

MIGRATION AND URBAN INFRASTRUCTURE SERVICES

THE IMPACT OF INTERNAL MIGRATION AND URBAN
GROWTH ON INFRASTRUCTURE SERVICES IN
TRUJILLO, PERU

R.M. JOBSE – MARCH 2008

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PREFACE

To be sure, working on my research project for my MSc thesis Technology and Policy has been a great experience. I learned valuable lessons, and improved my skills greatly. I have become better at making choices, collecting and analysing data and writing down what becomes obvious. I am happy with the result, and can say that this research project is a great ending of my studies. In this, my supervisors Aurora, Henny, Synara, Annelies, Roberto, and of course Eddy have been of great help. Thanks for your insightful comments and remarks, probing questions and useful tips.

Doing research in Peru taught me how to adjust myself to a culture where professional and social contacts are intertwined. For my pleasant experiences in Trujillo, I have a great many people to thank. The people from UPAO that gave me the support and freedom to do my own research. Thanks also to the many professionals that were willing to be interviewed, local presidents that were dedicated to improving their neighbourhoods and those living in harsh conditions and still found time to respond to the survey. Finally, living with the family of Sra Marieta and other students provided welcome distractions.

With the completion of this thesis, my studies in Eindhoven come to an end too. Studying Technology and Policy (MSc) and Innovation Sciences (BSc) at the Eindhoven University of Technology has shaped me considerably. Thanks you to all those that contribute to the high standard of education and research, including all the support staff. Also, thanks to the professors of the University of Pretoria (South Africa), where I spent my international semester.

During my studies, I have undertaken many extracurricular activities. Working with the students and staff of the University Committee Technology for Development (TvO) was always exciting and rewarding. Those that founded this committee inspired me with their passion for development issues, and my involvement with TvO has proven to be a worthwhile experience. Working with Studium Generale, the Battle of the Universities, Intermate and many others has been rewarding.

The unconditional support from my friends and family has helped me much more than I could describe here. Ria, Kees, Linah, Agata, Gertjan, Yvonne, and Alain, thanks for being my family. To my friends Alexander, Maarten, Marten, Paul and others; thanks for being such cool friends. Thank you also to all my friends from Zierikzee, the JBL168, the K-gang, Peru, South Africa and elsewhere. Your friendship has been a pleasant addition to my life as a student and helped me inexplicably with my thesis.

Finally, the proofreading and language skills contributed by my partner Lesego have been invaluable to the finished work. Her support and presence in my life make me look forward to all that will begin after graduating.

Robbert Marinus Jobse
Eindhoven, March 2008

EXECUTIVE SUMMARY - ENGLISH

This MSc thesis analyses the impact of internal migration and urban growth on the infrastructure services in the poor urban areas of Trujillo, Peru. The main focus is on the most recent settlements along the borders of the city. The study is based on a combination of secondary data and primary data collection. In total, 240 household surveys are carried out in three neighbourhoods of Trujillo (El Milagro sector VII, La Esperanza Nueva Jerusalén, and Alto Trujillo Barrio 2B). The infrastructure services considered are water, sanitation, electricity, telecommunication and solid waste disposal.

The research is structured via a framework, in which the availability and quality of infrastructure services is the outcome. Two processes influence this outcome; the process of migration and settlement, and the process of the delivery of these services. These processes are interdependent, and are influenced by other elements. The process of migration and settlement is influenced by the incoming migrants and the non-migrant population. The process of delivering infrastructure services is influenced by the characteristics of the stakeholders, and the non-migrant population.

The expectations based on the literature were that migration puts an immense strain on infrastructure services in urban areas and results in a further deterioration of infrastructure. However, the eventual findings of the study do not confirm these expectations. The coverage of infrastructure services in Trujillo has increased, and the growth of the poor parts of the city due to migration and internal growth has not led to a decline of the services provided. However, problems remain as long as intermediary service provision solutions are used, such as water supply by tricycles. These are typically used from the moment of settlement until the final infrastructure services are installed. In spite of increasing coverage, improving infrastructure services remains one of the highest priorities of the respondents of the survey.

Migration towards Trujillo remains a significant factor to the population growth of Trujillo. Most inhabitants of Trujillo are born in Trujillo or the surrounding area. This is also the case in the recent poor neighbourhoods, that continue to expand at the borders of the city. In these neighbourhoods final infrastructure services are typically provided as the last step in the settlement process. The electricity and telecommunication services are provided rapidly, whereas the installation of the public water and sewerage system takes up to ten years. Intermediary solutions are of poor quality, and especially water is barely affordable. The greatest problems are the lack of sanitation facilities and with solid waste disposal.

There are large differences in the quality of the provided infrastructure services in the recent neighbourhoods. The services offered to supply water are diverse, as many intermediary solutions exist. High prices and limited availability are the main problems. Concerning sanitation, the intermediary solutions used are of poor quality, and no collective action is taken to improve this. Solid waste is often dumped in the open field that is used for sanitation. Collecting of household waste is scarce and infrequent. The telecommunication services expanded rapidly, where new technological developments and price reductions led to increased coverage and improved service. The service providers have a positive impact on the coverage of infrastructure services, by extending the net and implementing new technologies.

The provincial authority coordinates the expansion of the urban area of Trujillo, and provides plots of land and security of tenure rapidly. The local municipalities seldom coordinate processes of neighbourhood improvement, and do not make use of their potential for improving the collection of household waste. The increased involvement of NGOs can speed up this process of obtaining and improving infrastructure services in the poor expansions of the city. Overall, an increase of the exchanging of information between actors is desirable.

RESÚMEN EJECUTIVO - SPANISH

La presente investigación analiza los impactos de la migración interna, el crecimiento urbano y la consiguiente demanda de infraestructura de servicios en áreas urbanas marginales de la ciudad de Trujillo, Perú. El estudio que se centra en los asentamientos humanos que se ubican al borde de la periferia norte de la ciudad se basa en una combinación de datos recolectados tanto de fuentes primarias como de fuentes secundarias. En total se realizaron 240 encuestas a hogares de los siguientes barrios: El Milagro sector VII, La Esperanza - Nueva Jerusalén, y Alto Trujillo - Barrio 2B. La infraestructura de servicios básicos y de saneamiento considerados son agua, desagüe y alcantarillado; electricidad, telecomunicaciones y disposición final de residuos sólidos.

La investigación esta estructurada bajo un marco teórico metodológico orientado a obtener como resultados la disponibilidad y calidad de la infraestructura de servicios. Dos procesos son considerados como influyentes en la obtención de estos resultados: el proceso de migración y asentamiento humano, y el proceso de abastecimiento y dotación de los servicios básicos y de saneamiento. Estos procesos son interdependientes y están sujetos a la influencia de factores externos. El proceso de migración y asentamiento humano esta influenciado por los flujos de población migrante y no migrante; mientras que el proceso de abastecimiento y dotación de los servicios básicos y de saneamiento esta influenciado por las características de los actores clave involucrados en el proceso y la población no migrante.

Los servicios básicos y de saneamiento se ha incrementado y el crecimiento acelerado de los asentamientos humanos más pobres de la ciudad debido a la migración y crecimiento interno contribuye al incremento de la provisión de servicios. Sin embargo, aun prevalecen los problemas debido a la existencia de alternativas de provisión de servicio a través de “intermediarios” como la dotación de agua realizada por tricicleros. Este tipo de provisión es utilizada típicamente durante todo el proceso de consolidación urbana: desde el inicio y conformación del asentamiento humano mayormente por procesos informales de ocupación del suelo como invasiones urbanas, hasta la instalación final de infraestructura de servicios. A pesar del incremento en la cobertura de servicios, la mejora de la infraestructura de servicios permanece como una de las prioridades de los encuestados.

La migración hacia la ciudad de Trujillo prevalece como factor significativo del crecimiento poblacional de la ciudad. La mayoría de habitantes de Trujillo han nacido en la ciudad o en sus alrededores. Este también es el caso de los barrios marginales que continúan expandiéndose en los bordes de la ciudad. En estos barrios, la implementación final de la infraestructura de servicios constituye la fase final en el proceso de asentamiento. La dotación de los servicios de electricidad y comunicaciones se caracterizan por una provisión e implementación rápida, mientras la instalación de agua, desagüe y alcantarillado toma aproximadamente diez años. Soluciones intermedias son de pobre calidad y especialmente el acceso al agua es bastante inaccesible por su alto costo. El mayor problema se presenta en saneamiento y la disposición final de servicios básicos.

Se pueden apreciar grandes diferencias entre la calidad de la provisión de la infraestructura de servicios en los barrios marginales mas recientes. Los servicios de provisión de agua son diversos y existen muchas alternativas de solución por intermediarios. Los altos precios y la limitada

disponibilidad son el principal problema. Con respecto al saneamiento, las soluciones intermedias utilizadas son de muy baja calidad y no existen acciones colectivas para mejorar esta situación. Los residuos sólidos son frecuentemente arrojados en las áreas destinadas a saneamiento. La recolección de los residuos sólidos domésticos es limitada y poco frecuente. Los servicios de telecomunicación se vienen expandiendo rápidamente, donde el desarrollo tecnológico y la reducción de precios contribuyen al incremento de cobertura y a la mejora del servicio. Los proveedores del servicio tienen impactos positivos en la cobertura de la infraestructura de servicios por medio de la expansión de redes y la implementación de nuevas tecnologías.

La autoridad municipal provincial coordina la expansión urbana de la ciudad y provee lotes urbanos y seguridad de la tenencia y propiedad de manera rápida con fines de formalización y saneamiento físico legal. Sin embargo, el gobierno local difícilmente coordina procesos de mejora de los barrios y asentamientos humanos marginales y no se utiliza su potencial y potestades jurídicas para atender estas demandas poblacionales. Uno de los ejemplos más visibles es la limitada recolección de residuos sólidos que es responsabilidad municipal. El involucramiento de organizaciones no gubernamentales podría acelerar el proceso de provisión y mejora de la infraestructura de servicios básicos y de saneamiento en las zonas más pobres de la ciudad. Finalmente, el intercambio de información entre los actores involucrados en estos procesos es deseable.

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COMPACT DISC

The compact disc contains digital versions of the main document, the appendices, and the raw data of the surveys. See compact disc for details.

LIST OF ABBREVIATIONS

AH	Human Settlement (<i>Asentamiento Humano</i>)
AAHH	Human Settlements (<i>Asentamientos Humanos</i>)
BUM	Marginal Urban Neighbourhoods (<i>Barrios Urbanos Marginales</i>)
COFOPRI	Formalisation Organisation of Informal Property (<i>Organismo de Formalización de la Propiedad Informal</i>)
CEPAL	<i>Comisión Económico para América Latina y el Caribe</i> (Spanish abbr.)
ECLAC	Economic Commission for Latin American countries and the Caribbean
ENAHO	National Household Survey (<i>Encuesta Nacional de Hogares</i>)
EPS	Service Providing Company (<i>Empresas Prestadoras de Servicios</i>)
FONAVI	National Housing Fond (<i>Fondo Nacional de Vivienda</i>)
IADB	Inter American Development Bank
INEI	National Institute of Statistics and Information (<i>Instituto Nacional de Estadística e Informática</i>)
MEM	Ministry of Energy and Mining (<i>Ministerio de Energía y Minas</i>)
MPT	Provincial Municipality of Trujillo (<i>Municipalidad Prnovincial de Trujillo</i>)
MTC	Ministry of Transport and Communication (<i>Ministerio de Transporte y Comunicaciones</i>)
MVCS	Ministry of Housing, Construction and Reconstruction (<i>Ministerio de Vivienda, Construcción y Saneamiento</i>)
NGO	Non Governmental Organisation
OSIPTEL	Supervising Authority of Private Investments in Telecommunications (<i>Organismo Supervisor de Inversión Privada en Telecomunicaciones</i>)
OSINERGMIN	Supervising Authority of Investments in Energy and Mining (<i>Organismo Supervisor de la Inversión de Energía y Minería</i>)
P.E. PLANDEMETRU	Development Project Metropolitan Area of Trujillo (<i>Proyecto Especial Plan de Desarrollo Metropolitano</i>)
PJ	Young Town (<i>Pueblo Joven</i>)
PPJJ	Young Towns (<i>Pueblos Jovenes</i>)
PNF	National Formalisation Plan (<i>Plan Nacional de Formalización</i>)
PPI	Private Participation in Infrastructure
PPP	Public Private Partnership
PSP	Private Sector Participation
SEDALIB SA	Water and Sanitation Providor La Libertad (<i>Servicio de Agua Potable y Alcantarillado de La Libertad</i>)
SUNASS	National Supervising Authority of Sanitation Services (<i>Superintendencia Nacional de Servicios de Saneamiento</i>)
TU/e	Eindhoven University of Technology
UNFPA	United Nations Population Fund
UN-Habitat	United Nations Human Settlements Programme
UPAO	Private University Antenor Orrego (<i>Universidad Privada Antenor Orrego</i>)

1 INTRODUCTION

1.1 RESEARCH OBJECTIVE

Most Latin American countries have reached a very high level of urbanisation, differing from less than half of the population in Belize, Honduras and El Salvador by more than 90 percent in Uruguay, Venezuela and Argentina¹ (ECLAC, 2006). In part the high rate of urbanisation is due to the natural growth of the Latin American metropolitan cities, in part due to rural-urban migration. Though the relative share of the population growth of the cities due to migration has fallen, it remains a relevant portion of the total growth of these cities.

The population growth of the Latin American cities has put strain on the cities' resources. Combined with large differences in the access to these resources and high income inequality (e.g. CIA, 2006), population growth has led to the existence of well-off neighbourhoods, entire poor suburbs constructed with corrugated iron sheets and everything in-between. Different cities show different characteristics (especially concerning the city centre), but the existence of slum areas is widespread in the Latin American metropolitan areas. About 32% of the urban population of Latin American and the Caribbean are slum dwellers (UN-Habitat, 2003b).

It is obvious that access to basic services for the urban poor is inadequate in most, if not all developing countries. Though access to infrastructure services such as water, sanitation, transport and telecommunications has increased considerably over the last two decades in Latin America as a whole (Calderón and Servén, 2004), it is still not omnipresent and poor urban regions are disproportionately affected. Moreover, the quality of infrastructure services is generally poor in urban areas, and the informational requirements to make an appropriate choice are much higher than in rural areas. (Fay, 2005)

Given these considerations, the objective of this research is to:

“Analyze the impact of contemporary migration of the urban and rural poor on the quantity and quality of urban infrastructure services in Trujillo, Peru.”

The corresponding normative objective of this research is to:

“Give recommendations to NGOs and local authorities to improve the delivery of infrastructure services to the urban poor in Trujillo, Peru.”

1.2 RESEARCH QUESTIONS

The following research question has been formulated:

“What is the impact of contemporary migration of the urban and rural poor on the quantity and quality of urban infrastructure services in the newly settled areas of Trujillo, Peru?”

This question is broken down in five sub question:

1. *“What is the size and direction of the migrations flows in the metropolitan area of Trujillo?”*

The migration flows in Trujillo are quantified. The focus of this research is on incoming migrants. Their actual number and location of settlement are put in perspective by analysing developments and the natural growth of the metropolitan area.

2. *“What are the characteristics of the migrants and their settlements in the poor urban areas?”*

The characteristics of the settlers and the urban poor provide insights to the variety of those living in the urban area. From this, relations between these characteristics and the delivery of infrastructure services can be found. Furthermore, their reasons for migrating and types of settlement in specific poor urban areas are determined to understand the process of settlement.

3. *“Which infrastructure services and in what quantities and qualities are delivered within the poor urban areas of Trujillo?”*

The actual status concerning the delivery (or lack of) of the services is evaluated. Detailed information is collected on the different qualitative aspects of the delivery in the various fields concerning infrastructure services.

4. *“How does the process of obtaining by and delivering infrastructure services to the urban poor take place?”*

The process of the delivery of infrastructure services is relevant to the understanding of the successes and failures of improving the situation of the settlers. The obtaining of infrastructure focuses on how the urban poor gain access to these services. This part of the research thus deals with the different actors involved in the process of service delivery: the actual behaviour of the migrants, the role of private institutions, public institutions and non-profit organisations.

5. *“What links exist between migration, migrants’ characteristics, infrastructure services and the process of delivery of these services?”*

The links between the four elements described in the former questions are studied to understand not just the elements, but their interactions as well. This includes a quantitative analysis, combined with insights in the qualitative aspects of these linkages.

1.3 SCIENTIFIC RELEVANCE

Though migration into the urban centres contributes only to part of the total population growth, it is an important aspect that has not been sufficiently examined. Not only are the characteristics of the migrants unclear, but also their origin is poorly covered in literature². Some scholars claim that rural-urban migration is overly covered, and that more research is needed on medium-sized and smaller urban centres (Lindert and Verkoren, 1997). However, rural-urban migration might be under-estimated due to misreporting by respondents, because of status or identification issues (Bilsborrow, 1998). Furthermore, the answer to the first research sub-question might provide information useful for the presumably important role of those urban centres. Finally,

seasonalmigration seems to be poorly covered in the existing literature, especially in conjunction with the delivery of infrastructure services.

There is a lack of statistics on internal migration in developing countries in general. This is especially the case for the inter-census periods. Therefore, the determinants and consequences of internal migration as well as its links with the development of the urban area and human living conditions are not completely understood. Such data should be collected via specialised migration surveys (Bilsborrow, 1998), as has been done in this research project.

Independent research can provide valuable insights into the strategies of the urban poor obtaining infrastructure services. This is desirable, since the institutes carrying out the bulk of the research have a major stake in policy and decision-making. Thereby, an information bias can occur in their research and data collection, and scientifically relevant findings might be overlooked.

Finally, this research focuses on the use of infrastructure services by migrants and the urban poor and the way stakeholders deal with the delivery of these services. The knowledge and strategies of those settling in poor urban areas are taken into account. The lack of inclusion of the stakes of the urban poor in the decision making process might be a major reason for the inadequate obtaining of services. New research to understand these processes is vital as the interaction underlying the delivery of infrastructure services have changed due to privatisation. Currently, research on the impact of the liberalisation of utilities in Latin America is being carried out on a large scale, mainly by large international agencies such as the Inter American Development Bank (IADB) and The World Bank. Their focus is mainly at the national level and on the functioning of the macro economy. Insights into the strategies adopted by the urban poor in the era of privatisation are yet to be developed. This research examines the strategies adopted by both users and suppliers, and thereby bridges the gap between various areas of research on migration, social interactions and infrastructure delivery.

This research is expected to contribute to the above, and to provide insights to the strategies adopted by the different parties. The outcome of this research is expected to give an overview of the existing situation in Peru, with specific focus on Trujillo and findings at neighbourhood level. This research fills a large existing gap in the literature on the linkages between migration and infrastructure service delivery. The current situation regarding the urban poor will thereby be understood better, which in turn will help improve the effectiveness of future policies and interventions to be implemented.

1.4 SOCIAL RELEVANCE

The urban poor in developing countries are living under harsh conditions. They lack basic services or receive poor quality services of fresh water, basic sanitation and electricity. Such services are especially lacking in the poor urban areas, where there is urban growth and a relatively large migration inflow. The way the urban poor deal with the difficulty of obtaining services can be expected to be partly case-specific, so that in-dept information such as that provided by this research can lead to immediate implementation by local institutions and contribute to improvements in the situation of these urban poor.

The poor provision of infrastructure services has a negative impact on the economy of the city, region or country. Not only does the lack of basic infrastructure services lead to an unhealthy working population and thereby low levels of productivity, it can also mean that the required economies of scale are not met, and that provision becomes an expensive undertaking for companies and governments. The lack of access to telecommunication services has a negative impact on the functioning of the market, as it leads to imperfect information.

The processes of privatisation of infrastructure services have only recently been undertaken in many developing countries. Experiences with governments withdrawing or changing their role are nowadays occurring widely. The need for policy makers to have some kind of best-practice is therefore apparent. This research on Peru and Trujillo will provide some of the necessary information desired by policy makers dealing with this issue. The information from this thesis will not only be valuable for those dealing with Latin America, but can provide suggestions and information useful in other developing regions as well.

Ultimately, the social relevance of this project depends on the actual implementation of the results. I expect it to have a positive impact on the situation in Trujillo and possibly other growing Peruvian cities. The research is carried out independent of NGOs and government, at the University Privada Antenor Orrego. This university operates in close collaboration with local agencies and the public authorities. Furthermore, the final document of the thesis will be made publicly available at the library of the Eindhoven University of Technology and on-line.

2 THEORETICAL BACKGROUND

2.1 MIGRATION

2.2.1 MIGRATION CLASSIFIED

There are two main types of migration; internal migration (within a country) and international migration. This research deals with internal migration only, as this contribute most to the migration towards Latin American cities.

Concerning internal migration, four types of migration are generally distinguished, based on the distinction between rural and urban areas. These are rural-urban, rural-rural, urban-urban and urban-rural migration. Since the 1950s, the focus in the existing research on Latin America has been on rural-urban and to lesser extent on rural-rural migration. More recently, several authors plead for new typologies that include either a more gradual distinction between different areas or typologies showing more than just one dimension (Champion and Hugo, 2004). Other scholars argue that more attention on the specific role of small cities in the process of urbanisation is necessary to understand the interdependence between rural and urban areas (Lindert and Verkoren, 1997).

Other types of migration often distinguished include return migration, seasonal migration, circular migration and sequential migration. These types of migration are based on different characteristics, such as the work pattern of employees, or their pattern of migration over their life. They provide necessary additional information for the understanding of migration patterns, but are often more difficult to research, as these require specifically collected survey data rather than census data.

So far, the term migration has been used without further specification. In general terms, it refers to the longer term movements of people from one place of living to another. It includes four dimensions; space, residence, time and activity changes. These dimensions can be interpreted differently, so that the use of term migration can be a source of ambiguity (Standing, 1984). Nonetheless, the term migration has become the dominant concept used when dealing with the long term processes of mobility of people, and the use of different terms would increase complexity and ambiguity even more, since no standards have been developed in the use of them. As different sources and data sets are used, caution in comparing them is required. Thus understanding the specific definitions and variables used is required to interpret the information.

