlements in Panama City will continue to proliferate as long as the formal market is inaccessible to a large part of the population. A holistic approach to policy that incorporates planning of affordable housing in areas that would otherwise be settled informally is key to improving living conditions as well as promoting sustainability and social cohesion in an efficient manner.

Organization Information

El Foro y Observatorio Urbano is one component of the Foro y Observatorio de Sostenibilidad, which joins researchers from the Smithsonian Tropical Research Institute (STRI), the Universidad Católica Santa María la Antigua (USMA), el Instituto de Investigaciones Científicas y Servicios de Alta Tecnología (INDICASAT), and McGill University. Established in 2012, the Foro y Observatorio de Sostenibilidad has the goal of creating connections, promoting dialogue, and establishing continuity between sustainability-based projects in Panamá. Specifically, the Foro y Observatorio Urbano aims to generate data and information and create discussion on the themes of urban sustainability, housing, and transportation in the context of social exclusion in Panama City.

Dr. Ariel Espino currently heads the Foro y Observatorio Urbano. Dr. Espino holds an architecture degree from USMA, a Master's in urban planning from the University of Arizona at Tucson, and a PhD in socio-cultural anthropology from Rice University. From 2004 to 2009, Dr. Espino led la Oficina del Casco Antiguo (OCA), revitalizing Panamá's historic neighborhood, while providing affordable housing and maintaining property rights for its lower-income tenants. He now works as an independent consultant with his own architectural firm, Grupo SUMA, and in 2015 published a book entitled *Building the Inclusive City: Theory and Practice for Confronting Urban Segregation*. In April of 2015, Dr. Ariel Espino and Carlos Gordón with the Foro y Observatorio Urbano released its inaugural publication, entitled *Los asentamientos informales en el área metropolitana de Panamá: Cuantificación e implicaciones para la política de vivienda y urbanismo* detailing the current levels and consequences of informal settlements in Panamá City.

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Please send thank-you notes to both Dr. Espino and Mr. Gordon.

Internship Hours Worked

Month	Hours of Work in Panamá	Hours of work in Field (Kuna Nega)	Total Hours	Total Days
January	50	0	50	7
February	24	16	40	5
March	30	50	80	10
April	56	8	64	8
Total	160	74	234	30

1. INTRODUCTION

1.1 Urbanization & Informal Settlements

Rapid urbanization is a significant global phenomenon. Today combined with exponential population growth, the scale of urbanization is historically unprecedented. Currently, more people live in urban areas than in rural areas, making up 54% of the world's population, compared to 1950 when 30% of the global population resided in urban areas. Latin America and the Caribbean is the most urbanized region of the world, with 80% of the population living in urban areas (World Urbanization Prospects Report 2014). With such high rates of urbanization, sustainable development is a challenge in cities, particularly for those in lower-middle income countries as highlighted. There is a need for integrated policies to improve the lives and conditions of urban and rural dwellers (World Urbanization Prospects Report 2014). The proportion of people living in urban areas globally is expected to reach 66% by 2050.

By concentrating people and services, cities have the potential to both provide better living standards to a greater portion of the population, as well as to serve as engines of growth, in terms of being agglomerations of labour (Wheaton 2002) and even creativity (Florida 2002). When urban systems are planned out and designed to effectively accommodate growing urban populations, rural to urban migration can bring many benefits to those who migrate. Indeed, one of the key reasons for rural-to-urban migration universally is the better access to higher quality economic opportunities, social services, education, health services, and for employment and education that cities provide (see Montgomery 2008, Cerrulli & Bertonecelli 2003, Zhang & Shunfeng 2003, Hossain 2001 for but a few examples).

However, many of the world's urban dwellers live in places that do not provide access to these higher-quality services, such as slums. Slums as defined by the United Nations' Human Settlements Programme (UN-Habitat) are living spaces be lacking in access to water or sanitation, living area, security of tenure, or durable housing (UN-Habitat 2007) In 2012, from 21% of urban residents in Latin America and the Caribbean, up to 62% of urban residents in Sub-Saharan Africa were living in slums (UN-Habitat 2013).

This high incidence of slum living can be partially attributed to the fact that much urban growth in the developing world currently takes place through informal settlements. The United Nations' Human Settlements Programme (UN-Habitat 2013) broadly defines an informal

settlement as 1) a residential area where a group of housing units has been constructed on land to which the occupants have no legal claim, or which they occupy illegally; and 2) an unplanned settlement or area where housing is not in compliance with current planning and building regulations (UN Habitat). Dr. Ariel Espino defines an informally constructed home as one that is constructed below formal construction standards, in a rapid, improvised manner using secondhand materials on land that is not legal property of the inhabitants (Espino 2015). Formal settlements can be characterized as being constructed by individuals or companies in accordance with existing planning and building norms and regulations, with services such as water, electricity, and sanitation, as well as property rights. On the other hand, informal settlements often lack property rights to the land, are deficient in basic services, do not follow building codes or zoning laws, and are self constructed. As such, informal settlements often begin as squatter settlements (Espino & Gordon 2015). While not all informal settlements lack services, and not all formal services provide adequate living, informal settlements are generally more precarious, and are often deemed as slums by UN-HABITAT (UN-HABITAT).

Informal settlements, like slums, are often lacking in crucial basic services such as safe drinking water, waste management, and sanitation. Living conditions such as these pose significant health risks as the population is exposed to a wide arrange of pathogens that often breed in households lacking in hygienic services, and food storage facilities. Basic cooking methods and burning of trash can result in overexposure to indoor pollution from smoke. Access to medical services is often limited, and the health risks to which pregnant women and infants are exposed to are higher. Overcrowding and lack of security can exacerbate issues with violence and drug use as well as other social issues (WHO). The development of informal settlements also creates challenges for the city relating to the environment and urban management, particularly the high cost of providing necessary services such as road infrastructure, potable water, garbage collection, and a sewage system.

The formation of informal settlements often happens through the process of *peripherization*. Peripherization occurs as urban poor, migrants from rural areas or urban residents pushed out of the city centre by gentrification processes are excluded from the formal housing market in the urban centre. For the purpose of this study, a household is considered to be excluded from the formal housing market if it is not able to afford the lowest price of formal housing available (Espino 2015). Instead, people seek out land or living spaces where

enforcement of property rights is weak, often public lands on the outskirts of the urban centre, and self-construct housing out of inexpensive materials - wooden board walls, zinc roofing (UN-Habitat 2013, Davis 2006, Gordón, personal communication).

In current housing discourse, slums and informal settlements are seen not as absolutely negative blights to be removed from the city-scape. Instead, they exist because they supply the high demand for affordable housing among the urban poor (Peattie, 1994). As early as the 1960s, John Turner first built the case through research in Lima, Peru, showing that shantytowns are one appropriate housing solution for the poor (Turner and Fichter 1972). There has been much work done to provide these settlements with basic services and improve the quality of life in informal settlements, including attempts to provide them legitimacy (Espino, 2015).

However, one negative aspect of urban growth through informal settlements is the fact that it is costly to supply infrastructure and provide services after-the-fact. Due to the lack of planning, it can cost up to three times as much (Espino & Gordon 2015) to supply services such as electricity, sanitation services, and roads after people informally settle. Furthermore, informally settled communities often do not plan areas for services that will be necessary as the community expands, these include schools, public spaces, police stations, etc. Because of these factors, providing better living standards to informal communities is a much less efficient use of state resources, and planning properly (providing affordable housing, sites and services, allocating adequate land) for increases in urban population growth, especially in terms of the poor, would be wiser (Davis 2006). This is especially important as given current projections, most of the urbanization that will happen in lower-middle-income countries will be in the form of informal settlements.

1.2 Informal Settlements in Panama

Panama today is an urbanized country: two-thirds of its population resides in urban centres. Its urban population doubled between 1990 and 2014 and is expected to double again by 2050 (World Urbanization Prospects Report 2014). The most important city in Panama is la Ciudad de Panamá (Panama City), where 1.4 million people reside in the metropolitan area, out of a national population of 3.8 million. Panama's rate of urbanization is now at moderate levels, at .4% yearly between 2010-2015. It is expected that by 2050, 77% of the population of Panama

will reside in urban areas (World Urbanization Prospects Report 2014). The historic centre of Panama City, Panama Viejo or Casco Viejo, was founded and settled in 1673, on a peninsula at the southwestern end of the current city.

Perhaps the most important feature of Panama City today, in terms of the city's economic as well as urban development, is the existence of the Panama canal. The protected canal zone, running south to north along the canal, and under the control of the United States until 1999, provided a significant barrier to urban development. As such, Panama City has seen successive waves of immigration, expanding first east away from the canal, then north along the road to Colón, and most recently west across the canal zone from the Casco Viejo (Espino, personal communication).

Settlement has happened through both formal and informal means in Panama city. Twenty three percent of the country's urban population lives in slums, as defined by UN-HABITAT (2005 UN-HABITAT streets report). Espino & Gordon (2015) estimate a much higher proportion of the population of Panama City that began living in informal settlements (44.7%), though this number is a high estimate as conditions improve over time. The amount of people living in slums is ostensibly due to the fact that this proportion of the population can not afford even the cheapest home on the formal market, further exacerbated by the fact that the government of Panama focuses its subsidies on middle-class homes. Furthermore, while these informal settlements are on the outskirts of the city, the major source of employment for people living in the periphery are in the centre of the city. With a lack of adequate public transportation, this leads to inordinate travel times for employment for an already marginalized population, with average commute times of 4 hours one-way reported (Espino et al. 2011).

1.3 Community of Greater Kuna Nega

Greater Kuna Nega is an informal settlement located about 15 kilometers north from the city, in the district of Ancón. There is some confusion in the public eye as to the demarcation of Kuna Nega; the name Kuna Nega is often used in the news and media to refer to the communities surrounding Kuna Nega proper, including the Valle de San Francisco, southeast of Kuna Nega, and La Paz to the north (personal communication, Alonso Martinez) while Kuna Nega as it is known to residents is a 18.5 hectare parcel of land independent of these three

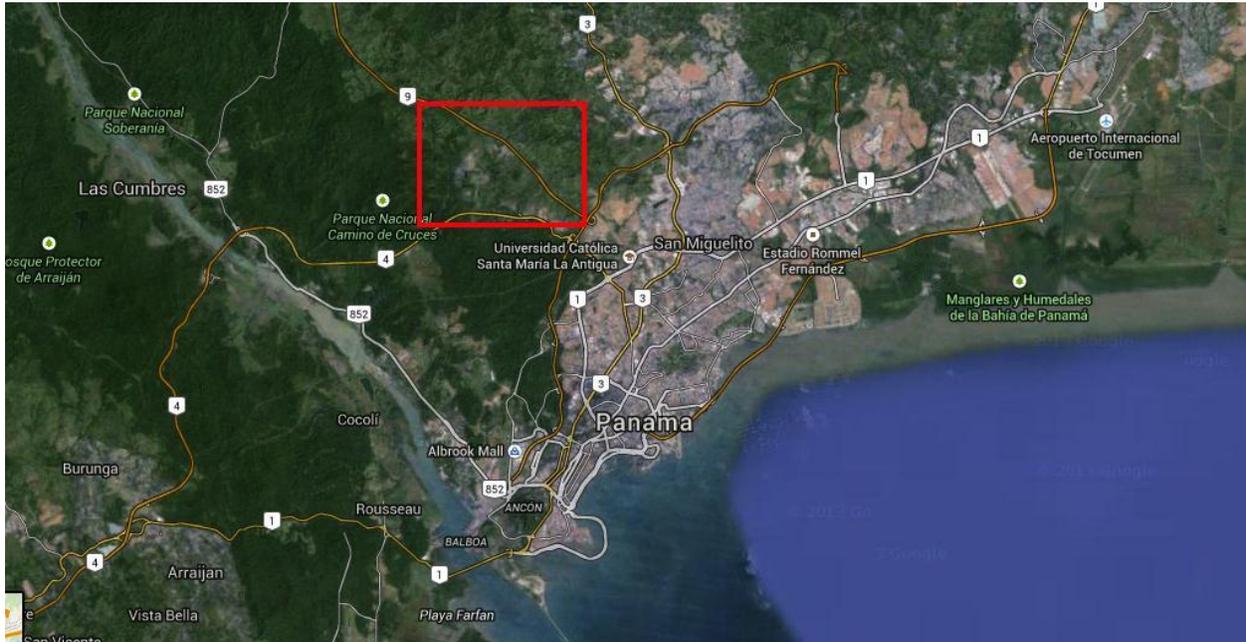
communities. In this paper, we use the term Kuna Nega to mean Kuna Nega proper (the 18.5 hectares), while the term *greater* Kuna Nega is used when referencing the three communities as a whole. Importantly, greater Kuna Nega is directly across (2km) from the city landfill on Cerro Patacón; the landfill was relocated to Cerro Patacón in 1987 after the establishment of Kuna Nega. A river, Río Mocambo, runs through Kuna Nega and the Valle de San Francisco. Kuna Nega is composed of Kuna families who have migrated from one of the Kuna *comarcas* or from other regions of Panama City, and is the largest settlement of Kuna outside of the San Blas Islands (Conn 2014).

The community of La Paz was constructed by the government in 2007 after a fire in the inner-city neighborhood of Curundú forced those whose homes were affected by the fire to relocate. The rate of migration from Curundú to La Paz then outpaced the government's provision of housing and services to the community, which resulted in the creation of self-made informal homes. La Paz today is a mix of formal and informal housing. The population of La Paz is predominantly made up of people of Latino and Afro-Creole background.

El Valle de San Francisco, south of Kuna Nega proper, is composed of three sectors. The first sector of San Francisco was informally built in the 2001 when the government evicted squatter households from Mocambo Abajo, at the western end of the *corregimiento* of San Miguelito (Bonilla 2006). The next two sectors are also informal settlements, with more recent arrivals. These two last sectors are comprised of more precarious housing, and their populations are growing the fastest. The population of San Francisco is composed of people coming from various regions of Panama, including other areas of the city, with a sizable indigenous Emberá population.

Figure 1 demonstrates the position of Greater Kuna Nega within the larger urban landscape of Panama City. While it is located relatively close to the city on the periphery, the parcel of land is undesirable due to its proximity to the municipal landfill. It is removed from the public transportation system as well as other amenities and benefits that come from living in a municipality. Figure 2 shows the parcel of uninhabited governmentally owned land in relation to Kuna Nega and Cerro Patacón that could potentially be used for a formal affordable housing development in the future.

Figure 1: Map of Kuna Nega in relation to Panama City



Source: Google Maps

Figure 2: Parcel of public land in relation to Kuna Nega



Transportation to Kuna Nega

Because of the lack of public transportation that reaches Kuna Nega, there exists a semi-formal system that has appeared. At the corner of the Transístmica and la Vía Fernández de Córdoba (accessible from Zona Norte Transístmica buses from Albrook), across the street from the Raenco store are taxis and buses that go back and forth between the corner and Kuna Nega. The taxis charge a fixed rate of 1\$/person at the time of this writing.

2. RESEARCH AIMS

This project aims to examine the spatial, temporal, and community dimensions of urban growth and informal settlements. The drivers and motivations behind the formation of informal settlements are generally well known, as stated previously. However, informal settlements in Panama City often appear and grow in a very short amount of time (Gordon, personal communication), and the process through which this happens is less well understood. In other words, while the ‘why’ of informal settlements is known, the ‘how’ of informal settlement establishment is less clear. There is a general lack of data and understanding regarding the actual formation and growth of informal settlements through time. These include tracing the growth of the community through time, the evolution of infrastructure including housing and roads, and understanding community and social dynamics that may be conducive to community establishment.

We approached this question from 2 facets, involving different scales of investigation. The first involves a larger-scale investigation of the development of settlements in general over the entire city over time. Categorized maps of urban settlements and roads of the greater metropolitan area of Panama City allow us to see where and when settlements appear, and in what way they form.

By mapping the growth of settlements and how they change in terms of formality, our project aims to provide visual and spatial context to the theme of urban growth in Panama City. Furthermore, these maps allow us to visualize changes in the nature of the settlements, that is, whether what started as informal settlements are today formal ones (the opposite transformation may also be true, such as when formal buildings are abandoned to squatting), as well as where

settlements have not formalized. A discussion of the reasons behind this change (or lack of change) may prove insightful in planning for future integration of informal settlements, as well as planning for continued urban peripherization.

The second facet of investigation focuses a smaller scale, and is based at the community-level. We conducted surveys in the community of greater Kuna Nega, as a case study of the history and social dynamics of informal settlements. These surveys provided context to how informal settlements form from the perspective of people living in them, and informed the following research questions: How do informal settlements form? Are there certain key actors who facilitate settlement, potentially through the sale of land either legally or illegally (“land pirates” (Espino, personal communication) or does settlement happen organically? What services exist and what services are lacking? What are the formal and informal social relations within an informal settlement, and how can these influence change in the community?