2.2.2 THEORIES ON MIGRATION

An early attempt to systematically generate laws for rural-urban migration was made by Ravenstein, in the year 1885. His work presented at the Royal Statistical Society can be summarized in the following laws; most migrants move over a short distance, and the number of migrations decreases proportionally with distance (i), migrants moving long distances generally move to large centres of industry and commerce, there is a step-by-step migratory process whose influence emanates from the largest cities (ii), each migration stream produces a compensating counter-stream (iii), natives of towns and cities are less migratory compared to rural natives (iv), females predominate amongst short-distance migrants (v), technological development stimulates migration

(vi), and the desire to 'better oneself' is more influential on migration than the flows created by laws, taxation, climate, social surrounding, etc (vii). As Butterworth and Chance notice, publications till the 1950s often see migration as a force independent of people, since they hardly address the reasons for migration (Butterworth and Chance, 1981, pp. 33-40).

The approach of push and pull factors provides an easy understandable framework for an analysis of the causes of migration. This was initially developed by Lee in 1966, and was based on the above described Ravenstein's Laws (Oberai and Bilsborrow, 1984). Certain advantages and disadvantages are assumed to be related to one's location. Being constantly exposed to this wide variety of pushing and pulling forces has an impact on the decision of individuals and groups to stay or migrate. Of course, these forces are relevant via the perception of those staying or moving towards the city ('bright light syndrome'). The information depends thus on perception, rather than a complete analysis in which all information is available and rationally analysed. Thus, the push and pull factors are weighed and perceived differently from person to person. Nonetheless, rural-urban migration has shown to be a result of a number of re-appearing elements.

The above indicates that an analysis of a wide variety of aspects is necessary to understand and explain migration flows. Such an integrated approach is contrasted by contributions from economist, who claim and to some extent have shown that labour and income are at least amongst most important variables. Before continuing on the various characteristics of migrants, it is useful to get a grasp of the models used by influential migration economists.

2.2.4 ECONOMICS OF MIGRATION

Throughout the last decades, economists have been dealing with causes and impact of migration. Though the purely economical approach may not be sufficient to explain the whole process, they did contribute to the debate by introducing models which can be verified in the real world. In this section the two most influential models, as developed by Lewis (1954) and Todaro (1969), are discussed, and followed by more recent findings on economic aspects of migration.

In his essay '*Economic development with unlimited supplies of labour*' (Lewis, 1954), Lewis presents a classical model with a dual economy and unlimited supply of labour at subsistence level. The dual economy consists of a modern exchange sector (industrializing urban areas), and an indigenous subsistence sector (rural areas). The unlimited supply of labour is caused by large population growth combined with diminishing returns on labour in agriculture. Therefore, labour comes available and will partly be absorbed by the industrial sector at wages above the subsistence wage. If capitalists reinvest their surplus, then capital formation takes place and the marginal product curve will shift upwards. This leads to higher outputs at the same wages, and is considered the essence of the development process. Since there is a relation between the earnings in industrial and subsistence sector, capitalists have an interest in keeping down productivity in the subsistence sector. (Thirlwall, 2003)

This model of interaction in a two-sector economy is specifically interesting, as it provides us with background on the behaviour of industry and individuals in the case of unlimited supply of labour. Also, he elaborates on the circumstances under which the tendency towards diminishing returns and zero marginal product¹ is not always the case. In an open economy, this can be due to; a rise in the productivity larger than the population growth (i), technical progress in the agricultural sector

increasing the labour's marginal product (ii) and via capital accumulation leading either directly to productivity growth or via technical progress (iii) (Lewis, 1954). Hence, technical progress plays an important role not only as an engine for increased employment in the industrial sector, but also as a reason for change in the supply of labour. Thereby, the levels of technology used influence the migration flows from the subsistence to the industrial sector.

After Lewis, important contributions to the economics of migration come from Sjaastad and Todaro. The Sjaastad model treats the decision to migrate as an investment involving an individual's expected costs and returns over time. (Oberai and Bilsborrow, 1984) The work of Sjaastad has been followed by works of Harris and Todaro. The Todaro model is an extension of the idea of cost and investment returns, and leads to various important conclusions. This model on rural-urban migration explains how an increase in urban employment may lead to a higher level of urban unemployment, under certain circumstances. The basic model by Todaro was first published in 1969, and later adjusted by many different scholars. Here it is useful to discuss the basic model, rather than all the extended versions.

In the Todaro-model, the decision to migrate depends on two principal variables; the urban-rural real income differential (i) and the probability of obtaining an urban job (ii). The urban-rural income differential has an impact as can be expected, with increase in rural income leading to a decline in the rural-urban migration, and vice versa. More interesting is the model's derivation concerning the probability of obtaining an urban job; paradoxically, the net rate of job creation is positively related to the level of unemployment. Thus; policies intending to create employment in the urban areas will result in increased rural-urban migration and more urban unemployment. Finally, Todaro mentions that a high difference in income between rural and urban areas might lead to large migration flows. Eventually reduced migration will take place, as a new income equilibrium is established. By then, many migrants will have ended up in slums. (Todaro, 1969)

The Harris-Todaro model has some serious theoretical oversimplifications, among which the overestimation of the link between migration and urban unemployment. Importantly, the model leaves out some important aspects of the heterogeneity of the migrants, such as risk aversion and differing situations in the rural areas. Also, the subsistence sector has not explicitly been modelled, the job hiring model is not realistic and the wages are assumed to be fixed. Finally, and most important for this study, is the notion that expected income differentials are assumed overly important, and other aspects of migration decisions overlooked. Combined, this leads to the conclusion that the link between migration and urban unemployment has not been clearly established. (Lall, Selod and Shalizi, 2006)

On a more general note; it is important to notice that there are some problematic aspects to migration studies. Concerning econometric studies, nominal wages are insufficient as a measure of income. Wage differentials and personal characteristics do not provide sufficient information for modelling of the migration decision process. (Lall, Selod and Shalizi, 2006, pp. 53-55) This is illustrated by a study on the costs of living. Here, the prices of land and services matter, as the non-food component of the cost of living has increased heavily in the 1970s. The nominal wage gap between urban and rural areas increased over time due to land scarcity in the city. This suggests that policies towards the urban settlements and social overhead are important in the migration decision of individuals (Williamson, 1988)

The household survival theory is a model that includes risk at the household level to explain migration. Instead of focussing on the individual decision, this theory sees migration as a way to maximize the chances of survival of the whole household by diversification of sources of income. This strategy is particularly used in case of an uncertain environment, when risks of crop failure, illness and external events are likely. The consequence on migration is that the migrants retain close ties with the household, and continue to send remittances. (Bilsborrow, 1998, pp. 17-22) Also, this indicates that migrants that move later are influenced by other household members. This link should be visible in sequential migration, where location and support from family members that have moved earlier can be expected.

Finally, there are some stylized facts as recognized by Pessino that show the shortcomings of the human capital models on decision making, as well as the other models described above. First, individuals act sequentially when choosing an optimal location. Next, there is a large correlation between in- and out-migration rates (where the case of Peru is used as statistical proof). Also, regions that are located close to each other can have a large wage differential over a longer period of time, without convergence of wages occurring. The models as well as the theories explaining and predicting migration have not been able to explain migration sufficiently. These notions show the importance of considering sequential migration when concerning migration. (Pessino, 1991) More recently, the focus of economists has shifted away from standardized models, and focuses on factors that influence migration. More complex decision making models, various decisive variables, and an integrated economic model (instead of a dual-economy) are common. There is no clear established theory that stands as the most popular ones today as was the case with earlier developed models. There is consensus that factors should be used that go beyond the human capital models; and individual and household decisions should be considered in the context of communal and regional developments (Zhu, 1998, pp. 161-163).

2.2.5 MIGRANTS CHARACTERIZED

The characteristics of migrants as described in the literature on internal migration mainly deal with rural-urban migration. On most other forms of migration, this author finds the information scattered and the conclusions very case dependent. Considering contemporary rural-urban migration as described in most literature on Latin American migration, some main features can be identified. These are described below.

The push and pull factors have often been used to characterize what drives migrants. UN Habitat, for example, refers to these factors often, though a strict classification is no longer used in the research done by this agency. In the rural areas, important push factors consist of environmental degradation and declining productivity, low income from agriculture, lack of lands, move to export rather than subsistence farming and limited off-farm employment. Pull factors from the urban areas are the relatively higher incomes, greater employment opportunities, economic safety nets, availability of social services, education and health care, improved water supply and other environmental and infrastructure services. Finally, political factors (i.e. instability, civil war and repression) can be both push and pull factors. (UN-Habitat, 2003b)

As is often pointed out, there are clear differences between rural and urban inhabitants. However, they can easily be exaggerated, mainly due to perceptions based on stereotypes (see Table 2.1). Though rural areas are distinct from non-rural areas, areas show much more heterogeneity than is

regularly assumed. (Champion and Hugo, 2004) This is relevant especially for the analysis of the urban area, but also pleads to focus on the specific case of the Peru rather than the worldwide situation concerning rural-urban migrants.

Table 2.1: Widely accepted stereotypical differences between urban and rural populations

Dimension	Urban	Rural
Migration Levels	High and generally net in migration	Low and generally net out migration
Demography	Low fertility and mortality	High fertility and mortality
Accessibility to services	High	Low
Economy	Dominated by secondary and tertiary activities	Predominantly primary industry and activities supporting it
Occupational structure	Manufacturing, construction, administration and service activities	Agriculture and other primary industry occupations
Education levels and provision	Higher than national averages	Lower than national averages
Accessibility to information	High	Low
Politics	Greater representation of liberal and radical elements	Conservative, resistance to change
Ethnicity	Varied	More homogeneous

Source:

Champion, T. and C. Hugo (eds.), 2004, *New forms of urbanisation; beyond the urban-rural dichotomy*, Ashgate Publishing Ltd., Aldershot.

In a number of thorough studies of Peruvian migration, Matos Mar and Manuel Mejía stress the importance of seasonal migrants. In the highlands of the Andes, seasonal agriculture is the only option, due to limited rainfall in some months. Large scale seasonal migration takes thereby places between coastal areas and the Andes (Matos Mar and Manuel Mejía, 1981). These seasonal workers all owned a small plot of land in the Andes, and were employed as casual workers in the coastal valleys during the dry period, until the rainy season began in their home communities or work in the coastal area became scarce. The wages paid to casual workers were below the rates paid to permanent farm workers. Amongst these migrants, three different groups were distinguished; migrants who were dependent primarily on earning of a wage because of the small quantity or poor quality of the land owned (i), migrants primarily dependent on farming their on plots of land (ii), and migrants from large estates where they were employed as serfs or semi-serfs (iii). (Matos Mar and Manuel Mejía, 1982)

Research has shown that the family and kinship networks play a crucial role in migrant adaptation to Latin American cities. It seems that few people undertake migration unless they have relatives there. Though in differing degrees, the extended family keeps playing an important role in settled migrants lives over a long period of time. Little agreement, however, seems to exist on the often suggested dominance of the mother/wife in decision making. Matrifocal families have been distinguished in research in the Caribbean area, whilst cases from Lima and Mexico City show a tendency towards male dominance in decision making. (Butterworth and Chance, 1981, pp. 91-98)

The migration towards the urban areas shows a relatively high share of women in the 1970s and 1980s. The female participation rates are highest in the large metropolitan areas, where demand for female labour was high in domestic services, personal services, commerce, and in the expanding ranks of office workers. Female participation in the labour market increased heavily in services, and declined in industry in some countries (e.g. Peru). From the late 1980s onwards, domestic servants became a significantly smaller portion of the female economically active population, and women became more often self-employed. (Oliveira and Roberts, 1996, pp. 275-279) The consequence of this recent change in decreased importance of domestic servants means that this share of the migrant population is likely to have declined.

In the specific case of Peru, the influence of the guerrilla organisation *El Sendero Luminoso* (Shining Path) on the migration towards Lima has been considerable. During the 1980s, there was a large flow of migrants seeking refuge in the capital as a means of escape from the mountainous areas close by. As the situation has improved in those areas, the flow of migration nowadays is only a fraction of what it was in the 1980s. In the research to be carried out by this author, it is relevant to consider the possible influence of these migrants and determine whether this specific group of people needs a more thorough examination.

2.2.6 MIGRATION POLICIES

The influence of different theories on the policies implemented has varied over time and place. However, it is safe to say that in the case of Latin America, the Todaro model and its derivatives have been the most influential concerning migration policies. As mentioned before, an important contribution the Todaro model was the link between migration and urban unemployment. From the Harris-Todaro model, it became clear that migration also caused unemployment; thereby governments implemented policies to reduce migration in almost any developing country. To what extent these were successful, as well as to what extent the Todaro models were actually adequate has not been proven sufficiently (Lall, Selod and Shalizi, 2006).

Over the last decades, policies to improve the rural situation to reduce migration towards the city have been implemented at a large scale. To what extent they were influential is hard to determine; the population living in the rural areas had been reduced to only a fraction of that of the 1970s and 1980s. Furthermore, statistics and research on secondary and tertiary cities is not sufficient to determine their role and importance as well as of the related programs implemented (e.g. Lall, Selod and Shalizi, 2006; Lindert and Verkoren, 1997). In the case of Peru, expectations on reducing the growth towards the coastal cities have not been met; as rural-urban migration was hardly limited by national policies and unemployment rates in cities remained high.

The agrarian reforms introduced in Peru in 1969 are one of the most influential policies concerning the rural areas. They were introduced with the intention to raise rural income and the living standards of the peasant population. This was to be reached via a transfer of land ownership, an output growth rate of 4.2% and the creation of more than 300,000 new jobs. The land ownership changed drastically, with 15,000 co-operative associations in which individual members represented investments and services. (Matos Mar and Manuel Mejía, 1982) By distribution of the existing cultivated land, the agrarian reform also was the first official attempt to define the city limits precisely (de Soto, 1990).

Closely linked to the migration policies were the urbanisation policies. These are described in section 2.3.3.

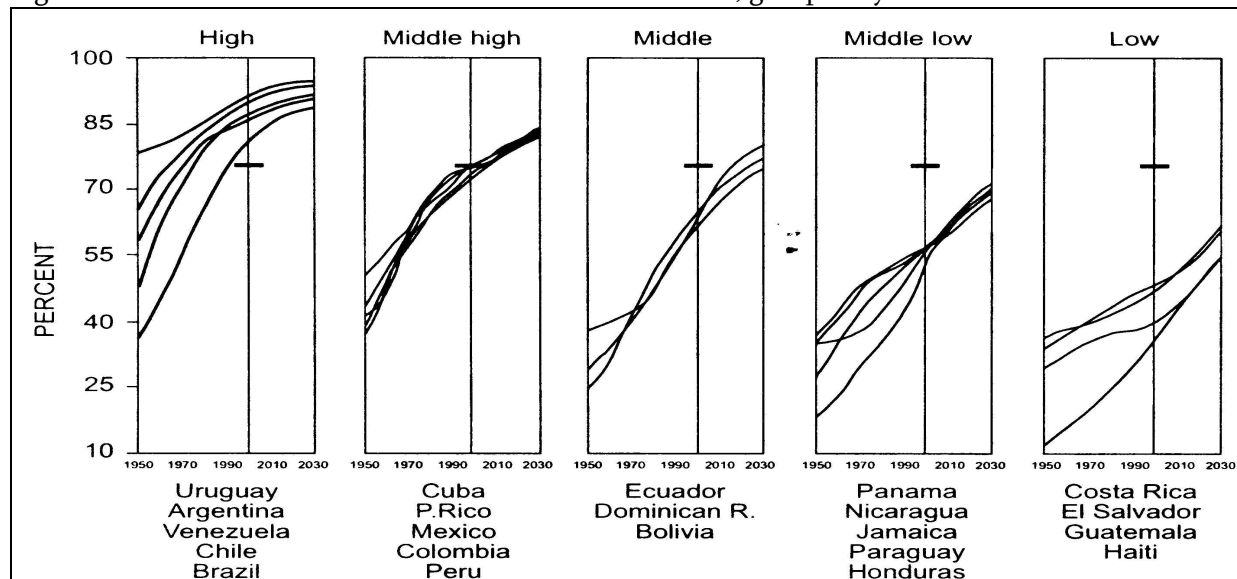
2.3 DEVELOPMENTS OF CITIES

2.3.1 LATIN AMERICAN URBANISATION

The urbanisation of Latin America has reached high levels; in 2005 about 77.8% of the total population was living in urban areas. Still, this figure is rising and by expected to reach 80.8% by the year 2015. There are, nonetheless, large differences in the level of urbanisation in Latin America and the Caribbean; they vary from about 40% to more than 90%. Peru has reached an urbanisation level of 71.9% in 2005, which is expected to grow to 73.3% by 2015 (ECLAC, 2006).

These statistics show that medium to high levels of urbanisation are reached by all Latin American countries. However, more than 80 percent of the total population and more than 85 percent of the urban population in 2000 were accounted for by 8 of the 22 countries. Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru and Venezuela show the highest rates of urbanisation, together with Uruguay, Puerto Rico and Cuba. When groups of countries are formed, based upon the level of urbanisation in 2000, they show remarkable similarity in levels of urbanisation over time² (see Figure 2.2). Figure 2.2 also shows that convergence in the level of urbanisation can be expected to continue. (Lattes, Rodríguez and Villa, 2004)

Figure 2.1: Urbanisation rates for Latin American countries, grouped by level of urbanisation



Source:

Lattes, A.E., J. Rodríguez and M. Villa, 2004, Population dynamics and urbanisation in Latin America; concepts and data limitations, in: T. Champion and C. Hugo (eds.), 2004, *New forms of urbanisation; beyond the Urban-Rural dichotomy*, Ashgate Publishing Ltd., Aldershot.

The level of urbanisation as a criterion is based on the difference between rural and urban areas (see section 2.1.3). This has become the basis for most, if not all, census data systems across the world, and quite often resulted in single-criterion definitions. (Champion and Hugo, 2004) The seemingly important characteristic of the level of urbanisation thereby tells a limited story. From this, two

aspects for the research are important. Firstly, statistics on urbanisation should be considered carefully, since country wide (as used in multi-country analysis) statistics are mainly derived from census data. They are thus directly based on the national definitions. Thereby, they depend on the criteria such as the political boundaries of an area, of the threshold to be classified as towns (100, 10,000 inhabitants, etc), on the presence of particular services, etc. (see Appendix B-1 for country differences). On the other hand, deriving the level of urbanisation from different thresholds for cities to be classified as urban (>2,000, >20,000 and >100,000) does not seem to have a large impact on the overall level of urbanisation. (Lattes, 2004) Secondly, the settlement system can be treated as a continuum, where an infinite number of categories could be distinguished. Such a range of categories could be based on multiple variables and categories. (Champion and Hugo, 2004) As a result, it is relevant to recognize the existence of different areas within the urban area. It goes beyond this research to develop a worldwide usable classification. Much rather should the research take into account the differences between urban areas, whereby specifically distinguishing characteristics of settlement areas of poor migrants and other urban poor is considered.

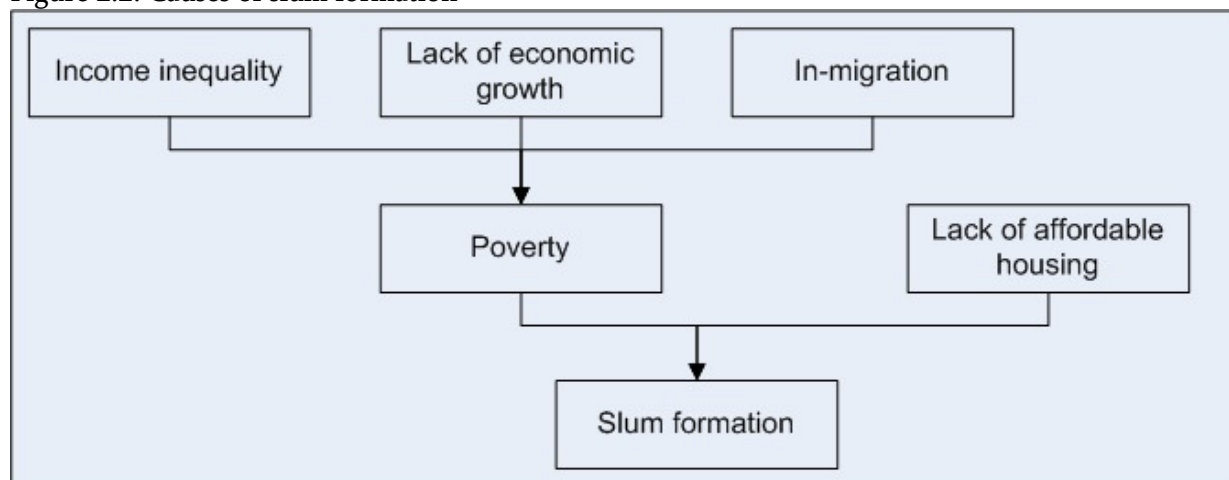
2.3.2 CITIES AND THE POOR

The existence of slums is a widely known phenomenon in all developing countries nowadays. There are, however, large differences between their rates of occurrence amongst the developing countries. Focusing on the Latin American and Caribbean countries, it is apparent that the country averages differ widely (see figure 2.2). Many Latin American and Caribbean countries have less than 25% of the urban population living in slums (i.e. Chile, Mexico, and Colombia). Some of the larger countries have between 25% and 50% living in slums (i.e. Argentina, Brazil, Venezuela) and a few countries have more than 60% of their urban population living in slums (Guatemala, Bolivia, Belize, Peru, Nicaragua and Haiti). When considering the absolute numbers, Brazil (51 million), Mexico (14 million), Peru (13 million) and Argentina (11 million) have the largest numbers of slum dwellers. (UN Habitat, 2003a)

Slums appear in a variety of forms, but can be placed into two basic categories; declining areas and progressing settlements. Within the declining areas, 'old' city centre slums and 'new' slum estates can be distinguished. In the progressing areas, a distinction can be made between squatter settlements and semi-legal subdivisions. (UN-Habitat, 2003b) The variety of (metropolitan) cities in Latin America covers this whole range.

The formation of slums is a highly interactive process, where different characteristics are interdependently influencing each other over a longer period of time. It is useful to have a look at the different causes of slum formation as mentioned by UN Habitat; the major ones being income inequality, lack of economic growth, in-migration (all leading to poverty) and lack of affordable housing, as displayed in Figure 2.2. (UN-Habitat, 2003b) To this author, it seems that not only the lack of affordable housing lead to the formation of slums, but the lack of affordable infrastructure services as well. Furthermore, the reduced level of in-migration in many Latin American countries demands a more detailed approach towards the population movements in a country and city. Finally, the income inequality being extreme in Latin American countries, cities and neighbourhoods makes this an important variable to consider.

Figure 2.2: Causes of slum formation



Source:

UN-Habitat, 2003b, *The challenge of slums; global report on human settlements 2003*, London, Earthscan Publications Ltd.

The Latin American cities show a diversity of developments in the use of land. This diversity in land use patterns and prices of land cannot be explained by the interaction between market factors and benefit of central location. Over the period 1930-1990, cities have become more mixed, especially in larger ones. Traditionally, Latin American cities are organised around a central square, and distance from this centre meant a decline in social importance of the inhabitants. The elite in the centre was surrounded by a ring of craftspeople and business. The urban poor lived in the outskirts, thereby merging economically and socially with the rural areas. Several trends changed these patterns. Under urban growth, the poor population and migrants in need of land were willing to move to any piece of land available. This type of occupation was not spatially ordered, since it depended on political factors, the strength of popular organisation and the intentions of the owners of land. Furthermore, the quality of infrastructure services declined as density in the centres increased, leading to pressure on the city centre's infrastructure. The upper class generally moved to well protected green field projects, which were often located next to poor urban areas. Finally, the middle-income households settled in low-income neighbourhoods, and preferred to spend their money on services rather than a convenient location. This was seen as a better investment, as affordability of land was difficult in Latin America during times of economic decline. Combined, these developments have led to mixed cities, where the centre and periphery of the city are harder to define. (Oliveira and Roberts, 1996)

2.3.3 URBANISATION POLICIES

The urbanisation policies in Latin America show many similarities over time; the processes of economic development and industrialisation seem to be the major driving forces to encourage urbanisation. The exact years during which the policies were implemented, however, differ from country to country. Below, an overview of the Peruvian situation is given.

Peru's capital Lima has been dealing with an immense influx of poor migrants since the Second World War, and has thus shown different approaches towards dealing with them. The changes and causes of change in the formal structure concerning the issue of informal housing have been described by Hernando De Soto (1990). They cover about the whole last century, and provide

insights in the many different approaches and issues that can still be recognized in today's policies. It is therefore useful to describe the different stages here.

- *The birth of informality (1920s)*: Established businesses develop neighbourhoods for the middle and upper class, bypassing public authorities and laws;
- *Recognition by relocation (late 1920s- 1950s)*: Gradual invasions of migrants throughout and around the city, natural disasters leading to government intervention (relocation) instead of ignoring their existence;
- *Political recognition of invaders (>1940)*: Political groups competing for sympathies and support of informal settlement dwellers;
- *Legislative recognition (1961)*: Access to formal ownership provided by Promulgation Act 13517, combined with a ban on new settlement;
- *Confrontation with the government (1970s)*: Military tried to enforce the neighbourhood organisation-model, massive well-planned invasions by settlers as a reaction to this rigid system;
- *Emergence of associations and cooperatives (1970s)*: Reform of rural land to urban growth areas used by rural landholders to cooperate with associations of settlers;
- *Urban recognition (late 1970s)*: Due to failure of controlling invasions by the authorities, they recognized informal settlements as formal neighbourhoods without exceptional rules;
- *Recognition of private property and informal organisations (1980s)*: Relaxation of requirements from the Lima City Council, leading to granting of titles;
- *Towards a state modelled on the informal sector (1980s)*: Violent clashes between new and old settlers, legal system (in the form of planned invasions) conflicting with the extra-legal system of informal settlements;
- *The unsuccessful prosecution of associations and cooperatives (late 1980s)*: Recognition of illegal land sales as a means of access to property.

The focus of De Soto is on the issue of property rights. In his view, these are a bottleneck in the process of development for many inhabitants of developing countries (De Soto, 1990). Its use for this research, however, is also of a more general kind; these observations provide us with specific insights in the Peruvian housing situation and the behaviour of those dealing (living in, governing, etc) with informal settlements. Most interesting of these different stages is not so much their exact years of appearance, but much rather whether they can be recognized in the development of new settlements nowadays in other Peruvian cities as well.

The high level of urbanisation has had an impact on the policies towards migration. Since the 1970s, rural-urban migration has become a less important issue. Inter-urban, intra-urban and international movements have gained more attention in Latin America (Oliveira and Roberts, 1996).

2.4 INFRASTRUCTURE SERVICES

This section deals with various aspects of infrastructure services relevant for this research. It does not provide a complete overview of the literature on infrastructure, nor on the relation between the urban development and infrastructure. Much rather does it provide sufficient information to

develop an adequate and workable framework for research (see next chapter) on the relation between infrastructure services and migration.

2.4.1 TYPES OF INFRASTRUCTURE SERVICES

This research considers the infrastructure services as provided in the urban areas. The delivery of these services is typically inadequate in the poorest neighbourhoods, and many different actors are involved in the provision of these infrastructure services.

A useful distinction between types of infrastructure is that between transportation infrastructure and public works vis-à-vis public utility services. This distinction is useful in the light of the privatization of public enterprises, and is in line with the distinction from micro-economic theory between public goods (non-rivalry and non-exclusive exhibited) and private goods (rivalry and exclusion allowed). Thus, transportation infrastructure and public works such as roads and bridges may not be established if no active government involvement or even provision takes place. On the other hand, public utility services (telecom, rail services, energy, water and sewerage) are often publicly-provided private goods; though incremental supply has a positive marginal cost, the cost of exclusion could be greater than the benefit. (Ordover and Uribe, 1999) According to this classification, this research will focus on public utility services, the transportation sector will not be covered.

In the field of public utility services, there seems to be general agreement on the classification of different sectors. It is apparent that the production and delivery of electricity, water, gas, sewage services, telecommunication services and public transport are not the same. They consist of and deal with different products (thus with different price-elasticities, mode of production, economies of scale, etc.) A common characteristic is that they all deliver products via a network-type of delivery system. In that sense the infrastructure services overlaps with the utility sector, but this research includes some other forms of delivery of the services as well (e.g. water sold via tricycles, sanitation via household latrines, etc.) that are normally not considered when the term utilities is used. Furthermore, the services with regard to solid waste disposal are considered infrastructure services. Nonetheless, much of the research on utilities in developing countries does not include waste disposal.

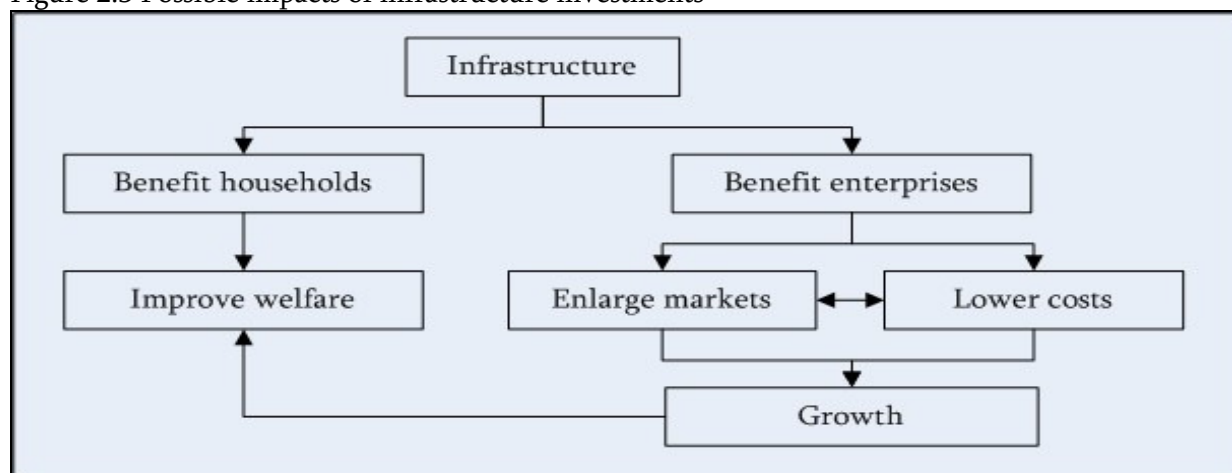
2.4.2 INFRASTRUCTURE AND DEVELOPMENT

The relation between infrastructure and development is complex and works in many different ways. Different types of infrastructure and infrastructure services have a different impact on different levels of a society and groups of people and vary from context to context.

Infrastructure improvements can lead to improved welfare and overall economic development of a region or sector. The way infrastructure can lead to improvements in welfare is shown in figure 2.3. Infrastructure can be productive in the sense that it leads to an increase in household as well as enterprise benefits. The benefits for enterprises lead to enlargement of the market, which combined with lower costs leads to economic growth. Economic growth and household benefits lead to improved welfare. Thereby, infrastructure investments lead to direct and indirect improvements in welfare. (Prud'homme, 2004)

An example of a paradigm that promoting the delivery of infrastructure services to the poor is the basic needs approach. In this approach, it is assumed that meeting minimum level of services has a positive impact on the economy and society. Though this approach is influential and important in the decision making, it does not provide clear information on the services that are most important to be delivered in a specific situation.

Figure 2.3 Possible impacts of infrastructure investments



Source:

Prud'homme, 2004, *Infrastructure and development*, paper prepared for the Annual Bank Conference on Development Economics, University of Paris, Paris.

The relation between infrastructure, growth and welfare shows that universal access is generally desirable. Typically, three factors are influential on the policies that are implemented and directed towards universal access. First, externalities exist, making subsidising prices for low-income consumers economically efficient. Examples of this are the cases where improved water delivery increases the general health, sewage removal that prevents environmental pollution and telecommunication services that benefit from increased use of the network. Second, infrastructure services can be merit goods; goods and services that society believes everyone should have. Utilities are often seen as merit goods, and are thus more appreciated than other ways of obtaining these services. Such preference for goods is not based on economical aspects where it concerns the typical aspects of merit goods. Third, politics and regional development strategies are often in favour of infrastructure services. This is in line with the expected economic growth (see above), though politics and popularity issues can be drivers themselves too. (Irwin and Brook, 2003) These aspects show that the general tendency towards universal of infrastructure services needs to be understood in a complex of actor interaction, where more than purely economic aspects need to be considered.

2.4.3 PRIVATIZATION AND REGULARISATION

It is apparent that infrastructure can be seen as distinct from other sectors and industries. Especially in the light of privatization, several of these aspects have gained awareness and attention. A clear overview of these differences is provided by Ordober and Uribe (1999). Services are often regarded as essential for both the public and the functioning of the economy, and political considerations are often involved in the processes concerning delivery. The provision is characterized by economies of scale and scope; one network is more economical than two, and coordination is usually easier within one organisation. Furthermore, investments are often long-lived and involve high sunk costs. This, together with expertise acquired, can lead to the possibility of private investors

behaving opportunistically. They can use their market power to create monopolies and limit access for new providers further. This leads to a situation where consumers have little control and choice over the infrastructure service. (Baker and Tremolet, 2003) The high risks involved for investors (amongst which the fear of expropriation) can stimulate them to recoup the full value of investment rapidly. However, when overprotection takes place (justified by the providing investors some security of investment) then impediments for entry will exist. Market competition and appropriate legislation may lead to competitive pricing behaviour but will function inadequate especially when it concerns bottleneck facilities and natural monopolies. Finally, the change from a state-owned monopoly enterprise to a private company may be lead by political objectives rather than neutral public goals, resulting in inefficiencies (Ordober and Uribe, 1999).

One of the most obvious changes in infrastructure service delivery throughout Latin America is the increased private sector involvement in all sectors. According to these in favour, the state-led model has been exhausted, and a retreat of the government (compared to the 1980s and 1990s) is often stimulated by large organisations such as the International Monetary Fund (IMF) and the Inter American Development Bank (IADB). There are some important reasons for cutting back on public spending. Infrastructure cuts were viewed as a valid means to financial adjustments, necessary to overcome liquidity crises. Also, returns on infrastructure spending are assumed to flow back to society rather than the government. Furthermore, cutting on infrastructure spending eliminates those projects that do not have a high rate of return. Finally, the private sector is assumed to be able to take over many aspects of infrastructure provision (Easterly and Servén, 2003).

The public and private spending on infrastructure shows that public infrastructure spending indeed declined during the Latin American macroeconomic crises of the 1980s and 1990s. However, deficit reduction was not an important reason for cuts in public infrastructure spending. Data on a variety of infrastructure sectors and Latin American countries indicates that private infrastructure spending increased after opening up, though unevenly amongst sectors and countries. The levels of private spending were generally below that of pre-reform public spending, whilst public spending did not always fall. A limited analysis on the efficiency of infrastructure investment shows no clear evidence for the assumed increase in efficiency (translating spending into assets) due to public sector participation. However, the quality of infrastructure has gone up after privatization in many sectors.³ (Calderón, Easterly and Servén, 2003)

The functioning of the utility market can be improved by introducing several reforms. Typically, these should include horizontal unbundling (competition in the sectors), vertical unbundling (ownership of utility sectors), private participation and free entry. In poor areas, small-scale and informal vendors should be allowed to provide services, even when they compete directly with the dominant provider. These alternative vendors can offer services that are of a lower quality and price. Many large providers use a high fixed price and low unit price. Small scale providers can offer a service at a lower fixed and higher unit price, which makes this service cheaper for those that have low usage. (Ehrhardt, 2003) Such alternative systems can include be found in all sectors of infrastructure services, and differentiation of quality of the service is very well possible.

Whether or not the private delivery of infrastructure services actually improves the current situation is debated heavily by many scholars, and results in Latin America differ considerably. An often indicated problem with the private delivery is that of the services not being profitable.

The strategies used by the poor urban population differ in longitude. Often, they are limited to coping and adaptive strategies. Coping strategies refer to temporary adjustments by individuals or households, to cope with the short term problems faced. Adaptive strategies are more long term, and involve clear desired change in the current situation. Finally, Livelihood strategies are the combination of resources and activities that are used, and do not necessarily involve change. (CFDO, 2004). These strategies are used to analyse the process of obtaining infrastructure service. It can be expected that there are differences between the types of service considered; on the short term drinking water is often more essential to live than having a cell phone.

The livelihood approach is limited in focus, and does not specify how much importance should be paid to the different aspects. These aspects can be analysed to more or lesser extent, and the application is thereby case specific. As can be seen in the next chapter, the application in this research focuses on migration, population growth, urban development and their infrastructure services. It does thus not use a holistic approach, but includes elements that are suggested by the livelihood approach.

3 RESEARCH DESIGN

3.1 RESEARCH QUESTIONS

The theoretical framework of the previous chapter provides a basis for a research design. The research design is fundamentally based on the central question. The central question of this research project is the following:

“What is the impact of contemporary migration of the urban and rural poor on the quantity and quality of urban infrastructure services in Trujillo, Peru?”

Five sub questions are formulated:

1. *“What is the size and direction of the migrations flows concerning the metropolitan area of Trujillo?”*
2. *“What are the characteristics of the migrants and their settlement in the poor urban areas in Trujillo?”*
3. *“Which infrastructure services and in what quantities and qualities are delivered within the poor urban areas of Trujillo?”*
4. *“How does the process of obtaining and delivery of infrastructure services to the urban poor take place?”*
5. *“What linkages exist between migration, migrants, infrastructure services and the process of delivery of these services?”*

These way in which these five research questions are investigated is elaborated on in this chapter.

3.2 CONCEPTUAL MODEL

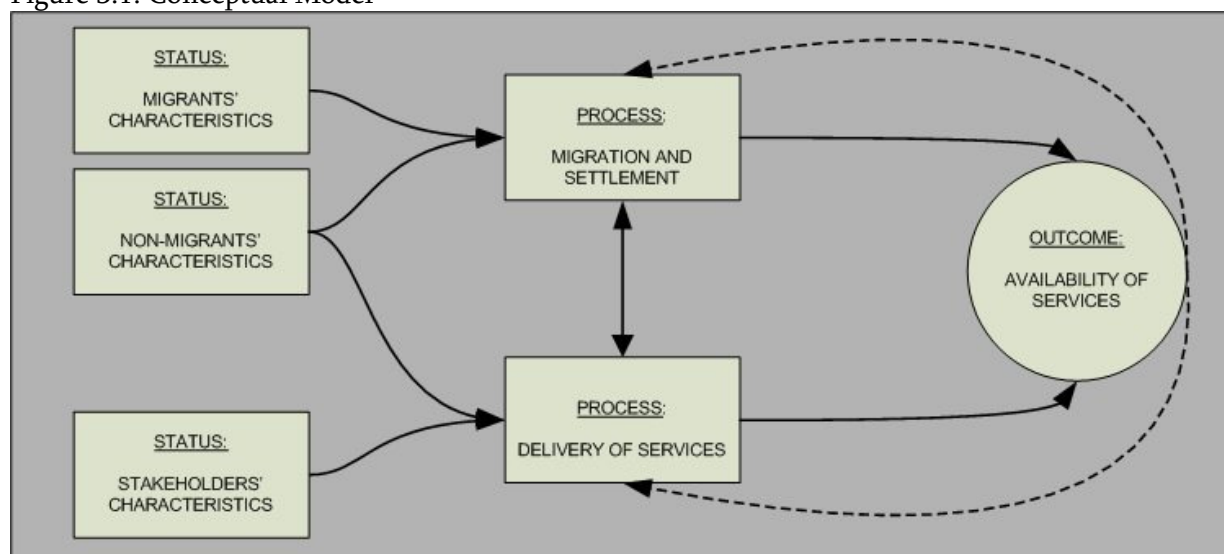
This section shows the conceptual model that provides a comprehensive overview of the research. The conceptual model is used for studying the interaction between migration and urban infrastructure services, i.e. as stated in the research questions. At the end of this chapter, a research model specifically designed for this research is presented.

The conceptual model consists of two elements that have a direct impact on the use of services (see fig. 3.2), and three that have an indirect influence. These elements can be studied relatively separately from each other, and they require different methodological approaches and indicators. The conceptual model shows which of these elements are directly related to each other, as well as the direction of the relation. The arrows from the status blocks to the process blocks indicate that the status influences the process in a unidirectional way. The two indicated processes influence each other, which is shown by the two way arrow. These processes lead to the outcome, the circle

indicating the availability of services. This is the availability and use of services in a specific area. Finally, some feedback loops exist, indicated by the dashed lines.

The element of the non-migrant population contains the group of people that does not move towards new settlements. They have a direct influence on the process of the delivery of services, as well as on the migration and settlement of migrants. The migrants are all of those that move to new settlements, whether they were born and raised in the close-by neighbourhood or not.

Figure 3.1: Conceptual Model



The elements are studied via both quantitative and qualitative indicators. For the status of the migrant population, the characteristics include income, household size, migration patterns, and reasons for migration. The non-migrant population is considered via their use of services, income, and household size. For the process of migration and settlement the indicators used are the different migration flows (quantitative and qualitative) at different levels (country, department, and district), urban developments, urbanisation levels, patterns of settlement, and the construction of houses are considered. The stakeholders' characteristics are analysed by considering the actors' responsibilities, size, and efficiency. The process of delivery of services is considered via the interests and strategies of the stakeholders, the functioning of the market, existing subsidies, and the costs of services. The final outcome, the availability of services, is studied in detail via; the type of services offered, the quality and prices of the services, usage statistics and availability.

The interaction is studied mainly via the strategies and behaviour of different individuals or actors. The strategies followed by the migrants to the migration and settlement process are considered by the actions taken to settle. The characteristics of the population determine their behaviour and influence. The same applies for the stakeholders; the processes are an outcome of their characteristics and choices made. The interaction of these processes is studied via the neighbourhood organisation and the way actors deal with each other. Finally, the influence on the outcome is studied via specific results of actions taken. The feedback loops are not explicitly considered in this research,

3.3 CONCEPTS AND DEFINITIONS

Throughout this research, various concepts and definitions are used. In this section, the most important ones are provided.

Poor urban settlements:

The term ‘poor urban settlements’ and the group of people qualified as the urban poor are similar to that of slums and slum dwellers in other research. The term poor urban settlement largely follows the typology of slums as defined by the UN Habitat; a group of individuals living under the same roof in an urban area who lack one or more of the following:

- Durable housing of a permanent nature that protects against extreme climate conditions;
- Sufficient living space which means not more than three people sharing the same room;
- Easy access to safe water in sufficient amounts at an affordable price;
- Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people;
- Security of tenure that prevents forced evictions. (UN Habitat, 2006; see Appendix B-3 for more details)

More detailed information is provided in the analysis of the studied cases, so that the discussion whether or not an area is considered a slum is less relevant.

Recent settlement: A recent settlement is a neighbourhood that has been established within approximately the last 5 years. Thereby, all migrants living in these settlements are considered recent migrants, according to Peruvian and international standards (Bilsborrow, 1998, pp. 6).

Migration: The movement of a person from one administrative division to another with the intention to change usual residence (Bilsborrow, 1998, pp. 3-5). Migration is thus considered at different spatial levels (district, department). The level at which migration is considered is mentioned in the relevant sections. This research excludes external migration, only internal migration is considered.

Urban - Rural: The difference between urban and rural areas is considered a difference in population size of the centre in an area. The distinction between urban and rural areas is considered on district and department level, and follows the definition used by the Peruvian National Institute of Statistics (INEI) where possible.