The answers to these questions provide context to the bottom-up influences of informal settlements, and allow us to see what people who are living in the community believe to be most important. Furthermore, they can point to what the on-the-ground realities of life are like in informal settlements, and show whether infrastructure and services are reaching all who live in the community. Given that informal settlements are rarely static and are almost always areas that see new arrivals of migrants (and as such are loci of urban growth), this information is useful for improved planning for new individuals and households, as well as the legitimization of tenure of current residents. Finally, as Dr. Espino through the Foro Urbano is particularly interested in providing planned, long-term, affordable housing to those who cannot afford other options, this study serves as a preliminary scoping exercise in assessing the present-day conditions in greater Kuna Nega. As there is still much public land around greater Kuna Nega Cerro Patacón that has not yet seen the arrival of informal settlers (yet slowly is being settled, as more people arrive), there is potential for planned projects to pre-emptively develop on this land, mitigating the costly post-settlement provision of services. Dr. Espino is interested in this avenue for greater Kuna Nega. Information collected here provides context and background in this regard.

3. METHODOLOGY

3.1 Mapping Urban Growth through Time

Digitized and geo-referenced aerial photographs of Panama City were obtained for the following years: 1972, 1980, and 1998. As well, a topographic map with housing delimited was available for the year 1960. Using these images in Quantum Geographic Information System (QGIS) software, housing areas were digitized and classified in terms of formality in new layer files. Classification was done based on data from the Foro Urbano providing the historic status of formality of the neighbourhood, and was also based on visual assessments of the distribution of the housing in each neighbourhood: generally, ordered and regularly spaced homes indicated a formal neighbourhood, while scattered homes, often without roads, indicated informality. Furthermore, by comparing the street network seen on each aerial photograph or map with a vector file of the present-day Panama City road network, we created new layer files of the street network for the four years.

Because the aerial photographs and the map covered different geographic extents of the city, in order to accurately assess and visualize changes in neighbourhoods and street, we focused our digitization on the area of the city east of the canal zone. This area was well-represented in each year's aerial photo or map. To note is that for the years 1980 & 1998, there were still a few gaps in the photos even when reduced to focus on the smaller area. In this case, we filled in these gaps with the previous year's data, on the assumption that what was already there would not have changed by the next time step. Evidently, this produces an under-estimate of the change that has happened, but was decided to be the best way to accurately stand in and reduce missing information

3.2 Kuna Nega Interviews

Structured interviews were held with 30 households equally distributed among the three communities of Kuna Nega, La Paz, and Valle de San Francisco. Semi-structured interviews were held with key members of the community; these included a founder of Kuna Nega, leaders of the respective community associations of La Paz and Valle de San Francisco, the community

police office, the director of the primary school, and the coordinator of Engineers Without Borders, an NGO operating actively within greater Kuna Nega. Sampling for the structured household interviews was based on opportunity sampling by going door-to-door and seeing who was available to talk. Care was taken to sample a variety of households, that is, aiming to cover the range of housing quality from formal to the most precarious, and covering a large geographic extent of all 3 communities. The structured interviews included 35 questions, and revolved around the themes listed in Table 1. Semi-structured interviews were similar, but focused more particularly on the specialty of knowledge of the key informant, for example, focusing on the history of the community in the case of the founders and community leaders. All interviews were conducted in compliance with the McGill University Protocol on the Ethical Conduct of Research. After presenting ourselves as student-researchers undertaking an internship, presenting the host organization, and its purpose in the community, we received oral consent from participants in the survey before proceeding.

Table 1. Structured Interview Themes Covered by Interviews in Kuna Nega

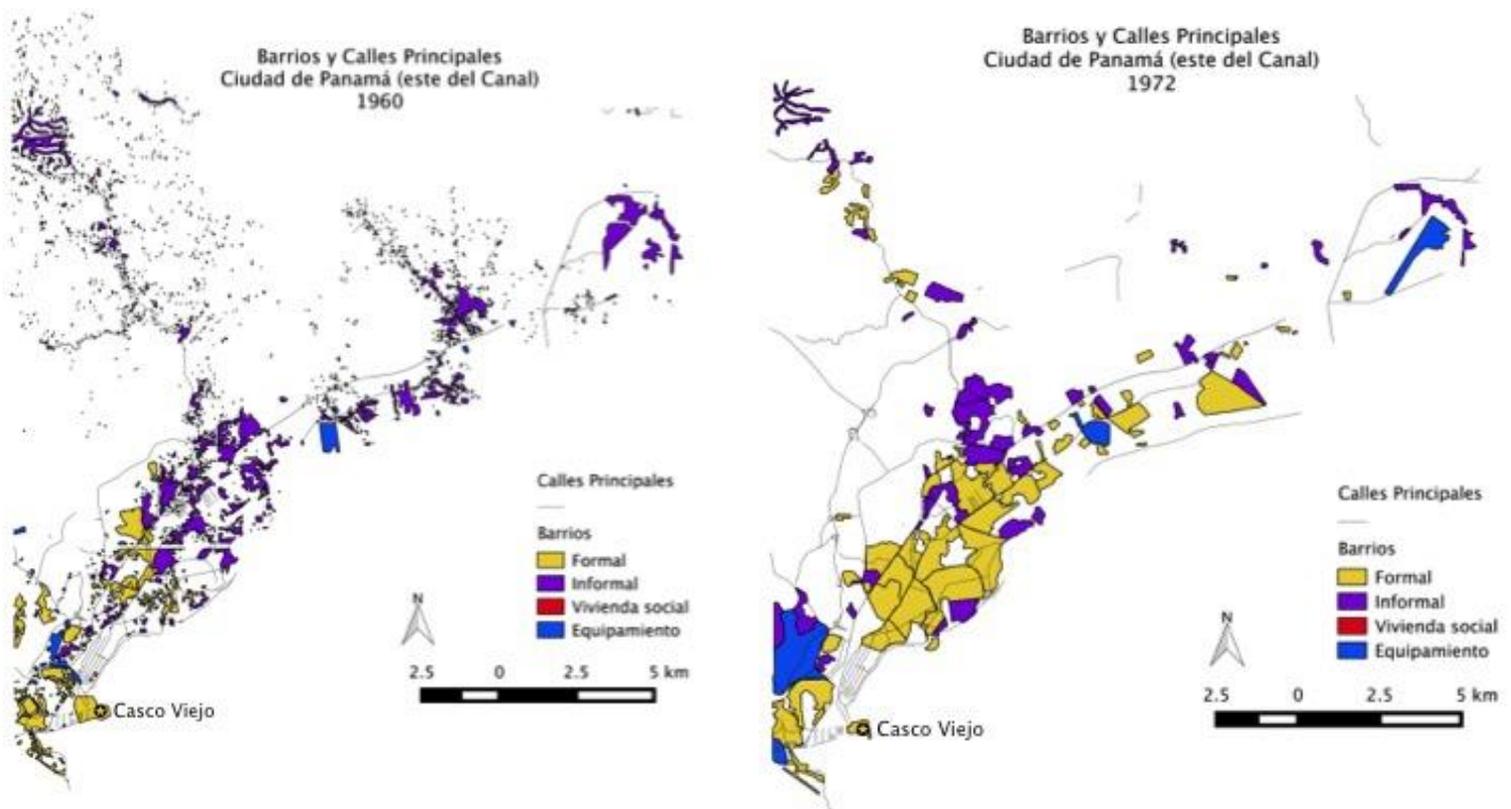
Categories of Questions	Details
History	Familial & Community - When & How they settled
Household Background	Family structure, education levels, employment
Health	Access to health services, environmental impacts
Community Dynamics	Community life, participation in community groups, interactions with & perceptions of the other communities in greater Kuna Nega, issues of crime
Future Aspirations	What is considered most important for the improvement of their family and the community

4. RESULTS & DISCUSSION

4.1 Urban Growth of Panama City - Mostly Unplanned

Neighbourhoods

The maps in Figure 3 provide a visual representation of the dynamics of urban growth in Panama City. We can see the process of peripherization at work, where informal settlements occur further away from the city centre. We can also see that over time, informal settlements closer to the centre end up becoming formalized, while new informal settlements appear or are pushed further out. For example, between 1960 and 1972, we see many of the informal settlements in the San Miguelito area become formalized, while new ones appear further out. Furthermore, between 1998 and 2014, we see informal settlements fill in many of the peripheral gaps.



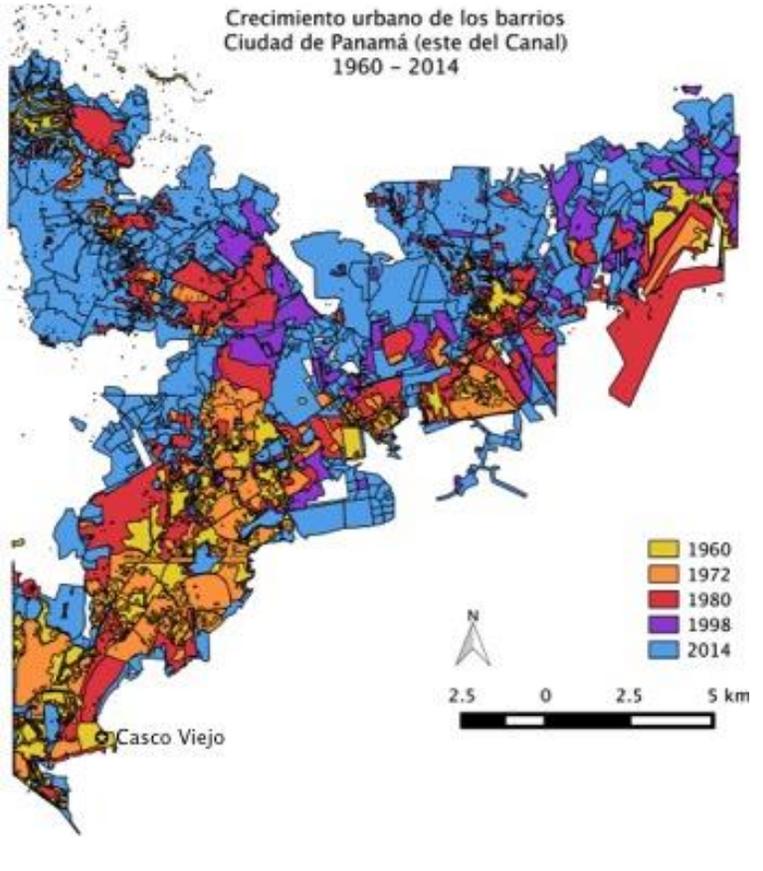
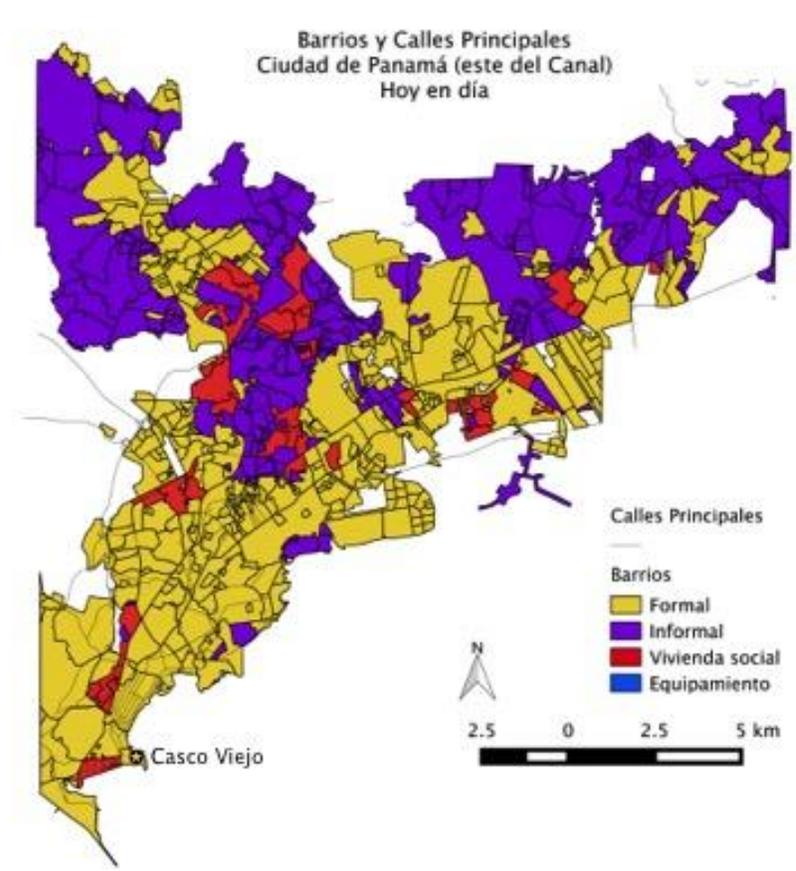
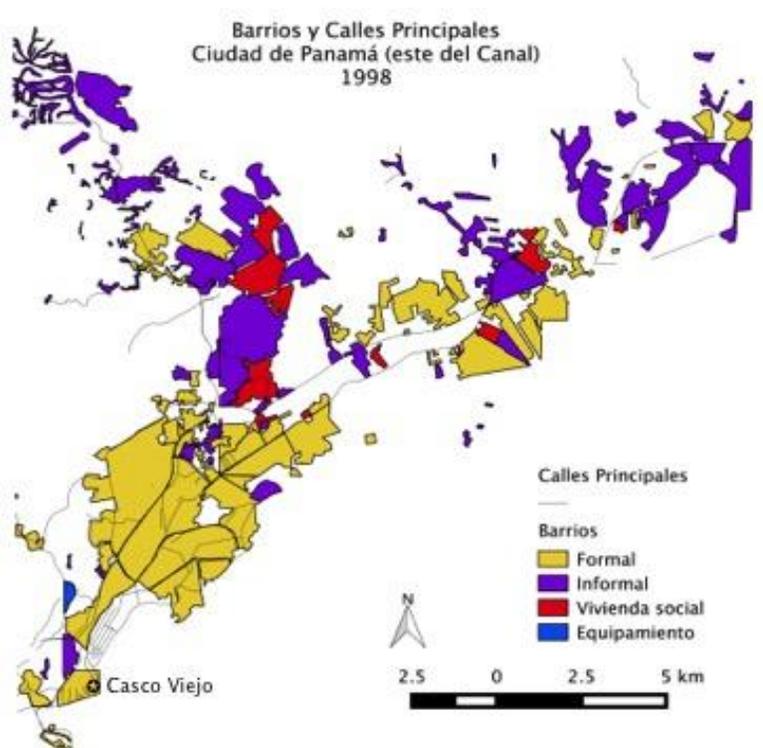
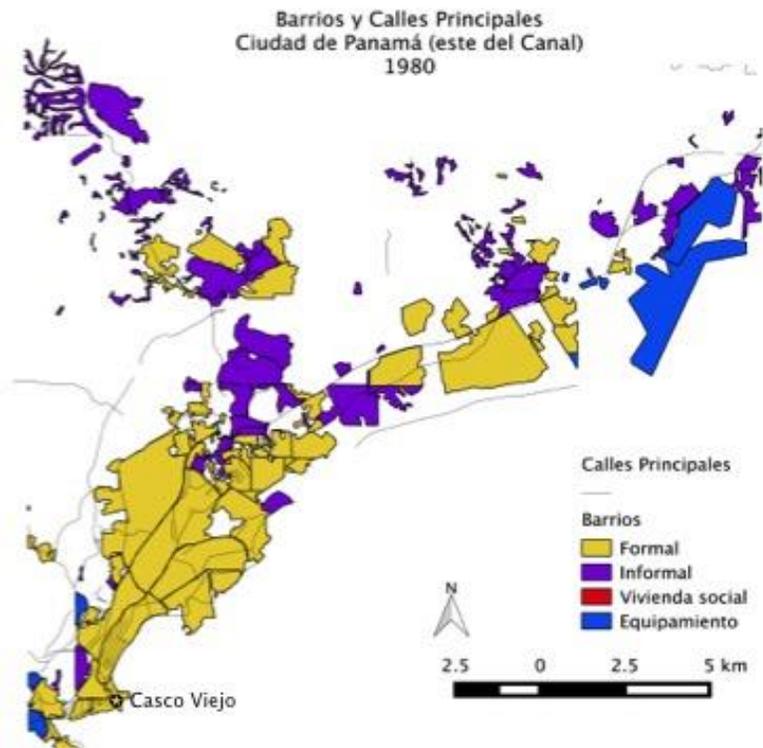


Figure 3. Maps of the settlements and main roads of Panama City in 1960, 1972, 1980, and 1998.

Table 1 shows the area of neighbourhoods that have been classified as either formal or informal settlements in these maps. While both formal and informal areas have grown significantly in area over the past 50 years, they haven't grown constantly. From 1960 to 1972 the amount of area dedicated to informal housing dropped, while the same happened for formal housing in 1998. The drop in area of informal housing between 1960 and 1972 corresponds visually to the change seen in the maps, where it appears that many of the informal neighbourhoods have been converted into formal ones. However, it is less intuitive as to why the amount of formal housing should decrease between 1980 and 1998, these may be methodological issues such as filling in gaps (1998 had the largest gaps in its aerial photos for the area, discussed more in section 4.4 Limitations). From the percentage values, we can see that while there has been much fluctuation in the past, especially the very high proportion of informal settlements in 1960 (methodological differences between the map of 1960 and the aerial photos of the rest of the years may again be a confounding factor), by 1998 the proportion of informal settlements is double the amount of slum households today as documented by UN-Habitat. A potential cause of this decrease from 1998 to today is that fact that in 1999, with the handover of the Panama Canal Zone, the country saw very high economic growth, potentially allowing it to raise standards of living and improve slum conditions.