Throughout the analysis, the different legal-spatial divisions of Peru are used. These divisions are also presented graphically in Appendix A Figure 2 to 4. Peru is divided into 25 departments, of which La Libertad is the focus of this research. La Libertad is divided into 12 provinces, of which Trujillo Province contains about half of the total population of the department La Libertad. The following divisions and according authorities exist:

1.	Nation	Peru	National Government
2.	Department	La Libertad	Regional Government
3.	Province	Trujillo Province	Provincial Municipality of Trujillo
4.	District/Populated Centre	e.g. La Esperanza	Municipality
5.	Neighbourhood	e.g. Nueva Jerusalén	Local representatives

The terms human settlement (*Asentamiento Humano*), marginal urban neighbourhood (*Barrio Urbano Marginal*), young town (*Pueblo Joven*) and similar ones are not used in this research. Instead, we use the term neighbourhood.

The populated centres are areas within a district that have gained importance and independence. In Trujillo Province, only some populated centres have been created (see Appendix D Table 8). For this research project, the populated centres Alto Trujillo and El Milagro are most important. The populated centre Alto Trujillo is part of El Porvenir, and the populated centre El Milagro part of Huanchaco. Most of the analysis is done at the level of districts. Only in some cases is are the populated centres considered separately. The level of analysis is mentioned in the respective tables.

The province of Trujillo is located within the department La Libertad, and consists of the following eleven districts:

- Trujillo;
 - La Esperanza;
 - El Porvenir;
 - Florencia de Mora;
 - Victor Larco Herrera;
 - Huanchaco;
 - Laredo;
 - Moche;
 - Salaverry;
 - Simbal;
 - Poroto.
- } Metropolitan Area of Trujillo

The two populated centres that are considered in this research project are:

- Alto Trujillo (located in El Porvenir);
- El Milagro (located in Huanchaco).

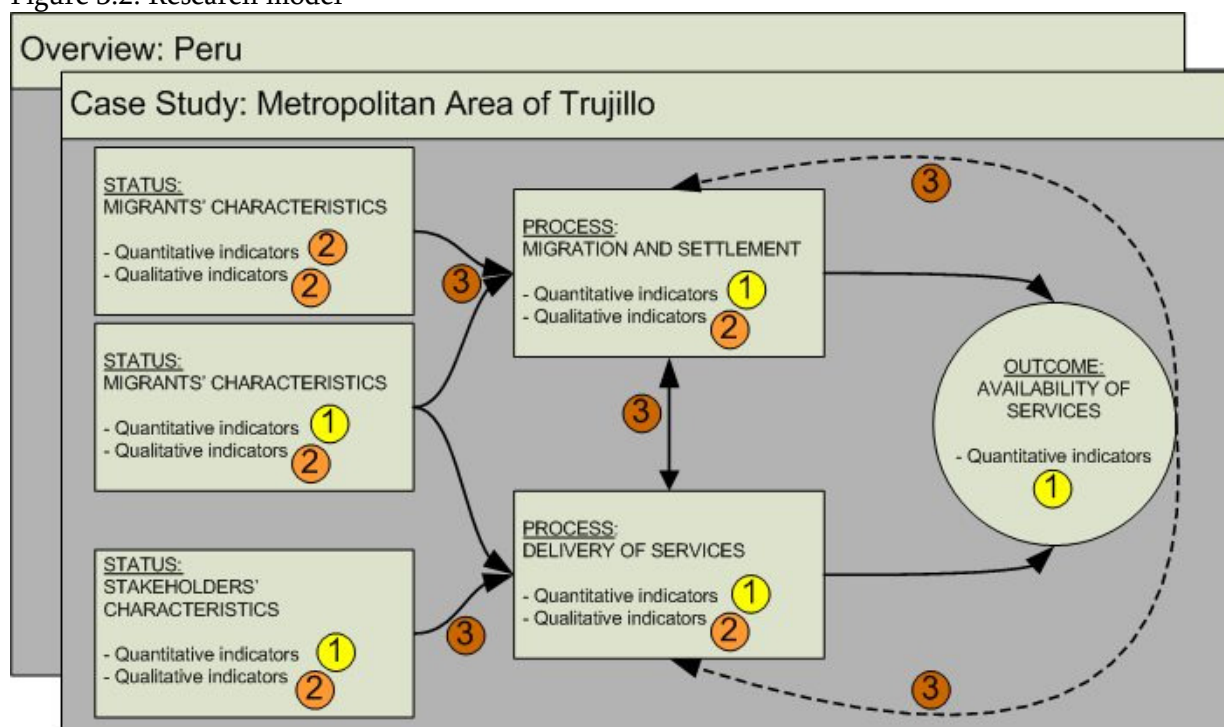
This research focuses on the metropolitan area of Trujillo. The metropolitan area of Trujillo refers to the urban area within Trujillo Province¹. This is basically the whole of Trujillo Province, excluding the rural districts Poroto and Simbal.

3.4 RESEARCH MODEL & STUDIED ELEMENTS

The research questions are answered by analyzing the various elements and their links. The way this is done is presented in Figure 2, the research model.

The research is carried out at two levels. First, there is the general overview of Latin America and Peru. The theoretical framework focussed on developments in Latin America as a region. The relevance for attention to Latin America as a whole is that comparable developments concerning both migration and infrastructure service delivery take place in different countries. From this framework, the Peruvian situation is better understood. This is especially the case on the aspects related to the changing roles of public authorities and private providers of infrastructure services. The Peruvian case is elaborated on in the research, and used to provide a framework for the developments in the metropolitan area of Trujillo.

Figure 3.2: Research model



The case study of Trujillo provides the in-depth insights in the processes and detailed data necessary to answer the research questions. As can be seen in Figure 2, four steps can be distinguished:

1. Analysis of the existing data and information on:
 - a. Characteristics of the non-migrants;
 - b. Migration flows and patterns of settlement;
 - c. Characteristics of stakeholders.
 - d. Infrastructure services use;
 - e. Delivery of infrastructure services;
2. Collection of data on and insights in:
 - a. Characteristics of migrants;
 - b. Characteristics of the non-migrants;
 - c. Process of migration and settlement;
 - d. Process of delivery of services;
 - e. Elements not yet covered with the analysis of the existing data (1).
3. Combining the above via an analysis of the links;
4. Conclusion drawing on the case study and combining them with information obtained from the literature overview.

3.5 DATA COLLECTION AND DATA ANALYSIS

Different methods of data collection are used for this research. The sources can be divided into background literature, secondary data, and primary data.

There is an extensive study of the background literature, which has been used to develop the research model and provide the theoretical background. All the background literature consists of

books written by various scholars, chapters in books, articles in scientific papers, and information available on websites. All background literature that is used is referred to in the bibliography, and comes from a variety of sources. For the case of Trujillo, the Environmental Atlas of Trujillo (MPT, 2003) and the works of Rosner (1999) and Amemiya Hoshi (2003) are important. The selection of literature for Trujillo was heavily limited to works with a sufficient level of novelty and scope. The literature used is published either in English or Spanish.

Secondary data is used for both the theoretical overview, the Peruvian situation and for the case study of Trujillo. The secondary data as used for the theoretical overview is obtained from the academic literature, and contains publications from the UN Habitat, the ECLAC and the World Bank. The data used for the overview of the Peruvian situation is mainly collected from the National Bureau of Statistics (INEI). For the case of Trujillo, the secondary data derives mainly from the planning department of the Provincial Municipality (Plandemetru), the work of Rosner (1999), the water supplier Sedalib, the electricity provider Hidrandina, and the various supervising authorities (SUNASS, OSINERGMIN and OSIPTEL). Most of the used data is displayed in the Appendices.

The collection of primary data is done through surveys, interviews, field trips and observations. The interviews are used to get detailed information on the actors (authorities, local representatives, companies and NGOs). They were carried out in formal interviews (where prepared questions were asked, tape-recorded, summarised and thereafter confirmed by the respondent) as well as in a more informal manner (where notes were taken immediately). A list of the interviewed people can be found at the end of the bibliography, as well as in the respective sections in the text. Field trips were undertaken with various parties² to observe their methods and acquire information on the area in which they operate.

In total 240 surveys were carried out. The data from the surveys is available on the CD attached to the cover of this thesis. To obtain a copy of the raw data, please contact the author. The surveys were carried out in three different locations in the northern part of Trujillo (see Appendix A Figure 6 for a map). The areas were selected on basis of their age, location, legal status and level of poverty. They had to be recent, poor, urban settlements, in different districts of the metropolitan area of Trujillo with different levels of security of plots. In total, the survey covers an area of 2,676 plots, of which about 9% is surveyed. The selection of the individual cases (persons) that were surveyed depends only on their location; the share of the surveyed households is similar in each neighbourhood (e.g. in every set of blocks of houses of the sample of El Milagro VII, about 7% is surveyed).

The surveys provide detailed information at the neighbourhood level. The three selected areas are the neighbourhoods Sector VII (in populated centre El Milagro), Nueva Jerusalén (in district La Esperanza) and Barrio 2B (in populated centre Alto Trujillo). These neighbourhoods include the bordering squatter settlements. For an overview of the studied areas, see Appendix A Figures 6 and 7.

The data for the selected neighbourhoods is highly representative for the recent settlements in the same district or populated centre. Thus all settlements of the populated centre Alto Trujillo that have been established within the last five years, are similar to the sample of Alto Trujillo 2B. Thereby, differences between the three samples (Alto Trujillo 2B, El Milagro VII and La Esperanza

NJ) represent differences between recent settlements of the whole of Alto Trujillo, El Milagro, and La Esperanza. The case of El Milagro VII is partly located within the Industrial Park of the Regional Government. The aspects of the research that are concerned with the legal status of these settlements in El Milagro VII are representative for all of the settlements in the Industrial Park, and not necessarily for the rest of El Milagro.

Table 3.1: Surveys carried out for this research project

Metropolitan area	District / Populated centre	Neighbourhood	Number of surveys	Number of plots	% surveyed
Trujillo	El Milagro	El Milagro VII	90	1,246	7.2
	La Esperanza	La Esperanza NJ	90	900	10.0
	Alto Trujillo	Alto Trujillo 2B	60	530	11.3
	Total		240	2,676	9.0

The selected neighbourhoods are representative for almost all of the poor recent settlements in the metropolitan area of Trujillo. Considering migration patterns, the three cases represent all the recent settlements of the northern districts Huanchaco, La Esperanza, Florencia de Mora, El Porvenir, and Laredo. The migration patterns and figures might be different in the districts Victor Larco Herrera, Moche, and Salaverry. The processes of settlement, delivery of services, the stakeholders involved, as well as the availability of services are highly similar in all recent settlements of the metropolitan area of Trujillo, except Alto Moche. The level and type of infrastructure provided in the recent settlements is not very similar to the older parts of the metropolitan area. Thus, the older parts of El Porvenir do not have much similarity with the recent settlements of Alto Trujillo. The census of 2007 (due to be published in June 2008) makes a further comparison possible, where especially similarities between migration patterns deserve comparison. In general, the data from the neighbourhoods is representative for most of the recently expanding settlements at the borders of the city.

The data from the surveys is analysed statistically in several ways. First, tables of frequencies and percentages are constructed. Second, some 5-scale variables are compared via their means (analysis of variance one-sample t-test). Third, all qualitative variables and some scale-variables of the questionnaires are compared via the Chi-square function and cross-tabulations with adjusted residuals. These allow non-parametric data to be compared independent of their distribution³. The Chi-square test statistic shows whether the distribution of variables of different categories are statistically dependent. The value for Chi-square is larger when there is dependency. The main means of interpreting is via the according level of significance, where <95%, 95% and 99% levels are used. A high level of significance is strong evidence in favour or dependency. The adjusted residual is similar in use to the Chi-square function, and provides information on the level of the different cells. A large difference between the expected value and the observed value indicates dependency. It behaves like a z-score, thus an adjusted residual larger than 2 indicates 95% significance, a value larger than 3 indicates 99% significance for that particular cell. The sign (+ or -) indicates the direction of the correlation. The analysis is done with SPSS version 15.0.

The tables on which the text in these chapters is based are included in Appendix C. An overview of all data is available on the attached CD. Most of the tables presented in Appendix C have strong correlations (e.g. Chi-square at 95% or 99% accuracy). This is partly due to the exclusion of most other tables, and partly due to the sample size of the survey. There were no significant differences

found between migrants and other settlers. This is explicable, as the differences are largest with those that do not settle in the recent settlements. There has not been made an extensive statistical comparison of those living in the recent settlements and those in other neighbourhoods. This is best done by comparing the data of this research with the census data of the 2007 census.

The survey is used to obtain information on various topics; it includes general aspects of the household, as well as the building and settlement process. The complete questionnaire in both English and Spanish can be found in Appendix J. All surveys were carried out in Spanish. Furthermore, it includes questions on all infrastructure services (i.e. water, sanitation, electricity, telecommunications and waste disposal). The questions are structured according to subject (e.g. the respective service), and are quite similar for the different infrastructure services to allow for comparison. There is a combination of open and closed questions. The categories as visible in the survey are for convenience only, as the category 'other' is always specified. On average, a survey took 25-40 minutes to complete. The surveys were all carried out by the author⁴, on a one-on-one basis with the respondents, where only one person in a group of people was selected to be interviewed, in order to prevent the copying of answers. The way the survey was carried out is thus similar in every case.

My experiences while carrying out the surveys were remarkably positive. Visiting these neighbourhoods without a guide did not lead to any threats or exposure to dangerous situations. Most visits were done during the day, though sporadic nightly visits were undertaken. Furthermore, most people were willing to spend the required time participating in the survey. My status as an independent foreign student (as opposed to being linked to an NGO or company) had a positive impact on the quality of the answers. The social desirability of answers was not influential⁵, as most of the surveys were carried out on a one-on-one basis and the respondents were open about all the topics.

4 MIGRATION AND URBAN GROWTH OF TRUJILLO

4.1 INTRODUCTION

The growth of and migration to the city of Trujillo form an important part of this research: its size and characteristics are vital in analyzing its impact on the infrastructure services. To understand the process of migration and its influence, a qualitative analysis of the settlement process is described. By doing so, answers are provided to the first two research questions;

“What is the size and direction of the migration flows concerning the metropolitan area of Trujillo?”

“What are the characteristics of the migrants and their settlement in the poor urban areas of Trujillo?”

In this chapter, these two questions correspond roughly to the next two sections. First, we discuss the migration and urban growth, including the migrants' characteristics. Then, the process of settlement and the various actors involved are elaborated upon.

The main sources used for this chapter are the two censuses of the National Bureau of Statistics (INEI, 1993a and 2005a), the Environmental Atlas of Trujillo (MPT, 2003), a study by Rosner (1999), by Amemiya Hoshi (2003) and the survey as carried out by the author. Waltraud Rosner conducted an interesting study on the impact of migration on the urban development of Trujillo. The study carried out by Nelly Amemiya Hoshi provides insights in the process of settlement. The Environmental Atlas of Trujillo contains various maps on the spatial distribution and developments on urban and socio-economic characteristics.

Other sources are only of limited use for this thesis. This is surprising, as a great number of studies on Peru's internal migration have been carried out since the 1950s. These studies were mainly anthropological studies on the population originating from the Andes (1950s onwards), the self-organisation of the people living in Lima (1970s onwards), and studies on the migration as a result of terrorism by the Shining Path (1980s and 1990s). Concerning studies on internal migration, we can distinguish three different types of studies. Studies that deal with rural-urban migration and its consequences on the Peruvian cities; studies analysing migration between the three natural regions (coastal area, Andes Mountain range and the Amazon basin), and studies dealing with migration increasing the Lima metropolitan area (Rosner, 1999, pp. 2-12). Over the last five years, especially the latter have been sufficient whilst studies on other cities remain scarce. Furthermore, most studies use INEI census data as their main source without adding independent data or interpretations, thus leading to duplication. Also, those that focus on the city of Trujillo are too few to be relevant. The relevant parts are also often included in the above-mentioned study by Rosner and in the Environmental Atlas of Trujillo.

In this chapter, the topic of migration and settlement is discussed at the national, regional and local level. Peru is divided into departments. Every department covers various provinces, which in turn cover different districts/municipalities. These different levels are also displayed on the maps of the

appendices (see Appendix A). In the next section, we describe the migration flows from these various areas towards Trujillo. Then, the behaviour of the actors, migrants and the settlement process in Trujillo are discussed.

4.2 MIGRATION AND URBAN GROWTH

4.2.1 POPULATION GROWTH AND MIGRATION IN PERU

The population of Peru has been increasing continuously since 1940, when data collection via national censuses began. This increase has been most visible in the urban areas. In those urban areas, the mortality rate was lower and job opportunities at the haciendas and in the industry led to a positive migration rate. As a result, the growth rate has always been higher for the urban areas than for the rural areas. This changed the relative importance of the urban and rural areas immensely. They sheltered about the same amount of people in the 1960s (according to the respective censuses, see Appendix D-1), after which the urban areas became increasingly important. Nowadays, the urban areas house 76% of the total population of Peru, compared to 24% in the rural areas (INEI, 2007).

Table 4.1: Population growth of Peru, for various areas.

	Urban	Rural	Lima	Other 31 cities	Rest urban	Total
1940 – 1961	3.7	1.3	5.0	4.0	2.4	2.2
1961 – 1972	5.0	0.5	5.4	5.9	2.0	2.9
1972 – 1981	3.6	0.8	3.7	4.9	2.4	2.6
1981 – 1993	2.8	0.9	2.7	3.3	2.4	2.2
1993 – 2005	1.9	0.2				1.4

Sources:

INEI, 1995, *Migraciones Internas en el Perú*, Lima

INEI, 2005, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

The relatively large increase of the population living in the urban areas was mainly due to the substantial increase of the population in the bigger cities. As can be seen in Table 4.1, the growth of the capital Lima has been similar to the national average for the urban areas since 1972. In the next largest 31 cities, the urban growth has always been larger than the average of all urban areas. These grow considerably faster than the rest of the (smaller) urban areas. In absolute terms, the growth in Lima is still larger than the following 31 cities (INEI, 1995).

The larger Peruvian cities (such as Lima, Arequipa and Trujillo) have experienced large growth due to migration since the 1960s. Due to the increasing population size of these cities, rural-urban migration was steadily less responsible for the total share, whereas natural growth as well as movements within the metropolitan area have become increasingly important. Also, the migration flows have spread to different cities, which has made the smaller cities (such as Chimbote and Pacasmayo in La Libertad) go through a phase of extensive growth as was earlier¹ experienced by the larger cities.

Migration patterns at the national level are best described as migration between departments. Peru is divided in 24 departments, of which focus La Libertad is the main in this research. The share of people that moved to a department different to the department of birth in 1993 was 20.6 percent of the total population, just over 4.5 million people. This proportion increased little from 1970 to 1993², and can be expected to have continued at this slow rate³. The ENAHO confirms this, with estimates that in 2003 about 22% of the total population migrated to a different department. (FAO-

RLC, 2005, p. 52-53) The majority of the people, therefore, continue to live in the department where they were born.

The patterns of migration provide a clear picture: Migrants move away from the Andes, mainly towards the coast. The departments with the largest cities attract most of the migrants, where Lima is by far the most popular destination (attracting about 40% of all migrants). Again, the data from the censuses of 1981 and 1993 provide detailed figures (see Appendix E). They show that the departments of arrival that were popular over 1976-1981 remained popular over the period 1988-1993. The departments in the Andes had a negative migration balance (except for Arequipa), even more so before 1993 than in the earlier five-year period. The Amazon departments became less popular, still the balance remained positive. (INEI, 1995) The changes in the flows between those two periods are thus small, as general trends stay the same. Migration has led to increased urbanisation, with especially the biggest cities becoming larger.

La Libertad has a population of about 1,5 million, and accounted for 6% of the county's population in 2005. The department is divided into twelve provinces, of which Trujillo is by far the largest (INEI, 2005a). Over the last half century, the population growth of La Libertad has been moderate, with an average annual growth of 2.6% over the period 1961-1972, steadily declining to about 1.8% over 1993-2005, as can be seen in Table 4.2 below (Gobierno Regional La Libertad, 2007). The annual population growth has thus slowed down in relative terms; in absolute terms the growth has never been larger than it was in the last decade.

Table 4.2: Population of the department La Libertad by the National Censuses

Year	Total	Period	Increase	Annual growth in %
1940	418,358			
1961	625,578	1940 - 1961	207,220	1.93
1972	825,285	1961 - 1972	199,707	2.55
1981	1,011,728	1972 - 1981	186,443	2.29
1993	1,287,383	1981 - 1993	275,655	2.03
2005	1,599,096	1993 - 2005	311,713	1.82

Source:

Gobierno Regional La Libertad, 2007, *Region en Cifras*, Trujillo.

Important changes have taken place on the composition of the rural versus urban population in La Libertad, as is shown in Table 4.3. The share of the urban population increased from 31% in 1940 to 74% in 2005. By far the fastest rate of urbanisation was reached in the period between 1961 to 1972, when the urban areas grew by 6.1% annually, mainly due to large-scale rural-urban migration. From 1993 to 2005, the urban area grew by 2.3%, whilst the rural area decreased slightly with -0.04% growth. This data is in line with national data and the constant increase in the urban population of the coastal regions (Gobierno Regional La Libertad, 2007; INEI, 2005). Over the last two decades, the growth of the urban area of La Libertad has been slower than the national population growth average for all urban areas combined. As the rural areas of La Libertad have become relatively less important, their share in the total growth via rural-urban population migration has become less significant too.

Table 4.3: Change in the urban and rural share of the population for the department La Libertad.

	Population			Annual growth		
	total	urban %	rural %	period	urban	rural
1940	395,233	30.9	69.1			
1961	597,925	41.3	58.7	1940 - 1961	3.41	1.20
1972	799,977	59.2	40.8	1961 - 1972	6.10	-0.66
1981	982,074	64.0	36.0	1972 - 1981	3.19	0.90
1993	1,270,261	68.5	31.5	1981 - 1993	2.75	1.02
2005	1,539,774	74.1	25.9	1993 - 2005	2.29	-0.04

Sources:

Gobierno Regional La Libertad, 2007, *Region en Cifras*, Trujillo.

INEI, 2005, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

The province of Trujillo is the most populated one of the 12 provinces of La Libertad. Nowadays, 50% of the total population of La Libertad lives in Trujillo Province. All the other provinces also have one or more cities or towns, and have therefore at least part of their population living in urban areas. Despite this, it is clear that the coastal provinces (Trujillo, Pacasmayo, Ascope, Chépen, Virú) are highly urbanised, with 84 percent of the population living in urban areas. The non-coastal provinces have less than a quarter of their population living in urban areas, and can therefore still be considered rural (see table 4.4 below, or in more detail in Appendix E). The province of Trujillo is almost completely urbanised. In the province as a whole, 97% of its population lives in urban areas. In this way, the Metropolitan Area of Trujillo is highly comparable with Trujillo province⁴. This does not mean that there are no rural areas in the Trujillo Metropolitan Area, but just that these areas are inhabited by very few people.

Table 4.4: Urbanisation rate of the provinces of the department la Libertad in 2005.

	Department: La Libertad			
	Trujillo Province	Other Coastal Provinces	Non-coastal Provinces	Total
Urban share (%)	97.4	84.0	24.1	74.1
Rural share (%)	2.6	16.0	75.9	25.9
Total	765,171	350,386	424,217	1,539,774

Source:

INEI, 2005, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

Migration has contributed significantly to the urbanisation of La Libertad. The department became a popular place to find work and make a living. From 1988 to 1993, La Libertad was the third most popular destination (after Lima and Arequipa) for migrants to move to. At the same time, the outbound migration flows remained large as well. (see Table 4.5 below, and Appendix D-2 for details). The share of the population that migrated to La Libertad increased during the 1980s, and is higher than the national average when Lima is excluded. The share of the population moving away from La Libertad has decreased to about 12% in the period 1988-1993. In 2007, these figures can be expected to have decreased further, as the share of the total population in the rural areas of La Libertad also has continued to decrease.

Table 4.5: Migration balances for Peru and the department La Libertad

	Numbers			% of population		
	Inbound	Outbound	Balance	Inbound	Outbound	Balance
Peru						
1976 – 1981	971,394	971,394	0	13.5	13.5	0.0
1988 – 1993	1,502,492	1,502,492	0	16.0	16.0	0.0
La Libertad						
1976 – 1981	40,946	54,377	-13,431	9.9	13.1	-3.2
1988 – 1993	80,368	65,722	14,646	14.9	12.2	2.7

Source:

INEI, 1995, *Migraciones Internas en el Perú*, Lima

The general trend for La Libertad as a popular destination for migrants is in line with the national trend that departments with large cities attract more migrants. Before 1981 however, La Libertad attracted few migrants. This changed and La Libertad became the third largest destination for migrants, after Lima and Arequipa. As Trujillo is the most important city in La Libertad, the trends can best be explained by looking at the developments at the province or metropolitan level. This is done in the next section.

Some conclusions can be drawn from the above description of the population growth and migration patterns of Peru and La Libertad. Nowadays, most of the Peruvians live in urbanised areas. Migration has been away from the Andes, towards the big cities that are mainly located at the coast. In La Libertad, these urban areas are also located along the coastline, whilst the rural provinces are located inland, with almost all of these provinces in the Andes mountain range. It is clear that the population growth in the urban areas has slowed down in relative figures over the last two decades; in absolute terms the impact is now larger than ever before. In the metropolitan areas of Lima and Trujillo, there is a slowing of the population growth in relative terms. Again, in absolute terms these cities continue to expand significantly. As Trujillo is by far the most important city in La Libertad, the migration patterns towards and the development of this city are highly relevant.

4.2.2 DEVELOPMENT OF THE METROPOLITAN AREA OF TRUJILLO

Since the 1940s, the city of Trujillo has increased considerably, covering an increasingly extensive area. As can be seen on the map of Appendix A Figure 5, the urban evolution took off in the form of developments in the eastern and north-eastern direction. These expansions of the urban area were not influential on the actual shape of the city and were still relatively small compared to expansion in the following decades, when new districts were formed. Today's city structure can be seen as an extension of the area as it existed around 1969. At that time, the historical city centre still occupied a central place, with an urban branch leading (Victor Larco Herrera) towards the ocean south-west of the city centre and three mutually connected new urban expansions (La Esperanza, Florencia de Mora and El Porvenir). Due to the explosive growth of Trujillo in the 1960s, various districts increasingly grew together with their borders less visible. In the 1980s and 1990s, the development of the city took place along the Pan-American Highway, where La Esperanza and the populated centre El Milagro are located, and in some other populated centres along the coastal part of the city (Huanchaquito, Alto Moche, Las Delicias) (Plandemetru, 2007aa). Most recent are the developments in Alto Trujillo, as well as at the edges of the existing urban areas. (MPT, 2003)

The total population of Trujillo Province amounted to 777,294 in 2006, and is expected to have passed the number of 800,000 inhabitants in 2008. The population growth has not been measured by the same organisation on a regular basis, making comparisons harder. The national census of 1993 was followed by the much discussed 2005 census, which is the best point of reference for comparisons. Various sources combined show that whereas the annual population growth rate declined after 2000, it has now increased again. The growth rate from the period 1995-1996 was around 2.7% annually, and slowed down after this period to an average of 1.7% over 2002-2005. More recently, the growth seems to have increased again, to about 2.5% over 2005-2006.

In the metropolitan area of Trujillo, all districts have had a growing population over the last 15 years. The population growth rate was smallest in the districts that were part of the older core of the city where space is limited (Trujillo, Victor Larco, Florencia de Mora) and largest at the outer part of the metropolitan area (Huanchaco, El Porvenir, La Esperanza) where horizontal expansion is easier (see table 4.6 below). These are also areas where more vacant land is present and horizontal expansion of the city takes place. In both the eastern and western area from the city centre, there are a number of family-owned areas (formerly established haciendas), where agricultural use has put its claim on land. In south-eastern and eastern direction, the irrigation project Chavimochic has led to increased large-scale use of fertile land strengthening the continued use as agricultural land, whereas developments towards the west are limited by the protected ruins of Chan Chan. Thereby, the city no longer develops in a spherical way. Much of the area north and north-west of Trujillo is claimed for agricultural developments under Chavimochic. The vacant areas on the west and north-west are filling up rapidly, as the city continues to expand horizontally. Huanchaco and El Milagro can thus be expected to absorb much of the city's growth and new developments, and La Esperanza and El Porvenir (i.e. Alto Trujillo) continue to expand towards the municipal borders.

Table 4.6: Population growth for selected districts of the metropolitan area of Trujillo

Department: La Libertad - Province: Trujillo Province						
	Trujillo Centre	F de Mora	La Esperanza	El Porvenir	Huanchaco	Total
1995 - 1996	1.6	0.7	3.1	3.6	6.4	2.7
1996 - 1997	1.6	0.8	3.1	3.5	6.2	2.7
1997 - 1998	1.6	0.9	3.0	3.4	6.0	2.7
1998 - 1999	1.7	1.0	2.9	3.3	5.8	2.7
1999 - 2000	1.7	1.1	2.8	3.1	5.6	2.6
2002 - 2003	0.9	0.9	2.2	2.1	3.7	1.8
2003 - 2004	0.9	0.9	2.2	2.0	3.6	1.7
2004 - 2005	0.9	0.8	2.1	2.0	3.5	1.7
2005 - 2006	1.5	1.2	2.7	3.9	5.0	2.5

Notes:

See Appendix E Table 6 for details.

Sources:

1993: INEI, 1993, *Censos Nacionales 1993, IX de Población y IV de Vivienda*, Lima.

1995 – 2000: INEI, 1999, *Perú: Estimaciones de Población por Departamentos, Provincias y Distritos 1995-2000 (versión actualizada)*, Lima.

2002 – 2005: Plandemtru, 2007, *Trujillo en Cifras y Mapas*, deducted from website MPT, Trujillo.
<http://www.munitrujillo.gob.pe/Trujilloencifrasymapas/paginas/menutotal.htm>

2005 – 2006: Sedalib, 2006, *Memoria Descriptiva del Sistema de Agua Potable CPM Alto Trujillo*, Trujillo.

From the paragraphs above, it can be concluded that the growth of the city has been rapid. Land for new expansion of the city is limited, but still available at the northern and western part of the city

where the poorer districts are located. Furthermore, what used to be one city can now better be described as a metropolitan area. Districts are increasingly interwoven, whilst large differences exist between various districts. This has led to a situation where different centres exist, and parts of the city have their own characteristics and institutions (such as municipalities). As we will see section 4.3, these spatial differences and actors highly influence the progress in the recent settlements.

4.2.3 MIGRATION FLOWS OF TRUJILLO

The metropolitan area of Trujillo has grown rapidly over the last few decades. Migration has been highly influential in the shaping of this city, and continues to play a significant role. The earlier developments of the city determine its current shape, and are still very visible.

Until the 1930s, migrants were mainly moving towards the employment-offering sugar cane haciendas at the coast, and the mining sites in the Andean mountains. The sugar cane workers were often illiterate small scale farmers, and they mainly moved to live permanently (either intended or by enforced contracts) at the haciendas. With the decrease in demand for sugar from Peru in Europe in the 1920s, the haciendas went into crisis. Over the next decades, most workers moved away from the haciendas, towards Trujillo where they were employed in the industrial sectors. It was also this demand from Trujillo's industry that attracted former mineworkers. These patterns of migration were eased by the recently built roads (such as the Pan American Highway along the coast, in the 1940s and the roads between coastal areas and the mines). Later on, the agricultural reform of 1969 (see also section 2.3.3) provided an incentive for farmers to try to get agricultural land from the haciendas, thus leading to migration directed from the mountains towards the coastal region.

Several external events (natural disasters) had their influence on migration. The earthquake of 1970 with its epicentre at Ancash made many people there and in the surrounding areas homeless. This made the decision to migrate towards the (richer) neighbourhoods and poor recent settlements of Trujillo a new option for many during the 1970s. (Rosner, 1999, p. 77- 95) Furthermore, the damaging effects of El Niño of 1982-1983 and 1997-1998 increased the movement of people, mainly away from the Andean mountains. Finally, terrorism by the Shining Path drove away a great many people away from the central part of the Peruvian Andes in the 1980s. However, its impact on Trujillo or La Libertad has never been properly studied⁵, but is estimated to be limited as most migrants fled to the central and southern coastal cities (INEI, 1995).

The department of birth for the population of Trujillo Province shows where the inhabitants of Trujillo originate from. Most were born in the department La Libertad, overall about 78% (see table 4.7). The most important department of origin of those not born in La Libertad is the neighbouring Cajamarca, followed by Lima and Ancash. There are differences in the importance of migration in the different districts. Migrants contribute to a larger share of the population in Huanchaco, Victor Larco Herrera, Trujillo and La Esperanza. There were relatively few migrants in El Porvenir, Florencia de Mora and the more rural districts of Trujillo Province in 1993. Until 1993, the most important migration flows towards Trujillo had been from the Andean mountains. The migration from the coastal regions towards Trujillo amounts to half of that from the mountain areas (INEI, 1993). The above is in line with the national migration trend, with a slightly higher number of migrants compared to the national average. Until 1993, the share of migrants from other departments towards Trujillo was not different than could be expected from a large Peruvian city.

Table 4.7: Place of birth (department) for selected districts of the Province of Trujillo in 1993

Department	Department: La Libertad - Province: Trujillo Province				
	Trujillo	El Porvenir	La Esperanza	Huanchaco	Total
La Libertad	74.4	87.6	76.0	71.5	78.3
Cajamarca	7.5	4.6	13.3	10.2	7.7
Lima	3.9	1.5	2.1	4.2	3.0
Ancash	3.0	2.2	2.1	3.9	2.6
Piura	2.9	0.8	1.6	2.7	2.0
Other	8.3	3.3	5.0	7.5	6.4
Total %	100.0	100.0	100.0	100.0	100.0

Source:

INEI, 1993, *Censos Nacionales 1993, IX de Población y IV de Vivienda*, Lima.

The migration towards Trujillo Province has until now been considered at inter-departmental migration level. The share of migrants is obviously much higher when considering migration from one district to another. The places of birth of the people living in Trujillo show that migration has been highly important in the growth of the city. As can be seen in Appendix E, the ratio of migrants as part of the total number of inhabitants is highest in the areas that developed more recently. In the central part (district) of Trujillo, about 50% of the population was not born there. The district Victor Larco has the highest ratio of migrants (76%), followed by La Esperanza (72%), Florencia de Mora (71%) and El Porvenir (69%) (Rosner, 1999). This indicates that internal population growth from within the district contributes only to a small part of the total growth of the district. This is not surprising, and just underlines that the city was adopting a more metropolitan character, where districts are no longer separate entities but more interconnected.

There are some differences in the origin of the migrants that moved from different a department or district towards a district in Trujillo Province. Rosner used detailed data to express the different places of birth relative to the number of migrants. The difference between this method and simply taking the place of birth of the total population is that the former excludes those who in 1993 lived in the same district of Trujillo Province as they were born⁶. The data from Rosner (see Appendix E Table 5) shows that about half (53%) of the total number of migrants come from within the department of La Libertad, 17% from the neighbouring district Cajamarca, and 6% from Peru's capital Lima (Rosner, 1999, p.166). This analysis does not change the importance of different regions for migration. However, it underlines more specifically the importance of the migration flows as they have taken place from the Andean mountains towards the province of Trujillo until 1993.

The distribution of the migrants by department of birth in the city of Trujillo in 1993 shows us that some differences exist. First, the migrants from within La Libertad contribute to the largest part of the total number of migrants in El Porvenir and Florencia de Mora. They contribute much less to the total in the district of La Esperanza, central Trujillo and Victor Larco Herrera (see table 4.8 below). The migrants coming from Cajamarca contribute to 26% of the total number of migrants of La Esperanza. In other districts, the contribution is much lower (not exceeding 15%). This can be explained by the proximity of La Esperanza to Cajamarca. La Esperanza is the closest location along the road towards this department. The two departments La Libertad and Cajamarca contributed to more than three quarters of the total number of migrants in El Porvenir, La Esperanza and

Florencia de Mora, and much less in central Trujillo and Victor Larco Herrera. In the latter two, the diversity is much larger. (Rosner, 1999, p. 170-172) From this it can be concluded that the migration from close-by regions was much more important than from regions in other parts of the country (in 1993). This is especially the case in the poorer and less central departments which today are growing fastest.

Table 4.8: Department of birth of the migrant¹ population for selected districts in 1993

Department: La Libertad - Province: Trujillo Province					
Department	Trujillo Central	VL Herrera	La Esperanza	El Porvenir	F de Mora
La Libertad	47.3	42.1	52.2	74.0	68.6
Cajamarca	15.4	14.9	26.4	9.6	14.4
Lima	8.0	11.3	4.2	3.2	3.5
Ancash	6.2	5.7	4.2	4.7	4.8
Piura	6.0	6.3	3.1	1.6	1.6
Other	17.1	19.7	9.9	6.9	7.9
Total %	100.0	100.0	100.0	100.0	100.0

Note:

1. Migrants are all those that have moved from one district to another (e.g. from Trujillo Central to La Esperanza). This defines the group of migrants, whilst for the analysis the department (e.g. La Libertad) of origin is used.

Source:

Rosner, W., 1999, Progresos migracionales y su impacto en el desarrollo urbano: El caso de Trujillo, Perú, in: Suida, H. (ed.), *Salzburger Geographische Arbeiten*, Volumen 35, Insituts für Geographie und Andgewandte Geoinformatik der Universität Salzburg, Salzburg.

The work of Rosner (1999, p.172-190) contains an analysis of the relation between the various migrants in selected areas to other areas. He shows that in 1993, the migrants settling in a certain area showed a strong correlation concerning their place of birth with those settling in close-by neighbourhoods. Thus, within the city the migrants' origins were centred. He shows that most of the migrants from the Andes Mountains settle in the northern part of the city, whereas those from the coastal areas settle in the central and southern part of the city. The migrants coming from the Andes but outside the department La Libertad settle along those neighbourhoods along the northern Pan-American highway, whereas those from the within La Libertad settle in the areas along the road leading to this part of the Andes. Similarly, the migrants from the southern versus the northern coastal provinces settle in different neighbourhoods in the southern part of the city.

Migration has been influential in the shaping of the city. This is equally the case for the central and the more distant districts when considering the place of birth. Most of the migrants are born in La Libertad, about 22% are born in a different department. The migration patterns at the district level show that a strong link exists between neighbourhoods, where movements are generally made to close-by districts or neighbourhoods. This indicates that the metropolitan area of Trujillo is likely to continue to expand in or close to those areas where most of the population lives. Thereby, further growth of the city in the north and north-west can be expected.

4.2.4 MIGRATION TO RECENT SETTLEMENTS

The recent settlements as mentioned in the methodological chapter (see Chapter 3) are areas where horizontal expansion of the city is takes place. The data from the surveys provides information on the migration towards the three selected recent settlements in El Milagro (formerly part of Huanchaco), La Esperanza and Alto Trujillo (formerly part of El Porvenir). Of those living in these

recent settlements, the place of birth, the last migration movement, their location five years ago and the nature of their migration movements are discussed.

The recent settlements of poorer areas of the city are located at the edges of the urban area. They come in the form of squatter settlements (*invasiones*) and areas where plots are handed out via Plandemetru. They include the whole of Alto Trujillo, some areas north-east of La Esperanza, the most western parts of El Milagro, and some areas at the more isolated Alto Moche and Alto Salaverry. The largest increase has taken place in Alto Trujillo, where about 11,832 families have been located since 1995 or 6,345 since 2000. In El Milagro about 4,000 families have settled since 2000. The increase is smaller in La Esperanza, where since the year 2000 about 2,061 families have inhabited the expansions Las Palmeras, Nuevo Indoamerica and Nueva Jerusalén (see Appendix E Table 7 and 8). Furthermore, expansion of Huanchaquito, Alto Moche, Alto Salaverry continues on a steady yet moderate level (Villacorte, 2007). The above described settlements have to large extent⁷ been planned and guided by Plandemetru (see next sections) over the last ten years, when a large influx of migrants was in need of plots. Since 2007, however, new squatter settlements have arisen due to changes in politics (see Section 4.3.2).

The place of birth of the people living in the recent settlements surveyed shows that they house relatively more migrants than the rest of the city. The percentage of people born in La Libertad is 61% on average (see Table 4.9 below), compared to 78% for the whole metropolitan area of Trujillo (see Table 4.7). The northern departments contribute to 32% of the total population, whereas the southern departments contribute to 7% only. Overall, this data shows that those born in the coastal provinces have barely moved to these recent settlements, whereas the departments of the Andes and Amazon basin contribute significantly more to the total population. The second largest department of birth is Cajamarca, accounting for about 15%. Interestingly, the departments San Martin (7%), Loreto (4%) and Amazonas (3%) contribute much more than average to the total population of these neighbourhoods. The migrants having arrived from Lima only account for 2% of the population, similar to the 1993 census. Also, La Libertad’s neighbouring department Ancash hardly contributes to the total population of these settlements, whereas it does in the 1993 data. This means that the population that has left the northern departments is likely to move to the recent settlements of northern Trujillo. Migration from other department remains more important in these recent settlements than in the district as a whole.

Table 4.9: Department of birth for the three selected neighbourhoods

Department	Department: La Libertad - Province: Trujillo Province			
	Alto Trujillo 2B	La Esperanza NJ	El Milagro VII	Total
La Libertad	71.7	61.1	54.4	61.3
Northern	20.0	31.1	41.1	32.1
Southern	8.3	7.8	4.4	6.7
Total %	100.0	100.0	100.0	100.0

Source:

Own survey data.

The data on the province of birth (see Table 4.10) show us from which area those born in the department La Libertad have moved. The most common province of birth is Trujillo, from which 42% of those born in La Libertad have moved to the selected areas. The next largest provinces are all part of the Andes; Otuzco, Sanchez Carrion and Santiago de Chuco. The coastal provinces

contribute significantly less to the total population, with Ascope as an exception. In Alto Trujillo, there is a large share of migrants from Otuzco, and a very small share of the coastal provinces. This indicates less diversity, and a stronger link with the areas in the Andes.

Table 4.10: Province of birth of those born in the department La Libertad (N=147) for the three selected neighbourhoods

Province	Department: La Libertad - Province: Trujillo Province			
	Alto Trujillo 2B	La Esperanza NJ	El Milagro VII	Total
Trujillo	41.9	43.6	40.8	42.2
Otuzco	32.6	14.5	10.2	18.4
S Carrion	11.6	18.2	8.2	12.9
S de Chuco	9.3	7.3	12.2	9.5
Other	4.6	16.4	28.6	17.0
Total %	100.0	100.0	100.0	100.0

Source:

Own survey data.

The collected data on the district of birth of those born in Trujillo Province shows that there is still a link with the location of the settlement and the proximity of other areas. The district La Esperanza is the most common district of birth (see Appendix C-2). Almost all of the eleven districts occur in the samples, with La Esperanza, El Porvenir, Florencia de Mora and El Porvenir contributing significantly more to the total population. In Alto Trujillo, significantly more people have moved from El Porvenir and Florencia de Mora and relatively few from La Esperanza. This shows that the own districts contribute to most of the growth of the recent settlements. The link between the district of birth and district of settlement still exists.

The importance of migration for the recent settlements is further illustrated by the figures for the location of the current inhabitants of the settlements five years ago. Below, this is done at departmental level (table 4.11) and for the metropolitan area of Trujillo (table 4.13). This variable on the location of people five years ago has also been included in the census of October 2007⁸. The three selected neighbourhoods are all recent settlements, which have been established not much longer than five years ago, and some areas within the neighbourhoods are even more recent. The figures for these settlements show that 18% of their population was living in a different department (see table 4.11 below). This figure is slightly higher than the national average over earlier periods and clearly higher than the average for Trujillo (see Table 4.5). The location where migrants lived five years ago is similar to the distribution of the places of birth for the migrants. The number of people that lived outside La Libertad five year ago is about half that of those that were born outside La Libertad. The share of the departments in the Amazon Basin is particularly small, indicating that the migration from the Amazon Basin has reduced significantly over the last five years. Migration over the last five years is more important for those settlements than for the metropolitan area as a whole.