Table 1. Area and percentage of informal and formal settlements in Panama City east of the canal zone for years 1960 - 1998

Areas (ha)	1960	1972	1980	1998
Formal	542 (30%)	2103 (68%)	4661 (70%)	3823 (57%)
Informal	1236 (70%)	994 (32%)	1955 (30%)	2848 (43%)

Streets

Maps of the street network (Fig. 4) allow us to see the disorderly way in which neighbourhoods have appeared in Panama City. In almost all cases in the 4 years studied here street development is due to neighbourhood creation, as these are very closely tied.

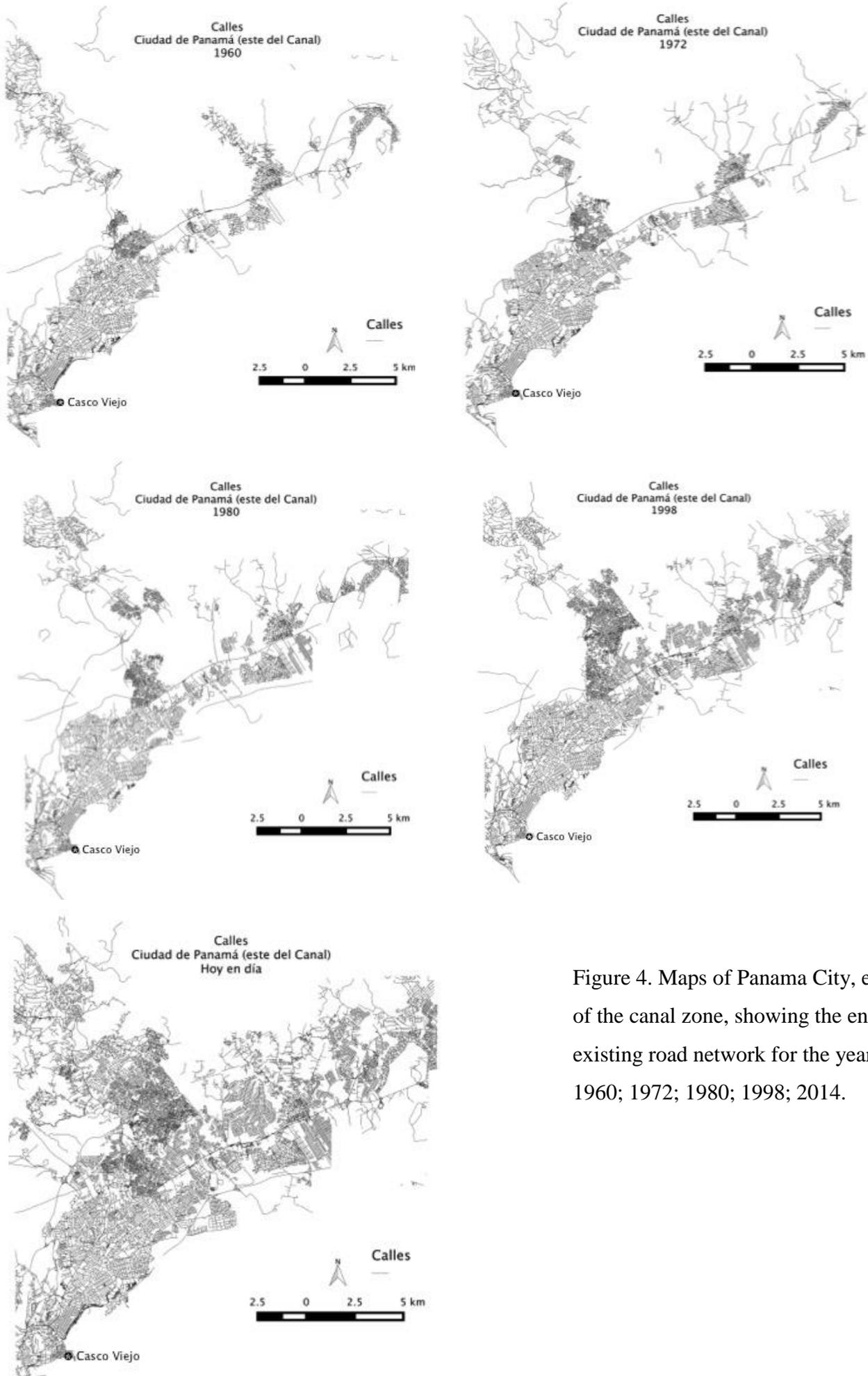


Figure 4. Maps of Panama City, east of the canal zone, showing the entire existing road network for the years 1960; 1972; 1980; 1998; 2014.

As such, we can see many neighbourhoods in the maps where street networks have either grown in an expansive fashion from one street connected to a main road, or otherwise filled in empty spaces between two main roads (Fig. 5). However, this unplanned apparition of streets, with many unplanned dead ends, yet another facet of informality, has consequences for the people living there. Poor street connectivity hinders the provision of basic services and infrastructure development, and reduces available transportation for residents (UN-Habitat). Furthermore, in the formally developed areas that show up through the years such as Figure 6, we can see that the streets are more regularly spaced, and uniformly created. However, the hierarchical model on which these are based (planning that directs suburban cul-de-sac streets all towards a main city thoroughfare) favours transportation by automobile, and increases congestion on main city roads (UN-Habitat).

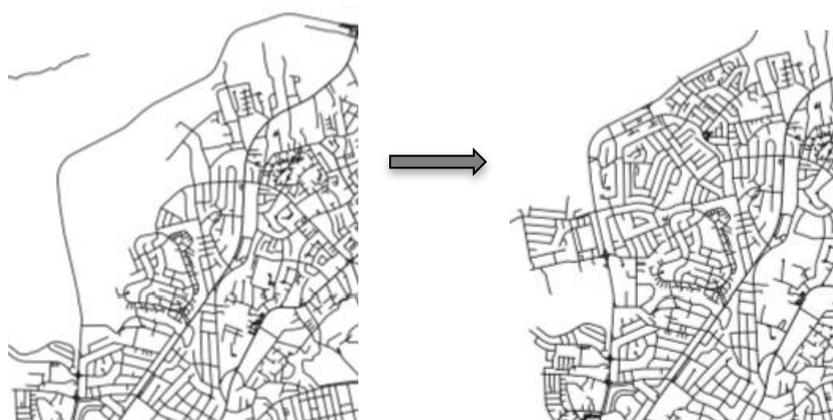


Figure 5. Example of street network expanding in an unplanned manner, filling in empty spaces, 1960 – 1972.

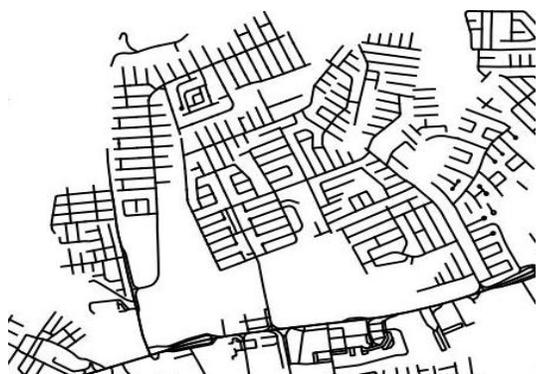


Figure 6. Example of hierarchical development of urban growth (suburban roads) with little connection to main thoroughfare road to the south

4.2 Kuna Nega

Community Origins

Kuna Nega proper is now currently inhabited by around 250 households, with houses of about 200 square meters in size. It was founded on June 20, 1980 by a group of seven Kuna women who had migrated to Panama City from Kuna Yala. Andrea Mendoza, one of the seven founders, cited her principal motivation for settling in Kuna Nega as wanting ownership over her own land instead of having to pay a high rent for unsatisfactory living conditions. As a lower income resident of Panama City, her family had been excluded from the formal housing market and was forced to enter into informal rental agreements. The land that is now Kuna Nega was completely uninhabited and the municipal landfill, Cerro Patacón, did not exist at the time. President Illueca formalized the Kuna establishment in 1984 by granting the Association of Kuna Nega title to a 18.5 hectare parcel of land.

The community of La Paz was formed under the Ministry of Housing's Project Genesis with the purpose of relocating families displaced by the 2007 fire in the inner-city neighborhood of Curundú. The funding covered the construction of houses on 200-square meter lots over a total land area of 12 hectares located north of Kuna Nega. The residents were responsible for paying a subsidised rate of \$2 per square meter to receive the title to the land (La Prensa 2013). Since the initial migration of Curundú residents in 2008, the area of La Paz has greatly expanded and a large portion of the occupants live in self-built houses on the hill between formal La Paz and Cerro Patacón. While the original government-provided houses are about 250 square meters in size, the informal self-built houses are generally smaller, with homes as small as around 50 square meters. The population of La Paz is estimated to have grown to be 700 residents composing approximately 150 households and occupies 15 hectares of land.



Image 1. Formally constructed housing in La Paz.

El Valle de San Francisco was first settled by families who were relocated from Mocambo Abajo, a community located 12 kilometres away in the direction of the city. The government evicted the inhabitants in order to construct two primary schools, a cemetery, and an extension to the campus of the Regional University of Panama. The evicted inhabitants of Mocambo Abajo previously had the right to occupy Mocambo Abajo under the Agrarian Reform of 1977 established by the Ministry of Agricultural Development. However, in 2001, the director of the Ministry of Housing claimed that the houses were built outside the boundary of this reform and that the houses in Valle de San Francisco were already built for the families to be relocated (Bonillo 2006). The Ministry of Housing promised title to 450-square meter lots in the Valle de San Francisco, including electricity, trash collection, and water services for each house (Ginebra 2000). None of these provisions have been fully met by the Ministry of Housing. Of the three communities, San Francisco is the largest as it currently occupies 38 hectares, with an estimated population of 3,000 people, and has the fastest rate of growth. San Francisco is broken into three sectors; Sector I includes the initial settlers from Mocambo Abajo, Sector II is a second wave of inhabitants, and Sector III consists of the most recently constructed houses. The size of housing here also ranges, with some of the original inhabitants in sector 1 owning homes made of concrete and of size comparable to those in Kuna Nega and La Paz, while the most precarious homes may be no larger than a small room.



Image 2. Precarious housing on the hillside of Valle de San Francisco.

Cerro Patacón

The Panama City Metropolitan Waste Authority, the Dirección Metropolitana de Aseo (DIMA), is in charge of trash collection and processing in the districts of Panama, San Miguelito, and Colón. Cerro Patacón is the official municipal landfill to which all the garbage collected is sent and processed. Located northeast of Panama City, the landfill began operation in 1987. The plot of land is 162 hectares bordered by Camino de Cruces National Park and Kuna Nega, La Paz, and Valle de San Francisco. Trash collection service is reported to be unreliable and infrequent in certain regions. This is trend particularly common to informal settlements where the road network is haphazard or non-existent and does not permit the passage of garbage collection trucks.

While the trash dump was designed to be a modern day sanitation facility, it has taken on the characteristics of an open dump since it's opening. Such characteristics include the infrequent covering of the garbage when it is meant to be covered daily, the failure to prevent large-scale uncontrollable fires, and the permitted entrance of informal recyclers (Linowes and Hupert 2006). The landfill is currently in its third stage of operation; five more hectares of land will be added over five years to accommodate three million tons of trash. On average, the landfill receives 2,200 tons of garbage daily.

Although the Ministry of Health established sanitary standards of operation for the treatment of waste in landfills in 2004, a treatment system was not established by the landfill operator, Urbalia, until 2013. Until this point, leachate (contaminated liquid-solid material formed from the mixture of waste and precipitation) was temporarily held in three storage ponds.

As the leachate ponds filled with waste, the operator was forced to look into a treatment solution (Soto 2014). A study conducted in a landfill in Nigeria showed that in bodies of water close in proximity to landfill leachate ponds there is an elevated alkalinity, acidity, hardness, and biochemical oxygen demand, leading to large changes to the composition of the body of water. Importantly, the concentration of heavy metals is drastically increased and is indicative of potential health hazards to humans and the environment exposed to the water (Farombi et al 2012). Urbalia's treatment system, intended to mitigate the effects of the trash dump on the environment, was put in place 29 years after the opening of Cerro Patacón. Therefore, both the air and water in Río Mocambo surrounding Cerro Patacón may already be highly contaminated. The system includes a plant to process the leachate and an incinerator to burn hospital waste (Aponte 2014). Throughout our interview process, it was common to see open fires on the trash dump and the resulting smoke and ash reaching the communities.

Scavenging and recycling has become a key component of the economy of greater Kuna Nega. The majority of the self built houses are initially constructed using recycled material such as sheets of metal and pieces of wood found in the landfill. Scavenging recyclables and reselling them also serves as a livelihood to inhabitants of the informal settlements. Under the definition of a sanitary landfill, however, scavenging is prohibited (Linowes and Hupert 2006). Recycled materials are collected and purchased in large quantities by different buyers that pass along the Carretera a Cerro Patacón. One family interviewed reported that in previous years it was common that a family would go to the trash dump to find food, construction materials, clothing, footwear, and other household materials because scavenging was previously unregulated. Currently however, the operators of Cerro Patacón only allow a certain amount of people into the dump each day, and recyclers are required to pay a small fee of \$1 per day. A case study of scavenger cooperatives in developing country urban slums shows that such a livelihood can increase the income of a cooperative's members, raise standards of living, improve working conditions, and encourage grassroots development (Medina 2000). While recycling can be a viable option as a source of income for unemployed lower income families, there are negative health and social effects associated with the livelihood activity. A study on the occupational risks of informal recyclers in Santo André, Brazil found that there is an elevated rate of physical injury and social exclusion among scavengers. The study broke described physical injury such as cuts and fractures, chemical illness such as respiratory illness, biological infections, as well as social

ramifications including exclusion, marginalization, malnourishment, lack of education, and lack of training (Gutberlet and Baeder 2008).

In addition to the health issues posed to scavengers, the close proximity of the communities to the landfill raises health concerns for all inhabitants of greater Kuna Nega. Community members reported throat and skin issues as a result of the burning of trash on Cerro Patacón.

There has been a history of uncontrollable fires on the landfill causing a great degree of harm to the surrounding communities. In 1998 there was a fire that lasted 9 days, which emitted noxious fumes and caused 25 people to go to the emergency room (Linowes and Hupert 2006). In March 2013, a large fire raged for five days causing panic about health and environmental impacts throughout the entire city, as the smoke from the landfill was detected as far away as Bogotá, Colombia. It was also cited that nine individuals from the communities surrounding Cerro Patacón with preexisting respiratory conditions experienced breathing complications due to the smoke from the fire (Campagna 2013).

Some residents of Greater Kuna Nega are outwardly opposed to the existence of the Cerro Patacón landfill.



Image 3. Proximity to Cerro Patacón taken from the border between Kuna Nega and La Paz.

When DIMA announced the landfill would enter into its third stage of operation, the people of the surrounding region blocked the highway to Cerro Patacón in protest. Although Urbalia claims that it has periodic meetings with the surrounding communities, the

founder of Kuna Nega recalled that nobody in the community was consulted before the construction of the landfill, and the community disapproval of the landfill is not taken into account in decision-making.

Infrastructure and Services

When the founders settled in Kuna Nega, the parcel of land was forest, with the founding members of Kuna Nega recruiting groups each day to clear the land by machete. The landfill was not there nor were there roads that accessed the land. The infrastructure has slowly evolved since the time of settlement. The road, which is now known as ‘corredor de los marginales’ (Ana Lorena 2015), was built in the early 1990s. The route provides Kuna Nega access to the city, bridges two sections of Río Mocambo that were impassable during certain months of the year, and creates a heavy flow of traffic through the community. Many people who live outside Panama City use the route to commute to and from their day jobs - this has spurred complaints from the residents, who cite the increase in traffic accidents.

The Panama branch of Engineers Without Borders (EWB) headed by Riziero Montieri has played an important role in the provision of services to Greater Kuna Nega since 2010. Previously, the government had installed a 15,000-gallon water reserve tank and a distribution system to serve the smaller community of Kuna Nega. Before the arrival of EWB, the reserve tank was abandoned and the distribution system was damaged (Riziero Montieri, personal communication). Many houses did not receive any water, while others received water a few days a week. Over the past five years, Montieri has installed 3 additional water tanks and a distribution system so that water arrives to each house. EWB is now looking to develop a grey-water treatment system because currently there is no sewage system and the population uses self-constructed latrines. UN-Habitat previously put in septic tanks for individual houses but the cost of servicing them was so high they became overfilled and were therefore abandoned. Montieri is beginning construction of septic tanks big enough to serve 4-5 households so that costs are reasonable. This plan is in its initial phases of implementation. All houses have access to electricity and costs are aggregated for the entire community and then split evenly among the households. Fees are paid monthly to the association.