Table 4.11: Department five years ago (2002) for the three selected neighbourhoods

Department: La Libertad - Province: Trujillo Province				
Department	Alto Trujillo 2B	La Esperanza NJ	El Milagro VII	Total
La Libertad	85.0	82.2	80.0	82.1
Cajamarca	6.7	3.3	7.8	5.8
San Martin	1.7	2.2	5.6	3.3
Other	2.0	12.3	6.6	8.8
Total %	100.0	100.0	100.0	100.0

Source:

Own survey data.

The impact of migration in the recent neighbourhoods can be extrapolated to the populated centres and districts where they are located in. This gives the impact of migration on the northern part of the metropolitan area of Trujillo. Table 4.12 shows how this estimation is done. The total number of people settled over the last five years in the district La Esperanza, and the populated centres Alto Trujillo and El Milagro is about 36 thousand. About 17% of the inhabitants were not living in the department La Libertad five years ago. This indicates that only a minor share of the total population in the settlements has recently migrated from other departments.

Table 4.12: Migrant population that five years ago lived outside the of the department of La Libertad

District / Populated Centre	People settled last 5 years ¹	Migrant share (%) ²	Migrant settled last 5 years
Alto Trujillo	18,582	15.0	2,787
La Esperanza	6,035	17.8	1,074
El Milagro	11,714	20.0	2,342
Total	36,332	17.1	6,203

Notes:

1. This figure is based on the number of households settlements since 2000 (seven year period). It is adjusted (multiplied by 5/7) to get a five year period, and multiplied by the average household size to get the total number of people settled over the last five years. The household size of the sample is 4.1 for all three neighbourhoods (see Section 4.2.5 for details).

2. The migrants shares are taken from the survey data. The figure for the total share is weighed with the total number of people settled over the last five years.

Source:

Own survey data.

The data for the migrants from outside the metropolitan area of Trujillo show a different picture. Of the people that settled in the recent settlements, 39% lived outside the metropolitan area of Trujillo five years ago. This share is much higher than the share of people that came from outside the department, and shows that the definition of migrants influences the share heavily. Those that did not live in the metropolitan can be considered migrants, since they lived in much smaller towns or rural areas before. This migration movement is thereby different in nature from those that move within the metropolitan area. From these figures, it can be concluded that migration contributes to much of the growth of the recent settlements. Since they contribute most to the total growth of the metropolitan area of Trujillo (see section 4.2.2 and Appendix E table 5-2), migration plays a significant role in the total growth of the metropolitan area of Trujillo.

Table 4.13: Migrant population that five years ago lived outside the of the metropolitan area of Trujillo

District / Populated Centre	People settled last 5 years ¹	Migrants share (%) ²	Migrants settled last 5 years
Alto Trujillo ³	18,582	43.3	8,046
La Esperanza	6,035	34.4	2,076
El Milagro ³	11,714	35.6	4,170
Total	36,332	39.3	14,292

Notes:

See table 4.12

Source:

Own survey data.

The changes in migration patterns are best understood by comparing the place of birth (from the 1993 census and own data) with the last migration movement. The last migration movement towards the recent settlements shows that La Libertad is by far the most important department, especially in the case of Alto Trujillo (see Table 4.14). Other departments contribute only marginally to the total direct migration. Furthermore, Cajamarca hardly stands out from other departments as a provider of migrants, and the departments of San Martin, Loreto and Amazonas contribute only marginally to the total migration. The southern departments hardly appear as an origin of the migrant population. This is in line with the statistics from the 1993 census, and indicates that the pattern of migration towards Trujillo has not changed. The data indicates indirect migration, as many of the inhabitants of recent settlements are not born in La Libertad. This means that migrants move to other areas within Trujillo Province before moving to these settlements. This phenomenon is strongest for Alto Trujillo. There is no clear pattern in these indirect migration patterns, other than that most of the migrants who moved to La Libertad move to the Province of Trujillo (86%) before moving to the recent settlements (see Appendix C-2).

Table 4.14: Department before last movement for the three selected neighbourhoods

Department	Department: La Libertad – Province: Trujillo Province			
	Alto Trujillo 2B	La Esperanza NJ	El Milagro VII	Total
La Libertad	98.3	86.7	81.1	87.5
Cajamarca		2.2	6.7	3.3
Lambayeque		3.3	3.3	2.5
San Martin		2.2	4.4	2.5
Lima		3.3	1.1	1.7
Other	1.7	2.2	3.3	2.5
Total %	100.0	100.0	100.0	100.0

Source:

Own survey data.

Migration patterns within the metropolitan area of Trujillo towards the settlements show the urban dynamics. These are highly important for the formation of the settlements, as most of the settlers come directly from within the metropolitan area of Trujillo. No direct migration from either Poroto or Simbal is observed, showing that these rural districts are not part of the metropolitan area, are rather isolated and do not contribute to the growth of the metropolitan area. Most of those settling in the recent areas come from La Esperanza, followed by Trujillo, Florencia de Mora and El Porvenir. The different cases show that migration from the own and close-by districts is more

important than from other districts (e.g. El Porvenir contributes to half of Alto Trujillo’s growth). Inhabitants of the districts that are further away (i.e. Victor Larco Herrera, Laredo and Moche) have contributed very little to the growth of the studied areas. This shows that though the share of migrants is significant, they do not often move to different districts within the metropolitan area of Trujillo.

Table 4.15: District before last movement for the three selected neighbourhoods

District	Department: La Libertad - Province: Trujillo Province			
	Alto Trujillo 2B	La Esperanza NJ	El Milagro VII	Total
La Esperanza	3.7	50.7	44.1	34.4
Trujillo	14.8	28.4	25.4	23.3
Florencia de Mora	24.1	7.5	5.1	23.3
El Porvenir ¹	50.0	4.5	3.4	17.8
Huanchaco ²	5.6	1.5	15.3	7.3
Other	1.9	7.5	6.7	5.6
Total %	100.0	100.0	100.0	100.0

Notes:

1. Alto Trujillo is included in the data for the district El Porvenir. See Appendix C-2 for data on Alto Trujillo.
2. El Milagro is included in the data for the district Huanchaco. See Appendix C-2 for data on El Milagro.

Source:

Own survey data.

The reasons for people to migrate include both push and pull factors. They are diverse, and include the need of shelter after disaster, work and education opportunities and affordability. In the case of the migration movement directed towards the recent settlements, the main reason for migration is to find a place for the household only, sometimes forced by high rents. The migrants either lived with family or rented a place before. Work and employment opportunities were reported only in 10% of the cases, and 5% named education (for children) as the main reason. Natural disasters were not often mentioned also in previous migrations, where work was more dominant as a reason. This is in line with the Todaro model, which states that migration continues to be driven by the prospect of employment opportunities in the city. The migration movement towards the settlements can best be described as push factors related to affordability, and the prospect of having a place of one’s own as a pull factor.

Most of the migrants that live in the recent settlements have moved to these areas in steps. They do not move directly from their place of birth to these areas, but much rather move from their department of birth to La Libertad or the metropolitan area of Trujillo, and then move to the recent settlements. This is especially the case when people are born outside the province of Trujillo. Table 4.16 shows that about one-third of the total whom settle moves directly to the new settlements. These are inhabitants of Trujillo Province that often move out of their parents’ houses to live on their own. Only a small part of the population of the recent settlements has moved there in three or more steps⁹.

These migration steps have occurred over the lifetime of the migrants. As the settlements where the survey is carried out have been established rather recently (in the last seven years), the last migration step was undertaken only recently. On average, this move was made about 1.5 years ago (see Appendix C-2). There are some years between this last movement and the previous movement.

This previous move was made 11 years ago on average, though a decent share moved less than 10 years ago. If a migrant has made three or more steps, then the first steps were taken 20 years ago on average. Only a small share of the population has made three or more migration movements, thus older migration patterns seem to be less influential on the migration.

Table 4.16: Number of migration steps of those living in the recent settlements

	Alto Trujillo 2B	La Esperanza NJ	El Milagro VII	Total
One	23.3	35.6	37.8	33.3
Two	61.7	53.3	51.1	54.6
Three or more	15.0	11.1	11.1	12.1
Total %	100.0	100.0	100.0	100.0

Source:

Own survey data

From the above analysis, it can be concluded that migration from the departments north of Trujillo, as well as migration within La Libertad have highly shaped both the city and the recent settlements. In these recent settlements, the movements within the metropolitan area of Trujillo are important. Furthermore, these recent settlements contain more people who are born outside La Libertad compared to the rest of the city.

The type of migration of those people that have moved towards the recent settlements can be characterised in a few ways. First, it is chain migration, where people move from a smaller place to the regional centre or directly to a major city (Trujillo). From there they continue to move, to the more recent settlements that are on the borders of the urban area. As we will see in the next sections, they do so mainly to get their own plot and house. Secondly, the last stage of the migration is mainly of the urban-urban kind, whereas the previous movements indicate rural-urban migration. Specifically, the earlier steps of migration take place away from the rural Andes, and to a lesser extent the provinces of the Amazon Basin. Migration from the more urbanised coastal provinces does not contribute significantly to the growth of the city via the recent settlements. Migration from the coastal provinces towards Trujillo and the coastal districts has taken place in the past, but this does not influence the current extension of the city in the recent settlements. Finally, the location of settlement of the migrants in the recent settlements is linked to the close-by districts. Thus, migrants generally settle in a place that is close to where they used to live. Migration movements of the past will thereby continue the shaping and expansion of the city significantly.

4.2.5 POPULATION CHARACTERISTICS

Within the metropolitan area of Trujillo, spatial segregation by varying incomes and the access to services is clearly visible. For the main part of the city, this is well illustrated in the Environmental Atlas of the provincial municipality of 2003. For the specific coverage of infrastructure services, see chapter 5 of this thesis. In this section, some characteristics of those that moved to the recent settlements are discussed and compared with the rest of Trujillo.

The families living in the recent settlements are not particularly large. On average they consist of 4.1 people of which 1.7 is below 15 years old. The average of 4.1 people as measured in the three settlements is the same as the average measured by the 2005 census¹⁰ (INEI, 2005). This goes against popular belief that those settling in recent settlements have large families. The household size of

those living in the recent settlements often did not change (69%), and in some cases increased (17%). This indicates that population growth is not currently leading to massive growth of the number of the inhabitants of these areas. Also, there is no relation found between income and household size. This is surprising, as theories (see section 2.2.4) suggest that either a positive or negative link exists. Furthermore, there are few changes in household size that are reported. Increases are commonly reported, as children are born. However, respondents barely mention to have experienced a decrease or temporary change in household size seldom occurs. Thereby, seasonal migration seems to be of no influence on these settlements.

The income of the families can be expressed by observing the population in poverty. The district with the least families in poverty in 2002, percentage-wise, were Trujillo and Victor Larco Herrera. Most districts have about 50% poor families, and the northern districts Florencia de Mora, El Porvenir and La Esperanza are inhabited by mostly poor families. (MPT, 2003) The inhabitants of the recent settlements are generally very poor. Their household income is often around or below minimum wage (minimum wage is S/. 500 per month). Only 23% of the household incomes was higher than S/. 500 per month, and most fall into the category of S/. 250 - 500 per month (see Appendix C - 2). When dividing this income by the household size, this means that all but some of the families live below the poverty line. This is not surprising, as it is indicated that 40% of those living in urban areas live below the poverty line as used by the Peruvian government¹¹. The amount of people living in extreme poverty is about 8% in Peruvian urban areas. (World Bank, 2005) An income of about S/. 200 per month for an average household is on the extreme poverty line of \$1.08 per capita per day. The data from the survey shows that 35% of the population lives below a monthly income of S/. 250. Therefore, the share of the population living in extreme poverty is higher in the recent settlements, whilst the share of people living in poverty (\$2.15 per capita per day) is not higher than average.

The prices of land in the different areas show large differences between the central and the more recent districts. The historical city centre is most expensive (over S/.150 per m²), followed by parts of Victor Larco Herrera south of the city centre. The price declines further from the city centre, where the principal roads increase the price of close-by districts. The poorest areas consist of illegal squatting settlements and the legal expansions where plots are provided by Plandemtru. Prices in these two types of settlements are generally below S/.25 per m². The density of neighbourhoods seems to increase over time, with the historical centre as the exception. Some districts seem to develop some local centre towards which the density increases, but this is not the case for La Esperanza where the diversity is larger. (MPT, 2003)

These above described indicators illustrate that the districts at the northern part of the city are generally poorer and cheaper, with the more recently developing parts of the city inhabiting the poorest population whilst providing the cheapest plots. They are the target category for tackling the millennium goals, and thus an interesting population for NGOs and public institutions.

4.2.6 PRELIMINARY CONCLUSIONS

The process of urbanisation has been gradual and ongoing in Peru. Migration towards the coastal cities and internal growth led to a steady increase in the size of the urban areas. This is no different for the department La Libertad, where a steady growth of the population took place and a continuous influx of migrants lead to further expansion of the city. The growth has steadily been

declining since the 1970s, though recently an increase can be noticed. Natural disasters (El Niño) temporarily increased the influx of migrants in the early 1990s, and the population of El Milagro and Alto Trujillo grew rapidly as a result of this migration.

The migration towards the coastal cities in Peru has been mainly rural-urban, where migrants left the Andes. This is also the case in Trujillo. The close-by departments and districts of the Andes contribute significantly more to the total migration than other areas. The importance of migration on the total growth of the city is moderate. It is especially visible in the rise of recent settlements that continue to develop in the more recent districts of the metropolitan area. Differences in income between districts are large. Recent expansions as they take place at the borders of the city are amongst the poorest, and continue to be formed. These settlements are formed mainly north and northwest of the city, and show a relatively strong link with the close-by district. Thereby, both internal growth and chain migration continue to lead to the horizontal expansion of the city to the north and northwest.

4.3 SETTLEMENT PROCESS

4.3.1 HISTORICAL OVERVIEW

In the national policy of Peru, land issues has been a contentious topic over the last half century. The aspects of neighbourhood organisation and more recently property rights have gotten much attention (amongst others by John Turner and Hernando De Soto respectively). This is illustrated by the notion that until the 1960s, the national government's policy was direct towards the formal provision of housing only. In 1961, a policy of accepting squatter settlements and providing them the prospect of obtaining property titles was developed. So during the period from 1963-1985 (including the military regimes), houses were constructed for the middle class, and squatter settlements were accepted. Only from 1985 onwards was there active involvement in improving these settlements, and property titles were provided. In 1992, a change of policy took place, and decentralisation combined with a reduction of government involvement lead to a situation where market forces were expected to regulate the provision of plots in urban areas. (Calderón Cockburn, 2007)

This policy and the issues mentioned by the government concerning settlement in recent expansions are limited to land issues and property rights. Until recently, there have been few governmental programmes directed towards the provision of housing and the urban poor. This sets Peru apart from other countries in a similar setting. By doing so, the economic costs and political conflicts have been limited, since for much of the poor Peruvians the main issue was the need for plots. (Ramírez Corzo and Riofrío, 2006, p. 12-19) Nowadays, the government-subsidised programmes concerning the urban poor mainly deal with land issues, rather than the provision of housing or improving neighbourhoods. As we will see later on (section 4.3.2 and 4.3.3), the current division of responsibilities puts much pressure on the individual, at and neighbourhood level, which can lead to the ineffective and inefficient development of neighbourhoods.

The responsibility of handing out property titles has changed between various actors. Until 1980, central government was responsible for handing out property titles. This changed in 1980, when the municipalities became the responsible actors. In 1996, the agency COFOPRI took care of all formalisation of informal property. Their role was limited again in 2001, when the prime responsibility was transferred to the Provincial municipalities, with COFOPRI as an assisting agency. Under the current administration, the recognised organisation became COFOPRI once again, with no role left for the provincial municipalities on the authorisation of informal property. (Calderón Cockburn, 2007) As we will see in section 4.3.3, this is the general case for Peru, but especially the recent changes are differently coped with in Trujillo.

The processes of settlement in Peruvian cities can be portrayed by considering the sequence of some processes. These are the obtaining of a plot, securing it and ensuring a property title, the construction of houses and the obtaining of services (infrastructure services, schools, hospitals, parks, etc.) A distinction is made based on the legal situation and the change in role of COFOPRI. Calderón Cockburn (2007) describes that in the late 1990s, the property title was provided only after a neighbourhood or block had been established and serviced and thus characterises the process of settlement as follows:

- Obtaining land (via squatter settlements/relocation);
- Securing a plot;
- Constructing houses;
- Obtaining services;
- Property titles.

The massive handing out of property titles under the *Plan Nacional de Formalización* (PNF) at the end of the 1990s has changed this process so that today, as he claims, the process has the following sequence:

- Obtaining land (via squatter settlements/relocation);
- Property titles / securing a plot;
- Obtaining services;
- Constructing houses (Calderón Cockburn, 2007).

In the case of Trujillo, various procedures have existed next to each other, under different authorities, subsidy programs and at different locations. These different procedures show some varieties on the two above described sequences. Even so, these are basic differences, that apply to most areas in Peru (and most likely all of the rural areas). The different patterns of settlement up to 2003 are elaborated on by Amemiya Hoshi¹² in her work on especially Alto Trujillo (2003, p.53-68). In Trujillo, squatter settlements have existed since the 1940s. They were recognised as Marginal Urban Neighbourhoods (*Barrios Urbano Marginales*, or *BUMs*) and correspond to large parts of the districts El Porvenir, Florencia de Mora, Michael Grau and La Esperanza. Since the 1970s, squatter settlements were formed at the vacant areas that were surrounding these districts. The provincial municipality guided the process soon after the occupation of vacant land, from 1981 onwards. In both these cases, the process goes according to first sequence described above, where the property titles are handed out after the neighbourhoods have been serviced. This process of settlement is carried out similarly in the case of illegal sales of plots, where the authorities do not interfere at all in the process after the first occupation, thus tolerating the occupation and construction of houses. This has been the case in the Industrial Park of the regional government in Trujillo over the last 25 years¹³.

The process of ‘guided occupation’ (Ocupación Guiada) is often referred to by Peruvian planning authorities, with Alto Trujillo as the main example. Here, the planning and handing out of property rights occurs before the occupation of land, after which the construction takes place and services are provided. By doing so, large inflows of migrants were provided plots rapidly during the 1990s (Amemiya Hoshi, 2003). These property rights are of a temporary nature, and cannot be sold to others, and so they are similar to the first sequence as described above by Calderón.

Finally, there are the programmes implemented by the national government where formal housing is provided; *Techo Propio*, *Urbanizaciones Populares* and *Habilitación Urbana Progresiva*. The former is established to provide an alternative to the illegal occupation of land, with a process similar to guided occupation. The program *Techo Propio* and *Habilitación Urbana Progresiva* have been implemented in the district of Manuel Arévalo in Trujillo over the last 20 years, but only on a limited scale¹⁴. The programme *Urbanizaciones Populares* is more influential in Trujillo, and directed towards the middle and lower-middle class (Amemiya Hoshi, 2003). These programmes are limited in scale or not targeting most of the urban poor. They are further discussed in section 4.3.3. The neighbourhoods established under the latter two programmes are the only ones in Trujillo,

next to the commercially viable construction, that provide services before the actual construction of houses takes place. This means that there is a constant pressure on the further expansion of infrastructure services as the expansion of the city continues in different ways.

4.3.2 CURRENT SETTLEMENT PATTERNS

The current reality of Trujillo is different from the above presented description that is more general and historical. The settlement in Trujillo is described in detail below, with special attention to the characteristics of the recent settlements and differences within the city.

- Basically three different processes of settlements are identified in this study of the recent expansions of the metropolitan area of Trujillo. These are the following:
- Settlements that were occupied in a guided way;
- Squatter settlements that are (expected to be) subject to relocation;
- Squatter settlements with a tolerated illegal status for a prolonged period of time.

The first type, guided occupation, is the case in the older part of the samples of Alto Trujillo and Nueva Jerusalén in La Esperanza. Here, Plandemtru has planned roads and public areas, and plots are distributed amongst the population in need of these plots. The procedure of obtaining a plot is via a standardised procedure with clear requirements (see section 4.3.3). The planning of public areas as well as the handing out of well-defined plots are part of the initial stage. Next, construction of public areas as well as houses takes place, after which infrastructure services can be applied for. Property rights are granted only later on, but security of plots is guaranteed. This process thus follows the line of the 'guided occupation' as described in the previous section. Although plots cannot be sold formally, this is happening in parts of Alto Trujillo. Here, squatters try to obtain a plot, and then change the name under which it is registered. The buyer will pay up to S/. 300 for a plot, without having all the legal rights¹⁵. The main problem is that many that do not sell their plot leave the neighbourhood, as they move somewhere else. This leads to half-occupied neighbourhoods, which are therefore unlikely to get full infrastructure services (i.e water, sanitation and electricity) installed.

The second group concerns settlers that occupy vacant land close to recently established neighbourhoods. Examples of this can be found in Nueva Jerusalén (sector II and III) and at many areas around the northern settlements of Alto Trujillo. The studied area Alto Trujillo 2B is also surrounded by some squatters. The squatters build only basic housing, in a very dense and organic way. These squatters demand plots from Plandemtru at the same time, and hope to be relocated. In this situation, there is much uncertainty as to what will happen, and when. In the case of Alto Trujillo 2B, the people occupying vacant land originally destined for industrial use are still waiting to be relocated, whilst the highly similar and close-by settlement on the other side of the 2B have been promised plots and roads in the area they used to. The inhabitants of these areas were not aware of the differences, and they expected to be treated similarly.