The majority of the existing infrastructure was paid for and constructed by the association and the community members. The main road through Kuna Nega was paved in the early 1990s

and the school building was built in 1997 once the bridge over Río Mocambo was constructed. The police station and the association buildings were built when the community was first settled. The construction of the formal sector of La Paz included the provision of essential services to the formally-built houses including a sewage system that empties into a septic tank. The septic tank, however, has not been serviced and frequently overflows, with the waste seeping into the surrounding land. The formally constructed houses have electricity and running water (although water is only provided 2 days per week). When water does not come from the water tank, the Instituto de Acueductos y Alcantarillados Nacionale (IDAAN, the national public services provider) brings water by truck to fill communal 55-gallon buckets of water for each household to individually collect. Inhabitants then carry the water back to the household for washing, cooking, and consumption purposes. In March of 2015, IDAAN installed a 25,000 gallon water tank to service the community of La Paz and its current extension as new houses are being constructed to the north, though this water tank is at the time of writing of this report not yet functioning. Residents report paying between \$30-\$40/month for electricity depending on usage. The water distribution system does not reach all of the households in La Paz, namely those houses most recently constructed located on the hillside closer to Cerro Patacón.

When asked what the most needed service for the community was, residents' responses included: a reliable water distribution system, increased operation and capacity of the health clinic, a sewage system, an expansion of the secondary school, improved security and transportation.

El Valle de San Francisco is arguably the most lacking in services. Apart from a portion of the houses in Sector I, none of the households have reliable running water. Many of the houses have water pipes connecting to a water storage tank, but the provision of water is rare and sporadic. Water is provided on an irregular basis by the same IDAAN trucks.



Image 4. 55-gallon water buckets where IDAAN trucks bring water in el Valle de San Francisco.

Even when this water is supposed to be clean, residents report that as the water in the buckets sits and stagnates, it becomes less potable, with reports of parasites and gastrointestinal problems common. When the water supply runs out, families are forced to get water from a well or from the river, both of which are considered by the people themselves to be contaminated. The households of the newest and most vulnerable sector often bathe in the river. Sector III is also in a flood zone, which is lacking in any form of a drainage system. During the rainy season of each year many houses are destroyed and families are forced to relocate and then return when the flooding subsides.

Montieri has just begun the initial phases of surveying for implementation of a water storage and distribution system in San Francisco. There is no sewage system in the community and households use self constructed latrines as in Kuna Nega and much of La Paz. Apart from a few houses in Sector I, the majority of households do not have access to electricity. The evolution of housing construction material is visible across the sectors of the community. The most established houses found in Sector I are made of cement and have zinc roofs, while the most recently constructed homes in Sector III are made of a variety of materials including wood and metal sheets and are often precariously situated on the hillside or in the valley.

Social Dynamics & Social Services

The Association of Kuna Nega is the most established and self-organized governing structure of the three communities and has reached out to the surrounding communities to attend meetings regarding common issues. However, our understanding is that La Paz and Valle de San Francisco have not attended these meetings. It is unclear whether this is due to unwillingness or lack of adequate communication on either side. As is stands, Kuna Nega is fairly insulated, and engages in little communication and relation with its neighboring communities. In general, people from Kuna Nega have a negative perception of people from La Paz and San Francisco. Interaction between the 3 communities centers on the primary school, the police station, and the health clinic, which serve Greater Kuna Nega.

The current school was constructed 18 years ago by the community. The director of the school, Catalino Lopez, is faced with handling the cultural diversity among the students and their parents (there are Kuna, Ngöbé, Emberá, Afro-Creole, Latino), and emphasizes the importance of respect among groups. The curriculum is in Spanish and English. His greatest concern is for a lack of attendance at school. He states that Kuna Nega is unique in that the communities and families do not place enough importance and priority on education – sometimes a family will “arbitrarily” choose to pull their child out of school for a year. Annual cost of school is relatively minimal; it is \$7.50 for the first child and \$1 for every additional child. With this, students receive school materials (pens, paper, notebooks, uniforms, backpacks), which is made possible by the funding received from the Ministry of Education, MEDUCA.

Health issues are common in the community due to the close proximity of the landfill, contaminated water, and lack of a sanitary sewage system. There is a health center that is lacking in equipment, capacity and personnel. It is supposedly open two days of the week, but was not open any days of the week that we were conducting interviews, and the lack of reliable opening times was also stated to be an important issue by more than half of the people in each community. When the health center is not open, people need to look for medical care in the city, which can take a long time to access; transportation is expensive if it is an emergency. Ambulances often take a long time to reach the community and sometimes do not come at all.

Crime is perceived as an issue amongst all three communities. A few interviewees cited that gang activity was forming in La Paz and already exists in San Francisco. When asked what type of petty crime was most common, most reported armed robbery, which is oftentimes

committed by adolescent males. A few hot spots for robberies are the main road in Kuna Nega and the bridge linking Kuna Nega and La Paz during nighttime hours. Violence rates have been reported to have risen with the increased traffic on the Carretera to Cerro Patacón. However, people from La Paz perceive the overall crime rate in Greater Kuna Nega to be much lower than that of the inner city, whether they came from Curundú, San Miguelito, or other parts of the city. The police station located in Kuna Nega serves the three communities as well as Cerro Patacón, Villa Cardenas, Mocambo Abajo, and the baseball stadium. Three groups of five police officers rotate shifts. According to one police officer, the most pressing issues within the communities are undocumented people, domestic violence, robbery, and homicide. Perpetrators are commonly male minors who rob cell phones and wallets using knives and, occasionally, guns. The officer cited a need for more police staff and equipment in order to properly patrol the assigned communities. The police communicate directly with the Association of Kuna Nega, leaders of La Paz and San Francisco, as well as the Catholic Church to monitor crime within the communities. The station has the strongest ties with Kuna Nega.

Common occupations of the residents of Greater Kuna Nega interviewed include taxi driver, security employee, construction worker, city maintenance (such as maintaining parks), store clerk, and street vendor. Most people work in Panama City and commute on the unofficial buses that travel from Kuna Nega to the Transistmica, which connects to the city's transportation system.

Weekend and leisure activities remain separated by community. Most interviewees belonged to either the Catholic or Evangelical Church, however, there are multiple different churches observed throughout each community. Many community leisure and weekend activities are coordinated through each respective church. Some community members reported having no strict affiliation with either church and instead alternated between churches. The Catholic Church provides an avenue for integration between communities because there is only one Catholic Church shared between La Paz and Kuna Nega. Although communities remain separate at large, intermarriage among the younger generation is becoming more common. Issues between and within families and communities have resulted from this. For example, there was a couple (a Kuna woman and a man of Afro-Creole descent) that had to move to La Paz from Kuna Nega because of issues that had arisen in the family. On the other hand, work often brings people of

the three distinct communities together. One man who worked in construction/public maintenance mentioned having friends in the neighboring communities.

Governance

The parcel of land was officially granted to the founders of Kuna Nega by President Jorge Illueca in 1984. According to Andrea Mendoza, the Association of Kuna Nega has not had a particularly good relationship with any one of the government administrations since the founding. For the most part, the association is in contact with the mayoral office and the delegate of the district of Ancón. The association is hopeful because the current mayor's office appears more willing than most to give financial assistance to Kuna Nega. Their contact is the alderman, Ivan Vasquez. According to Montieri, this is possibly because he has previously helped the association with projects and has been efficient in providing resources.

Internal governing structures in Kuna Nega are strong. The Association was formed initially among the founders and their husbands to plan and organize themselves. They originally tried to replicate the system of congress that exists in the *comarca* with *sailas* but it suited the community better to govern through the association. The association is in charge of all community matters, from collecting fees such as water, trash collection, electricity to providing loans and construction of houses to new inhabitants. There is an internal tribunal, the *tribunal del pueblo*, whose members are elected at the general assembly, which deals with internal disputes and small crimes. Punishments usually take the form of fines or community service requirements.

All those living in Kuna Nega pay membership fees and in return receive benefits. For example, when a member dies, the family receives a lump sum of money. Apart from constant meetings held throughout the year, all the members of the association meet for a general assembly once a year to review the current issues of the community, vote on new measures, vote on new leadership, and raise personal concerns. Important to note is that the Association decides on who can live in Kuna Nega; you must be of Kuna descent or marry into a Kuna family in order to be granted the right to land and communal benefits in Kuna Nega. At this point in time, because land has become limited, the association is now restricting new land titles to children of families already established in Kuna Nega.

Valle de San Francisco has had informal community organization in the past but internal divisions and lack of participation have led to its dissolution on various occasions. Montieri and certain community members are promoting the formation of an association along to be recognized by Vasquez in order to advocate for the provision of services that were promised by the government such as title to the land, water, and garbage collection. He has been aiding community members in coordinating meetings to discuss issues facing the community. At these meetings, attendance is taken in order to show the mayoral office that there is support and a need for formal recognition of the association by the government. The association is currently in the process of establishing leadership. La Paz has a committee that is led by three members of the community. Like San Francisco, it is recently formed and has not had many meetings besides establishing leadership by vote of the community. They currently are limited in capacity to organizing the projects that are taking place within La Paz.