The third group, which has the tolerated illegal status, occurs in a large part of the sample of El Milagro, where settlements are located on the property of the regional government as part of the Industrial Park. Within this group, important differences exist: some land was vacant before occupation, while other blocks were illegally claimed by small scale industry (*corralones*). Where the land is vacant, the squatters invaded the area and settled down organically, but soon established

a more organised form of occupation. Public areas were reserved and new plots indicated before occupation took place there. In the case that land has been claimed by entrepreneurs for industrial purposes, this was done by constructing a wall, either from bricks or more common with adobe blocks. When the claimed area is not in use, either the population in need of plots tear down these bulwarks and use the material to start constructing, or the 'owner' divides the area himself and sells plots. Both these two ways of dealing with *corralones* are present in El Milagro and are highly undesirable. The first is undesirable because the industrial representative is likely to put a claim on his land after occupation, which can and has led to life-threatening situations for the squatters¹⁶. The second situation is undesirable since it concerns illegal sales and accordingly high prices for the plots¹⁷ whilst no official rights are transferred.

The level of consolidation of a neighbourhood is linked to the construction materials used. This link exists in two directions. For the authorities, it is much harder to relocate or change the plots once houses are built with adobe or bricks. The population, on the other hand, only starts constructing with decent materials when they expect it to be worth the investment. Improving the house is delayed mainly for two reasons; a lack of money or because the household doesn't have its own plot yet (see Appendix C-3). The level of consolidation does not have to be formalised, as the above described category of prolonged squatter settlements shows. Over the last decade, there have been no cases of forcing the departure of settlements that were reasonably consolidated in Trujillo. There is thus a balance between the public policy and the actions taken by the migrants, where the expectations of the migrants for obtaining a plot are not set very high.

The investments made and materials used typically follow a sequence. First, a family lives in a reed-mat house. A one- or two-roomed house is created, with poles and reed mats for walls and roofing. There are often no provisions taken to improve the floor. Plots are not clearly indicated, and the density of the neighbourhood is high. In the cases of informal settlements that are planned to be relocated, migrants often construct with mats only. In the next stage, plots are more clearly defined, either by the authorities or by self-organisation. Reed houses are moved for some time to these new plots, and construction with better materials is done elsewhere on the plot. A shaft is dug, about half a metre deep, and foundation stones are placed. On these, construction with adobe blocks (either reinforced with natural fibres or just plain adobe) starts. The roofing materials are often first provisional (reed mats, poles with plastic bags, small corrugated iron sheets, etc), and improved at a later stage. Some families can afford to build the roof with good materials (poles, mats and adobe) immediately, whereas others continue with provisional roofs for years. Further extension of the house and improvement of the floor indicate a high level of establishment, as does the construction of brick walls. Cement flooring and brick walls are rarely used in the recent settlements studied.

This sequence is clearly visible in the surveyed areas. A strong relation is found between the time since arrival and the materials used. For the materials used for the walls, this can be seen in Table 4.17. Those that moved to the current location less than a year ago construct mainly with reed mats, though about one third has already started building with adobe. The use adobe has become the most common material in recent years, whilst 28% continues to live in reed-mat houses. Families start building with bricks only after two years of settlement, and even then this construction material barely appears in the studied areas. The link with other parts of the house (floor, roof) shows a similar tendency, with a less defined pattern than the walls (see Appendix C-3).

Table 4.17: Construction materials of the walls by the time since arrival

	Under one year	Under two years	More than two years	Total
Adobe	34.8	68.5	80.0	50.8
Mats	63.1	27.8	11.1	45.4
Bricks	1.4	1.9	8.9	2.9
Other	0.7	1.9		0.8
Total %	100.0	100.0	100.0	100.0

Source:

Own survey data.

From these processes of settlement, it can be concluded that the current situation in Trujillo has changed considerably. It is different from both the ideal situation where property rights and services are installed before settlement takes place, since services are installed only much later in the process. The process of settlement of this study differs from the situation in Trujillo as described by Amemiya Hoshi in two ways. It differs since it includes the Industrial Park of El Milagro. Here, no guidance from any public authority takes place with regard to the plots. Also, this research shows that the current situation has changed for the most recent settlements in areas where guided occupation was planned. These are squatter settlements that show their demand for land by actually invading vacant areas. This has not happened before at this scale over the last decade in those areas where Plandemetru is responsible for the planning. The process of settlement has become slower, and delays before services are requested and installed have increased.

4.3.3 ACTORS INVOLVED AND NEIGHBOURHOOD ORGANISATION

There is a variety of actors involved in the process of the expansion of the metropolitan area and the settlement in new neighbourhoods. The number of actors involved with migration as such is relatively limited. Many more are actively participating in the actual settlement of people moving to new areas. The most important actor is Plandemetru, the planning office of the provincial government.

The national subsidy programmes¹⁸ from the ministry MVCS have had a significant impact on the construction sector in parts of Lima and some other large cities. In Trujillo, however, these programmes have had very little impact from 2004 to 2007. There were only three projects carried out under the various programmes, two in central Trujillo and one in La Esperanza. The planned extension of these programmes in cities other than Lima happens slowly, and the requirements for neighbourhoods are often hard to meet by poorer areas and experience is first gained in and around Lima¹⁹. Other recent programmes from the central government concerning housing ('Techo Propio', 'Techo Propio Costo Cero') have had only a marginal impact in the poor urban areas of Trujillo. This is mainly because a neighbourhood needs a decent level of consolidation before one can apply. Inhabitants of the poor neighbourhoods do not know of these subsidy programmes, and municipalities are not involved in the process of application²⁰. Most of the subsidy programmes such as 'A Trabajar Urbano' and 'Banco de Materiales' have a highly disintegrated system of subsidy provision, with little coordination between them (Calderón Cockburn, 2007). It can thus be concluded that the national government has little direct influence on the housing situation in the poor urban areas of Trujillo. Since the ending of the national housing fund (FONAVI) in 1998, the involvement of the national government in the supply of housing in the urban areas outside Lima has been much more limited. This is basically because the focus is on improving the situation in rural areas, with a reduction of migration towards the coast as the main goal²¹. Potentially, the more

recent programme 'Techo Propio Costo Cero' and 'Techo Propio' can influence most of the recent settlements in Trujillo. The programme MiBarrio is less likely to have impact on Trujillo (Estéves Dejo, 2005). To use this potential, better coordination between the neighbourhoods in Trujillo and the Ministry MVCS, as well as tender-support from NGOs are required.

The regional government of the department La Libertad is the most important actor in the Industrial Park, and outside this area not involved in the urban developments of Trujillo. The responsibilities of the regional government are mainly related to the rural areas. Over the last few years, the socio-environmental issues related to the booming mining sector, and coastal developments related to erosion are the main priority²². They do not actively try to influence the migration patterns to and from the rural areas of La Libertad. The Industrial Park in Trujillo, northwest of La Esperanza, is property of the regional government. The regional government has to apply to the national government's ministries to change the zoning plan, so that it can be used for residential instead of industrial purposes. In this case, the park was originally designed to attract and locate new industry, but as the demand declined over the years, the land available in the park was never fully occupied. As a result, the regional government has been slacking in the relocation of the squatter settlements, although they had originally intended to. This applies to the studied case of El Milagro (i.e. Las Molinas), where a high level of permanency of the building has been reached too. Furthermore, the management of the Industrial Park does not try to limit or support the inhabiting of industrial plots (*coralones*). Thereby, squatters inhabit these plots and entrepreneurs threaten them to relocate. Mediation from the management of the Industrial Park could solve these issues beforehand. Overall, the policy of the regional government towards settlement in the Industrial Park is vague, and should be changed to actively sustaining and using the zone for either industrial use, or for residential use.

The most important actor concerning the metropolitan city of Trujillo is the planning department of the public authorities of Trujillo Province, Plandemetru. They are the main authority concerned with planning, and are involved with the spatial design and allocation of public works (such as squares, parks, roads), as well as the allocation of plots in (often vacant) areas of the province and providing them to the applicants. This area includes the municipalities of the various districts and populated centres, and does not include the property of the regional government. As part of the planning of vacant land, they act as an intermediary between the need for urban expansion and the expansion of the special (agricultural irrigation) project Chavimochic. This task is increasingly important, since the most recent urban expansions on the northern side of Alto Trujillo are touching upon the planned land designated for agricultural use. The office Plandemetru has gained in-depth knowledge on developments, and its effectiveness and efficiency concerning the handing out of plots is of a high level. Perfect!

The responsibility for providing property rights has traditionally been of the national institution Cofopri. They are active in most urban and all rural areas of Peru. In La Libertad, the provision of plots has been dealt with by Plandemetru. They do not provide property rights that can be sold to others, but apart from that there is no practical difference²³. Over the last five years, several laws to change the handing out of property from local authorities to Cofopri have been approved by the National Congress. This has lead delays, as data was transported from provincial governments to the office of Cofopri, and needed revision. The situation concerning the populated centres and municipalities within the metropolitan area of Trujillo is different. Plandemetru still deals with these, though Cofopri claims to be the responsible actor for these areas too²⁴. Changes in the

responsibility are unlikely to lead to improvement, as Plandemetru has been dealing with the expansion of the city and the handing out of plots over the last decade in an effective way. The temporary changes of responsibilities and forced slowing down in the handing out of plots has led to the rise of new squatter settlements in Alto Trujillo. Such situations should be avoided, and changes in the responsibilities for providing properties should be considered with great care.

The municipalities are involved in the process of settlement in two ways. They have planning departments that deal with the execution of projects, and they coordinate the neighbourhood organisation via committees. The planning departments from the municipalities are mainly concerned with the planning of the public areas, such as parks, roads and levelling of land. Project proposals from various committees (*comités*) are considered, and when approved executed. The municipality often subsidises labour and fuel, and provides machinery. In the case of Alto Trujillo, the municipality pays S/.700 of the total S/.1,200 per day, the inhabitants of the neighbourhood (or block) pay the rest. The municipalities of Alto Trujillo and La Esperanza do not undertake any levelling of land before the population has applied for it, mainly to discourage the appearance of squatter settlements²⁵. This is in line with the settlement process where the provision of services is only the last step, but considerably increases costs for carrying out the levelling.

The neighbourhood organisation is generally coordinated by the municipalities. Different committees are formed (for general issues, different infrastructure services, health and children, etc) and a local president is elected yearly. The relation between the municipalities and these committees differs. In El Milagro, no coordination exists, and the presidents active in the studied area do not have regular contact with the municipality or each other. In La Esperanza, the contact of the neighbourhood's population with the municipality is mainly via a separate office (*participación vecinal*), which after approval can get the representatives in contact with the relevant public servants. Involvement from this office is low, and knowledge of the actual situation not up to date. This is mainly due to a lack of dedicated manpower and resources. As a result, the coordination of neighbourhood improvement in La Esperanza does not take place via the municipality, but much more in an informal way. Local presidents that live further away from each other do not have contact with each other, even though they often share many characteristics and problems. The municipality does not provide sufficient support in the services that they offer (such as the availability of machinery for levelling), which leads the population to distrust the municipality's goodwill²⁶. In Alto Trujillo, the topic of neighbourhood organisation is much higher on the political agenda. Alto Trujillo has the status of an independent authority (*centro poblado*) since 2002. Since then the municipality has managed to receive support from NGOs. These are recently starting to function as an intermediary between with the local presidents and representatives of the municipality. The prospects for improving the process of settlement and obtaining of infrastructure services are good. However, continuity and independency of the NGOs are prerequisites here.

The involvement of NGOs involved with the processes of migration and settlement are limited in Trujillo. In the capital Lima, the neighbourhood organisation of earlier settlers has led to their own non-profit institutions and attracted NGO involvement. In Trujillo, this has not happened, and neighbourhood organisation has only recently become an issue for the NGO Intervida Trujillo. Their planned efforts to bring together different local representatives can have a positive impact on the process of settlement and obtaining of services²⁷. This will be especially the case when Intervida systematically provides support when these representatives deal with other institutions.

Furthermore, the weak link between neighbourhoods and governmental programmes can be improved with the knowledge and efforts from Intervida.

From this analysis, it can be concluded that the impact on migration patterns is limited. Plandemetru has dedicated an area in which the city can grow, and follows the migration movements of the population by providing plots to squatters. This has been done rather effectively, though changes in administration and uncertainty of responsibilities led to a slowdown of the provision of plots. The organisation of neighbourhoods happens on an ad-hoc basis, where formal responsibilities are not backed up by support. Involvement of NGOs has been limited in these processes, and can improve the contact between various actors and increase knowledge of the existing possibilities for improvement in the recent settlements.

4.3.4 PRELIMINARY CONCLUSIONS

The process of settlement in new areas in Peru has been dealt with in various ways. Squatting has generally become less common, and formalization of property is carried out on a large scale. The expansion in the poor areas of the metropolitan area of Trujillo is coordinated by Plandemetru. Under their supervision, large settlements were created and formalized and squatting became uncommon. The last year, squatters invaded vacant land again, as the process of handing out properties slowed down.

When recent settlements are established, the population is provided with plots without services. The processes of obtaining these services have yet to start. There is thus a constant need for further expansion of the infrastructure networks. Plandemetru and other actors are thus responsive to the population rather than pro-actively dealing with migration and growth of the city. In Alto Trujillo, illegal sales of plots are becoming more important, and stricter control of Plandemetru will be required. The case study of El Milagro shows that the regional government allows squatting in practice, and allows neighbourhoods to settle on areas dedicated for industrial use. Within three years after arrival, most of these settlements have reached a medium to high level of consolidation that makes relocation hard.

The next steps in getting services are to be taken by the organisation of the neighbourhoods. The contact with the municipalities is often insufficient and the different committees get little support. The NGOs active in Trujillo have insufficiently gotten involved in the organisation of neighbourhoods Trujillo. Thereby, the local presidents and committees deal with most applications themselves. Continuous involvement of NGOs by monitoring the process, advising local representatives and mediating between actors improves the situation. This is mainly since knowledge about developments increases and processes can be speeded up.

5 INFRASTRUCTURE SERVICES IN TRUJILLO

5.1 INTRODUCTION

The use of infrastructure services by the urban poor is a key element in this research project. In this chapter, the various services are discussed. These are water, sanitation, electricity, waste disposal, and telecommunications. Each of these systems is discussed in separate sections respectively.

For each of these different services, the following research questions are answered:

“Which infrastructure services and in what quantities and quality are delivered within the poor urban areas of Trujillo?”

“How does the process of obtaining by and delivery of infrastructure services to the urban poor take place?”

What linkages exist between migration, migrants, infrastructure services and the process of delivery of these services?

Before discussing the infrastructure services into detail, a more general description of the importance and the differences between the various services is given below. All of the information provided here is specified in the respective chapters, where a more in-depth analysis explains the details and driving forces of these differences.

The importance of infrastructure services as a basic need is widely recognised, and has been elaborated upon in the theoretical background (chapter 2). The data from the questionnaires carried out in Trujillo show that the main perceived problem with regard to the current living circumstances is the lack of decent infrastructure services; 68% mentioned only infrastructure-related problems as the main problems, 13% only non-infrastructure service related problems, and 18% a combination of these two groups. The lack of decent water supply was by far the most mentioned problem, followed by the lack of decent sanitation facilities, and electricity supply. The collection of solid household waste and services related to telecommunications were hardly mentioned. (See Appendix C-4).

The coverage and the speed of expansion of the various infrastructure services differ substantially. There are services that take longer to install due to the more complex infrastructural requirements (sanitation, and to lesser extent water), but it is mainly the decision-making procedure and the actors involved that determine the timing of installation. This is visible with the electricity net, which has been installed rapidly in many parts of the recent settlements. This is also a result of the efforts of the electricity company that is willing to increase its coverage, and to provide intermediary solutions (provisional net). Something technically far simpler, the collection of solid household waste, is not carried out in most settlements. In the case of telecommunications, the system that requires connection to a physical network (landlines) is expanding slowly. Good alternatives (mobile phones and a newly developed type of landline) exist and are used extensively.

This happens with water provision too; the alternatives are used for a long period of time before the public net is installed. Alternatives are not used in the case of waste disposal, and only marginally in the case of sanitation. Thereby, the difference between the various infrastructure services in terms of expansion, coverage and the exploitation of temporary solutions are large.

The impact of migration is mainly visible through the emergence of new settlements at the city margins. Within those settlements, the impact of migration is much harder to determine; the place of birth, former locations and timing of migration are factors that do not explain the behaviour and characteristics of those living in the settlements. Nonetheless, the ratio of migrants in the recent settlements is high (as explained in the previous chapter) and their origin diverse. Thus migration is a driving force behind the formation of recent settlements. It is therefore relevant to inspect the on-going processes that are put in place to obtain and improve the infrastructure services.

There are differences between the three locations studied in the cases with respect to the infrastructure services offered and their quality. These differences can to a large extent be explained by the behaviour of the different actors. Alto Trujillo enjoys much more involvement from NGOs and the coordination and support from the municipality is decent. In La Esperanza the recent settlements are treated differently and get formal support, but practical actions remain limited. In El Milagro, there is very little involvement or interference by the municipality. This is the case in both the areas that fall under the populated centre El Milagro and those that are still property of the Regional Government. This has an important impact on most of the services, with the exception of telecom services.

The quality of the services (water, sanitation, etc.) can be compared via the perception of the end users. Respondents indicated the quality, using a five-point scale. There are no significant differences found for this indicator. The data often lacks a normal distribution, and is often skewed. This means that users find, for example, the quality of the services related to the delivery of water no better or worse than those of telecommunications. Significant differences are found when the different options for the specific each service are compared. This is done in the respective sections.

In the next sections, the different infrastructure services are discussed separately. The sub-chapters all have the same structure: firstly there is an elaboration on the current situation and developments concerning the coverage of the service. Then, there is a description of the conditions in the recent settlements as observed through the questionnaires. Following that, the actors that are active with that particular service and their strategies are discussed. Finally, I draw some conclusions concerning the three above-mentioned research questions for the respective infrastructure service.

5.2 WATER

5.2.1 INTRODUCTION

The delivery of drinking-water supply to the poor is one of the main challenges for the large Peruvian cities. The tackling this problem is done by a great many actors, and delivery of drinking water occurs in a variety of ways. These options differ highly in price, and occurrence in the recent settlements.

The main sources used for this section are the national census of 1993 and 2005 (INEI, 2003a; INEI, 2005a), the Environmental Atlas of Trujillo (MPT, 2003), data obtained from Sedalib (Sedalib, 2007a) and the survey carried out by the author, as well as from the interviews with the various actors.

5.2.2 CURRENT SITUATION AND DEVELOPMENTS

Water can be obtained in many ways. Since Trujillo is located in a desert, it is not possible to use natural rivers¹ or natural springs as sources of water supply in most parts of the city. Furthermore, rainfall is scarce and thus not an option for regular provision. This lack of natural water supply, combined with fertile soil, has led to the realisation of a large scale irrigation project: Chavimochic. The metropolitan area of Trujillo has benefited greatly from the investments of the project. Large amounts of good quality water² are transported to the metropolitan area and its agricultural surrounding, where it is used for either agriculture or consumption. (SUNASS, 2004b) In addition to this, groundwater is obtained from deep wells, going down to more than 100 meter in depth.

In the metropolitan area of Trujillo, there are the following types of water supply for drinking water:

Public net: The public net with in-house taps is the most commonly used mode of drinking water supply. The water is delivered via the public net to the house (front door), where a meter is installed to measure the amount of water used. From there on tubes deliver the water to personal taps (in-house or in the garden) and personal storage tanks.

Public tap: Public taps are taps outside the building, to which the water is delivered via the distribution net by the water company via a distribution net, and the taps are used by a block or various families. One person is made responsible for the payment to Sedalib.

Public basin: The public basin (*pozo publico*) consists of a covered basin with a tap. The tank is filled by water trucks/tanks, after which individuals buy smaller quantities from the person in charge. The basin is often constructed with bricks overlaid with cement. The basin cover can be of cement, reed with cement or wood with plastic.

Water trucks: Water trucks like those used to fill the public basins are also used to distribute water to the population directly. The water truck enters a neighbourhood where they fill the (personal) barrels, buckets and jerry cans of the queued population. Though private trucks operate as well, those delivering directly to the population (thus not via basins) are owned by the local governments.

Tricycles: Tricycles are used to deliver water to households. The tricycle carries 200 litres (55 US Gallon) in a plastic tank or (much less common) in an oil drum. The water originates from the public net, and is only sporadically tapped from the public taps.

Leakage: Storage reservoirs that are used to store and deliver water to the public net and taps are often located on hills and higher parts of the city. At the connections of the main pipes, water is often leaking or dripping. This water is collected by simply placing a bucket underneath.

These various sources are used throughout Trujillo, and their proportional use shares characteristics with the general Peruvian situation. Table 5.1 shows these differences between three areas (Peru, the department of La Libertad and the Province of Trujillo) for 1993 and 2005 (see Appendix F for absolute figures). In all these regions, the public net has become more important. The second most-used source in Peru and La Libertad are rivers, natural streams and similar sources. Their use has become much less important, though they remain the second most important source. Looking at the province of Trujillo, the single most important source is now the public net; and public taps have become much less relevant. Another interesting trend is the increased use of the shared public net, with a connection outside the building. In general, it can be concluded that the quality of the type of water supply is improving. Also, the variety of alternative sources for those that do not have a connection to the public net continues to exist.

Table 5.1: Types of water supply used in Peru, La Libertad and Trujillo Province in 1993 and 2005

	1993			2005		
	Peru	Department La Libertad	Province Trujillo	Peru	Department La Libertad	Province Trujillo
Public net	43.1	48.9	70.6	60.4	66.5	82.3
Public net outside building	3.6	1.1	2.0	7.1	4.7	3.4
Public tap	10.7	9.8	11.4	4.8	4.3	3.2
Public basin	11.6	16.4	7.2	7.4	9.8	2.8
Water truck	5.2	2.6	3.7	4.0	1.7	3.0
River etc	23.2	18.7	2.8	12.6	8.1	0.3
Other ¹	2.5	2.5	2.3	3.9	4.9	¹ 5.1
Total percentage	100.0	100.0	100.0	100.0	100.0	100.0

Notes:

1. The group 'other' is large for the case of the province of Trujillo in 2005, amounting to more than any of the other sources other than the public net. This indicates that other sources (i.e. tricycles and storage basin) are a very important alternative, or that the measurement error is very large.