When asked whether collaboration among the leaders of the communities to mount a mutually beneficial political front, all community leaders said it could be possible but since there is so little communication it would be difficult to coordinate. Both Valle de San Francisco and La Paz reported attending periodic meetings at the Association of Kuna Nega but for the most part, communication between the three communities is minimal.

4.3 Implications

As the urban landscape of Panama City has expanded over time, informal settlements such as Greater Kuna Nega have appeared on the peripheries of the city. With more migration, if the city continues to grow in the unplanned manner demonstrated in the maps, these informal settlements may continue expanding. As people migrate to the city and are excluded from the formal housing market, informal housing construction becomes the only choice. As this phenomenon persists, the provision of basic services such as public transportation, potable water, sewage disposal, trash collection, health services, and ownership of land will become more difficult and costly for the state to undertake.

This challenge has harsh ramifications for the people living in informal settlements. Isolation from the urban landscape and the provision of government services leads to marginalization and inequity. As stated, when communities are removed from the formal

network of public transportation, the commute to work is longer and more expensive. While acute and chronic health conditions arise from environmentally hazardous practices (such as burning trash), health services are difficult to access. Narrow dirt roads often do not permit the passage of fire trucks or ambulances in the case of an emergency. The existence and conditions of informal settlements result in the marginalization of a large portion of society, and was in full evidence in Kuna Nega.

As the maps show a large prevalence of informal settlements, we can assume that the conditions of Kuna Nega are not isolated to the community, but are associated with a greater pattern of urban growth in Panama City. By showing the historic growth of informality through time, maps allow us to project and pinpoint the areas that are still growing, or that may become new areas of informal growth. The information that this study provides can support a policy that targets planning for the arrival of migrants. The information collected in the Kuna Nega case study can also serve to better inform planning policy and future improvement of informal settlements.

While many of the challenges typical to informal settlements are present in Greater Kuna Nega, the community of Kuna Nega is also an exception. It is an example of how varied informal settlements can be in terms of ethnicity, background, conditions and social cohesion. Self-organization and governance under the Association of Kuna Nega has proven to be an effective method in confronting issues and challenges faced associated with the lower standards of living of the community. For example, the association allocates land, extends loans, and facilitates cement-housing construction for new community members by recruiting community volunteer work. As new inhabitants do not have enough savings to invest in construction materials, this process allows them to skip over the initial phases of precarious construction, and provides durable, well-established homes. Furthermore, the *tribunal del pueblo* serves as a community dispute settlement mechanism, helping to compensate for what the understaffed police force lacks in capacity. The leadership holds members accountable to contributing membership fees, donations and time to the operation of the community, and provides support (monetary and labour) for services such as installing aqueducts. Strong community cohesion in an informal settlement like Kuna Nega can serve to mitigate the pattern of social exclusion. Self organization creates the conditions necessary for mounting political pressure or demanding completion of

promises made by the government, and can be a model for other marginalized communities facing similar exclusion.

The parcel of land has served the government as a type of escape valve for the relocation of displaced people. Government services were promised during the community formation but were often abandoned or neglected later on. A future development plan of the uninhabited government land around Kuna Nega would need to address and improve the management of the Cerro Patacón facility as well as investigate and address the impacts on the health and environment of the surrounding area.

4.4 Limitations & Next Steps

GIS

Limitations to the mapping aspect of this project included the fact that aerial photos were not available for many parts of the city, especially those of the most peripheral areas where most recent growth is happening. Smaller holes in the photos (in 1980 and 1998) were corrected by filling them in with previous years' data; this leads to underestimates of the amount of change in our maps. Furthermore, when categorizing, with a lack of historical data on all areas, there was uncertainty in visual categorization of the neighbourhoods as being formal or informal, and this can lead to discrepancies in the final results as well.

Kuna Nega

Time was limited and we were not able to reach a significant portion of the population of Greater Kuna Nega. We were able to conduct 10 interviews in each community as well as key community actors. As foreigners to the community by appearance, it is possible that people were hesitant to offer certain information to us perhaps suspecting that we were affiliated with either the government or another company. A further limitation was the language barrier presented particularly in Kuna Nega where many of the elders spoke little to no Spanish and communicated solely in Kuna. A large portion of information was missed when we attended the General Assembly of the Association of Kuna Nega because the majority of the conversation among members took place in Kuna. Finally, the demographic of people that we were able to reach with through our sampling process may have been limited to those who remain in the household most

of the time. Many of the men with full time jobs were not around to be interviewed on either the weekdays or the weekends. While this was a limiting factor in who we spoke to as a representative of each household, most of our information needs were met.

Next Steps

The spatial data we have produced in this project will be useful for the Foro in terms of understanding the historic basis of urban development in Panama City. Because of time and technical constraints, more in-depth analysis of the mapping was not done, but easily can be in the future. For instance, UN-Habitat, in its report *Streets as Public Spaces And Drivers of Urban Prosperity* (2013), calculates indices of street connectivity, fragmentation, density, etc. that inform the quality of the street network. Furthermore, with more historical spatial data, such as incomes, education levels, and services, these maps can be useful in placing informality in a larger context.

In Kuna Nega, as we have established reliable contacts in all three communities of Greater Kuna Nega, future incorporation into the internship or field study semester as a whole may be mutually beneficial to the students, the continued study under the Foro Observatorio, and the communities. The social dynamics of GKN are quite unique as a result of the close proximity of diverse ethnic groups who experience similar experiences of marginalization, yet deal with these in different ways. The module presented by Dr. Ariel Espino to PFSS incorporates field study in the formal settlement of San Miguelito that began as an informal settlement. A day of field study in Greater Kuna Nega (especially Sector III of San Francisco) could provide context of the current conditions typical to informal settlements as well as the evolution of the quality of housing construction as it is constantly improved over time. If interaction with Greater Kuna Nega could be incorporated into the internship with el Observatorio Urbano, further internship work may be worthwhile. As the school is a meeting point of all cultures present, some sort of brief educational program (based on environmental or health aspects) could serve as a way to probe the potential of increased communication, interaction, and collaboration among the three communities; the director of the school is very keen in this aspect. A long-term field study in Greater Kuna Nega could provide a relevant source of information to el Observatorio Urbano as it could track an individual case study in the growth and evolution of informal settlements over

time. The information collected for this study could serve as a baseline for a long-term project that could involve community participation in collecting research.

5. CONCLUSION

The future of urban growth of Panama City will be shaped by the extent of government attention to the phenomenon, in addressing not only the housing deficit but also the informal conditions of a large portion of the current urban landscape. The Rio +20 Conference in June 2012 addressed the future of population growth in the form of slums and informal settlements throughout the world and especially developing countries. The resulting consensus known as the ‘Future We Want’ acknowledged that cities have the potential to be a vehicle in moving toward an economically, socially, and environmentally sustainable society and that this necessitates a holistic policy approach to urban planning and management (United Nations 2012).

This study highlights how informal settlements in Panama City are no exception and have been a persistent and sustained phenomenon in its urban growth. As such, there is a need for overarching policy that is inclusive and aims to improve the conditions of the informal settlements that exist today. There may be room for community-based action as well: the political organization of Kuna Nega proper described in this study may serve as a model for informal settlements to self-organize.

It is also necessary to be cognizant of the fact that informal settlements in Panama City will continue to proliferate as long as the formal market is inaccessible to the urban poor. Planning of affordable housing in areas that would otherwise be settled informally may be key to improving living conditions in an efficient manner.

Finally, it is important that future research and study focus on informal origins of housing and community development rather than centering research around the current conditions and whether or not they are classified as ‘slums’. In order to prevent the persistence of slums, forward looking policy must pre-emptively the formation of informal settlements by providing viable alternatives for the low-income portion of the population.

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Appendices

A. Ethics Certificates

<p>PANEL ON RESEARCH ETHICS <small>Navigating the ethics of human research</small></p> <p>TCPS 2: CORE</p> <p><i>Certificate of Completion</i></p> <p><i>This document certifies that</i></p> <p>David Chen</p> <p><i>has completed the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE)</i></p> <p>Date of Issue: 3 January, 2015</p>	<p>PANEL ON RESEARCH ETHICS <small>Navigating the ethics of human research</small></p> <p>TCPS 2: CORE</p> <p><i>Certificate of Completion</i></p> <p><i>This document certifies that</i></p> <p>Sophie Kronk</p> <p><i>has completed the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE)</i></p> <p>Date of Issue: 4 January, 2015</p>
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