Sources:

1993 data: INEI, 1993a, *Censos Nacionales 1993, IX de Población y IV de Vivienda*, Lima.

2005 data: INEI, 2005a, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

Thus the province of Trujillo, in general, has a high coverage of the public net, with other sources being much less important. However, the differences between the districts of the province are large, and the net coverage in the less central and less densely populated districts is much lower. The data for the three districts shown in table 5.2 illustrates these differences (see Appendix F for an overview of all districts).

Between 1993 and 2005, the coverage of the public net has increased in all areas except El Porvenir. The main part of the neighbourhoods with public taps has been connected to the public net, thereby making the use of public taps proportionally much less common. The use of water trucks has become less common in central Trujillo, but not in the northern suburbs La Esperanza, El Porvenir, Florencia de Mora and Huanchaco. From this it can be concluded that although the expansion of the public net has been ongoing, the alternative sources that are not directly related to Sedalib still play a vital role.

Table 5.2: Types of water supply used in three selected districts of Trujillo Province in 1993 and 2005

	1993			2005		
	Trujillo central	La Esperanza	El Porvenir	Trujillo central	La Esperanza	El Porvenir
Public net	87.2	65.0	77.2	89.7	84.8	72.2
Public net outside building	4.4	0.3	0.4	5.5	0.7	3.6
Public tap	7.5	28.6	9.4	1.4	3.5	8.3
Public basin	1.1	1.0	1.5	1.0	0.8	2.1
Water truck	2.6	2.0	6.3	0.5	2.4	5.7
River etc	0.3	0.7	0.6	0.0	0.0	0.0
Other 1	1.4	2.4	4.6	1.9	¹ 7.9	¹ 8.2
Total %	100.0	100.0	100.0	100.0	100.0	100.0

Notes:

1. Again, the measurement error for the year 2005 contains a large share of the alternatives or measurement error for the public net.

Sources:

1993 data: INEI, 1993a, *Censos Nacionales 1993, IX de Población y IV de Vivienda*, Lima.

2005 data: INEI, 2005a, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

The development of the public net of Trujillo shows how it has followed the expansion of the city, as can be seen on the map of Appendix F Figure 1. One of the main features of today's network is that the highly interconnected system does not include the whole of the metropolitan area of Trujillo; Huanchaco (excluding El Milagro), Moche, and Salaverry are dependent on a relatively autonomous system. This part of the public net is not separately treated in this thesis. The oldest part of the public net of Trujillo dates back to 1930; part of the first distribution net north-east of the city centre is still intact, and most of the city centre's network that was built between 1951 and 1970 is still used. This part of the network has proven to be problematic, due to obsolescence and the increased pressure on the system, and needs to be replaced urgently³. The network in the less central areas of the city is much younger. Most of the network of the northern districts Florencia de Mora, la Esperanza and El Porvenir was established between 1971 and 1990, when the military governments invested heavily in infrastructure in the poorer areas⁴. The expansion of the network between 1990 and 2001 did not keep up with the urban expansion and catching up in the earlier expanded areas was still the main characteristic of the programme. (MPT, 2003) In the Investment

Programme 2005-2010, the expansion of the networks in those more recent areas have high priority. Included are the neighbourhoods Las Palmeras and Nueva Jerusalén (district La Esperanza) and large parts of the populated centre Alto Trujillo (Sedalib, 2007b). From the above, it can be concluded that the bulk of the maintenance that needs to be done has to be carried out in the central part of Trujillo. The network nowadays covers most of the city, yet the outward expansion of the network needs to continue to cover those areas not yet serviced. The most recently established areas are not yet included in any investment programme, so it is safe to say that before 2010 no public net will be installed.

The use of public taps as a main source remains common in absolute terms, their proportional usage has decreased. Recent data illustrates that they are mainly used in La Esperanza, where about 112 taps were used in May 2007. This number is similar to 2005, and with an average of 15.6 registered users/households per tap, about 1,717 households are using taps (Sedalib, 2007a). This number is considerably higher than the 1,042 households from the 2005 census data (INEI, 2005a), and could easily be much higher, as informal agreements can be made between the representative of the neighbourhood and its inhabitants⁵. The total number of taps (see Appendix F , table 5) has not changed much over the last five years. They were used as temporary solutions in Florencia de Mora, and recently new taps have been installed in Huanchaco. In Alto Trujillo⁶, they have hardly been installed, mainly because the coverage of the public net is low, thereby making it technically difficult to create enough pressure to supply to the taps as used in the current systems⁷. Since expansions in the net are ongoing, new possibilities for installing public taps will arise and their use as an alternative source in the expansions of the city can be expected to remain large.

Concerning the complete set of available options, the three cases studied in Trujillo show that those different systems co-exist; none of the studied areas showed one exclusive system. The public net with in-house connections is not available in these areas, as it takes up to ten years before the public net is installed. The maps of Appendix F show in which part of the area the various water sources are located. It indicates that a relatively small part of the whole neighbourhoods is served by public taps (all outside the house). Often, a mixture of various services co-exist within the neighbourhoods of the recent settlements.

A variety of water services is used in Trujillo, where the public net is the most important service in most areas. The coverage of the public net is increasing. Therefore, areas where migrants have arrived are increasingly served by the public net. Differences between the various districts of Trujillo are still large. Coverage is lower in the northern districts, where the most recent areas exist. The most recent settlements are basically served by alternatives, as can be seen in the next section.

5.2.3 RECENT SETTLEMENTS

The delivery of water in the recent settlements occurs mainly via systems alternative to the in-house connections. In the three areas studied, the alternatives used are different for distinct. This variety makes for an interesting analysis, which is demonstrated clearly in the data from the questionnaire.

The usage of the different alternatives varies between the three cases, as can be seen in Table 5.3. Combined⁸, the public basins are the most common form in general; they are almost the only source used in Alto Trujillo, but are hardly used in Nueva Jerusalén. Tricycles appear only in El

Milagro, there they are used amply. This variety in popularity of services should always be taken into account when discussing the water situation in the recent settlements; they are discussed below in more detail.

Table 5.3: Usage of the different services in the three selected neighbourhoods.

	Alto Trujillo - 2B	El Milagro - VII	La Esperanza - NJ	Total %
Public basin	90.0	21.1	2.2	31.3
Public tap		20.0	50.0	26.3
Water truck		1.1	41.1	16.3
Tricycle		53.3		20.0
Other	10.0	4.4	6.7	6.3
Total %	100.0	100.0	100.0	100.0

Source:

Survey by author.

In the case of Barrio 2B in Alto Trujillo, the main source of water supply is via public basins. Water trucks only deliver indirectly to individual customers; they fill the public basins after which units are sold separately by the owner or executive. There is no network of public taps, nor do tricycles deliver water. The latter is hard due to the slope, which makes it hard to deliver. The alternative to the system of public basins makes use of the neighbourhood 2A, next to 2B; this area has in-house public net, they sell or provide water for free in small quantities to those living close by (for maps of water services for the three case studies, see Appendix F figure 2).

The case of Nueva Jerusalén shows more variety in used sources of water supply. This is particularly interesting since it is located close to Barrio 2B and borders with Alto Trujillo. The older part of Nueva Jerusalén (sector I) is connected to public taps, where branches of pipes are created by parts of a block. The more recent area (sector II) uses water delivered directly by water trucks. In the most recent settlement (sector III) there is no service, so that inhabitants of this area either go ask other families for some water (from public taps), or use the water leaking from the close by storage reservoir.

In the case of El Milagro VII, a wide variety of options is used as well. The oldest part is connected to public taps, though not everyone living close to a tap uses this service. Both the older and the more recent neighbourhoods make extensive use of the service provided by tricycles, and some privately owned basins exist. Despite the lack of formal coverage of the public in-house net, two households managed to get an individual connection to the public net⁹. The areas next to sector VII (both north and along the Pan-American Highway) have full coverage from the in-house public net. There is no contact with these areas, so that unlike in Alto Trujillo, this alternative is not exploited.

The situation in these three cases can be extrapolated, where the situation is highly similar to the rest of the recent settlements of the respective municipalities. Thus in all parts of Alto Trujillo where there is no public net, the service is provided via public basins. This means that because the density of public basins in this area is higher, costs of water delivery are lower, making this service more attractive. Tricycles are found in many areas of El Milagro, but nowhere in any of the other districts. The case of Nueva Jerusalén is characteristic for all of the recent settlements of La Esperanza; water trucks deliver directly to the population where no public net or taps exist. From

this it can be concluded that the physical characteristics, to some extent, but mainly the involvement of different actors and the existing system in neighbouring areas combined determine the actual system used.

The different systems of water delivery lead to a different amount used. The least amount used is by those that receive their water directly from water trucks- 55 litres/day per household. They receive their water two times a week, often on two days following each other; so that the amount that one can use during the week is limited by either the storage capacity (plastic buckets) or the total amount delivered. This explains this very low usage. Those using a basin use significantly more, 75 litres/day per household. Just as with the trucks, the water has to be carried to the house personally, which is both tiring and time-consuming. The users of tricycles and public taps use about the same amount; about 100 litres/day per household. Both these systems provide the possibility of receiving water every day or two days (often with public taps, the users are divided in two groups which share turns). Those that have most recently moved to a squatter settlement will often get only water from the trucks, except for all of El Milagro, where tricycles are available. The above shows that though all people living in the recent settlements use little water, there are still big differences due to the existing system of water supply.

The costs for the use of water differ significantly amongst the different systems (see Table 5.4). Those receiving water from trucks do not pay anything for this service. The water from taps is cheapest, about S/.2 per m³. This consists of the normal price for water as charged when connected to the public net, plus some added amount for the maintenance and similar activities. Much more expensive is the water from the basins; here the water is delivered via trucks, and sold in small quantities for S/.8 per m³. Basins can be privately owned or be an investment by a block of houses. When privately owned, the owner needs to recover the investment of the basin, and often wants to earn with the sales as well. Water from tricycles is the most expensive; about S/.15 per m³. The water is delivered to the house by a tricycles, the cyclist makes a living from this service, which increases the price of water significantly.

The affordability of the different services is clearly linked to the type of water supply used. Those with a tap spend only one percent of their income on water. Those with a basin spend a considerable share of their income, namely 5%. Those with tricycles spend 11% on average on water. When a household spends more than 10% of its income on water by the use of 20 litres per person per day, the service is considered to be unaffordable. Thereby, the delivery of water via tricycles is very expensive, also to international standards. Though water via basins is relatively expensive, it is considered affordable.

The usage and price combined show that the water received from tap is the cheapest (after the trucks that deliver for free), even whilst the usage of those using a tap is highest. The usage influences the expenditure (twice as much water used is twice as much paid), but does clearly not influence the monthly bill as much as the type of service used (see table 5.4 above). It is thus desirable for those living in the recent settlements to get connected to the public net as fast as possible, even if this means using public taps instead of in-house taps. Also, the investment on building a basin is recovered within weeks or days; this indicates that either the service of tricycles is deemed better than that of a basin, or that investments are hard to make.

Table 5.4: Usage and price characteristics for the different services.

	Household usage (litres / month)	Price per m ³	Expenditure per household per month	Expenditure / household income (%) ¹
Truck	1,671	-	-	-
Tap	3,068	2.1	4.6	1.2
Basin	2,274	8.3	18.0	4.8
Tricycle	3,000	15.0	44.4	11.4

Notes:

1. The household income was included in the survey in categories. The maximum value of the categories are taken, since they are closest to the expected income. The analysis is carried out at the household level and for the actual amount of water used. The average amount of water used is 22 litre per person per day.

Source:

Survey by author.

The expensiveness as perceived by the end users is in line with the prices paid; the responses are best explained by the price per m³, less by the monthly expenditure. Those with a public tap are very likely to consider the price very cheap or cheap, whilst those with service from tricycles are very likely to find the price very expensive. Those using either a public basin or any other service (except trucks) find their service slightly expensive. The price does not seem to change or vary over time; about 70% of the respondents had not experienced any change of price, whilst an increase was experienced by 18%. Hardly anyone mentioned a decrease in price (1%). Those with service from tricycles experience significant variations (between the summer and the winter period), whilst few using a different service noted any variations. From this it can be concluded that though the prices might not have fallen, they have not increased much either. Small changes in price might not influence the choice for a certain type of service, as prices are very different for each service.

The different types of service used are partly a result of the actions taken by the inhabitants. Most inhabitants have taken some kind of action upon arrival to get their water service improved. These come in several forms; personal action to get water, consulting someone to deliver water, and combined actions to get water. Individual actions consist of contacting a vendor, or asking at the neighbouring block; these seem to confirm the status-quo in the system used. More interesting are the combined actions, as they facilitate change. In the older part of Nueva Jerusalén (section I), cooperation of inhabitants was large, and combined efforts led to massive stealing from the public net and storage reservoir, after which a fine had to be paid. Though large (about S/.2,300), this was combined with investments from the inhabitants and the promise from Sedalib to install public taps, and for some years they have been using this service. In El Milagro, the combined investments in tubes and efforts (digging) also lead to the installation of public taps. Further expansion of the systems of public taps seems unlikely, as Sedalib is not in favour of them (see next section). Nonetheless, combined actions can lead to the improvement of the system; be it either by building basins or getting connected to the taps. Efforts to get the local president or authorities to improve the service from the trucks (e.g. visiting more often) did not show clear results, and tangible improvements were made.

Planned actions for improvement are much less common; about half report not to have any such intentions. Responses are dependent on their current situation; those receiving water from the trucks report that they want more storage, whilst those with public taps want to visit authorities to get the in-house net. People receiving water from the trucks are likely to want to construct basins, an action that is of the least interest to those serviced by tricycles. The area where the NGOs and

authorities have the most contact with the population, Alto Trujillo, is also the area where the inhabitants are most likely not to take any actions, and are less likely than the other areas to contact the authorities. This can indicate trust in the authorities, and support for their strategies. It can also indicate limited neighbourhood organisation, due to limited coherency and negative prospects. It is possibly a combination of both; people will wait or leave but not take much action. In many of the recent settlements, combined action has shown to be a means for improving water services. Opportunities for further development and rapid recovery of investments exist in both La Esperanza and El Milagro.

The differences between the water systems in the various recent settlements are large. The situation concerning the delivery of water is different in each of them; they all share the lack of coverage from the in-house public net. The situation is similar in the recent settlements in the rest of each district, which shows that the physical characteristics are of minor importance. Different alternatives show different characteristics, which can be seen in the price, usage and satisfaction. Furthermore, they are partly a result of actions taken by the inhabitants, as well as by the various other actors involved in the delivery of water services.

5.2.4 ACTOR STRATEGIES

The existence of various ways in which water is delivered to the population means that different actors are involved. Furthermore, there are the different authorities (national, provincial, local) and NGOs that influence the delivery of each service. Their main strategies and influence are discussed in this section.

The privatisation process has somewhat changed the actors involved in the Peruvian water sector. The Peruvian market has been divided into urban and rural areas. In the urban areas, the sector consists of different companies (*Empresas Prestadoras de Servicios de Saneamiento*, or EPS), each responsible for a certain urban area and its inhabitants. They have been established since 1994 and can be of a public, private or mixed character. These companies have representatives of the municipalities. In addition to this the rural areas are served by municipalities and in the case of Lima, under authority of the national government. (SUNASS, 2004b, p. 17-29) In the case of Trujillo, Sedalib is the respective company, and the most important actor in Trujillo. This company has a board with representatives of the municipalities, thereby being of a mixed character.

An important distinction can be made between investments and maintenance. Maintenance is in all cases done by Sedalib, whilst investments in the expansion of the net are optional for Sedalib. In the current circumstances, this means that Sedalib does not invest much in expansions. Financing of new projects mainly comes from the central government. Such projects are thus financed by the central government, carried out by Sedalib, and all delivery of the water is done by Sedalib. In the past, groups of people living in the recent settlements were able to invest in pipes, so that they could get public taps connected. Sedalib is no longer supporting this strategy, claiming that the pressure is quite low and expansion of the net via public taps problematic for a guaranteed delivery⁸. This means that the best and the cheapest service provided in the recent settlements will not continue to expand. This will increase the demand for alternatives; thus more trucks will be needed in Trujillo to deliver water directly or via public basins.

Another important actor in the water sector is the supervising authority SUNASS (*Superintendencia Nacional de Servicios de Saneamiento*), which was established in 1992. Its function is to regulate, supervise, standardise and penalise the privatised companies as well as those that were delegated to institutions other than the state. (SUNASS, 2004b, p. 18-19) Their office in Trujillo has a limited capacity, and has just recently been installed (December 2006). Before that date, only limited supervision by Sedalib had taken place¹⁰. The office organises public discussion forums when important decisions must be made, therefore providing the opportunity for the representatives of the population to be heard. For many years, the lack of a decentralised office was a serious flaw in the functioning of the system. Furthermore, concerning complaints, their services are formally limited to those already provided by Sedalib, thus excluding any influence on the process of obtaining a connection of any type. This means that there is no involvement of SUNASS in the recent settlements, whilst representatives of these areas continue to visit and speak on public hearings organised by SUNASS. SUNASS could take up the role as a voice of the people in these areas in the future, within the existing legal framework.

By comparing the characteristics of the company Sedalib S.A. with the Peruvian average, some differences become apparent. As can be seen in table 5.5, the coverage for water by Sedalib is much lower than the national average. At the same time, the price for water is much higher and the average number of hours that the water is delivered daily much lower. This data for 2002 has not changed much, showing that the performance is lagging behind the national performance of water companies. (SUNASS, 2004a, p.31-33). The discussion on the efficiency also concerns the board, which still comprises mainly political positions, where SUNASS prescribes more technical staff involvement. To what extent the board makes decisions benefiting their own position is subject to an ongoing debate, but seems less relevant to the work of the company on the short term. On the longer term, quality improvements can be achieved.

Table 5.5: Indicators for company performance in 2002

Indicator	Sedalib SA	National Average
Coverage water	77%	83%
Coverage sanitation	71%	74%
Price [Soles/m ³]	1.70	1.33
Continuity [average hrs/day]	7.0	17.3

Source:

SUNASS, *La calidad del agua potable en el Perú*, p. 33, Lima.

The efficiency of the company is also improved via a reduction in the loss of water. The loss of water reached its peak of a stunning 45% in 2005, and has been decreasing since then. Sedalib has (temporarily) terminated the contracts of those connected households that did not pay. By doing so, the actual number of connected households decreased from January 2005 to January 2007, and is only recently increasing again (see Appendix F Tables 6 and 7). Furthermore, the disconnecting and sabotaging of meters has become higher priority for Sedalib. Of major concern here are mainly those connections that have been in existence for a longer period of time already, and much less the recently installed meters¹¹.

The municipalities have a direct say in Sedalib, while at the same time they have the option of providing other water services in those areas not connected to the public net. The latter is done only on a very limited scale; the municipality of La Esperanza has one truck freely delivering two

times 12 m³ per day to different settlements¹². Other municipalities have no such service at all, and their limited resources and lack of formal responsibility to provide water services are the main reasons not to provide them. The provincial government, with Mayor Acuña, have started to deliver water by truck to different areas. From January 2007 this was done with one tank of 8 m³, more were planned to be bought in autumn 2007¹³. Hereby, the provincial government delivers a limited yet essential service to the population in need, whilst gaining political support in return¹⁴. Possibilities for further expansion of this system exist, as the recent settlements will continue to grow and demand alternatives. In El Milagro, the trucks are not very popular; inhabitants often comment on the limited frequency of the visits of about once a week, with more frequent visits only around election time. If political support is desired; a well functioning, frequent and consistent delivery service is necessary. Since this service does not have to be provided for free, opportunities exist for such expansion by either Acuña or other investors.

In Trujillo, the only NGO active in the provision of water related aid is Circulo Solidario. They have built a great many public basins in Alto Trujillo, mainly with financial foreign (Spanish) support. They no longer continue to build these, as they consider it more efficient to focus on streamlining the investments and the building of the public net. Their influence on the population not served via the public net has been large in the past, especially in Alto Trujillo where the most basins were built. Due to strategic changes and different priorities, their direct involvement in the existing and future recent settlements, and their role in the water sector in general have become very limited.

From the above characterised setting and behaviour of the various actors, it can be concluded that the main focus is on Sedalib. This scenario has been created by a strong focus of the municipalities on Sedalib, whilst actively participating in the delivery of water to the urban poor that have recently settled. The involvement of NGOs is very limited, and has been focused almost entirely on Alto Trujillo. With new involvement of the provincial government, not only has the delivery of water to the most recent settlements improved, but a new incentive for other actors to meet the needs of the population has been created as well.

5.2.5 PRELIMINARY CONCLUSIONS

The delivery of water in Trujillo happens via different systems. These have developed under the influence of a city expanding continuously via squatter settlements; it are these areas that use distinctive alternatives. The public nets have gradually expanded, covering an increasing share of the city. The expansion of the network did not manage to keep up with migration and expansion of the city until 2001, this has changed since then and coverage is increasing. The need for alternatives will continue to exist, as it takes about ten years for the recent settlements to get connected to the public net.

The delivery of water via alternative systems differs highly in price and quality. The price paid for water per m³ is 15 times higher when using tricycles instead of the public in-house net, other services are also more expensive. The public taps as the best alternative. Since these will no longer be installed, the demand for an increase in the quality and a lowering of the price of the service is high, and will continue to be the demand of an increasing amount of people. Water from tricycles is not affordable to international standards, thus supply via basins is preferred. The migrants living in recent settlements do not receive support rapidly from NGOs or municipalities. It takes up to

two years before basins are installed. Often, neighbouring blocks provide assistance during this time, but this service is limited. Depending on the future rate of migration, possibilities for NGOs, private companies and especially municipalities to improve these services are many.

The expansion of the public net is a clear result of migration towards the recent settlements, and the infrastructure is clearly adequate when this service is provided. Both the efforts from the national government (investments) and Sedalib are effective in the metropolitan area of Trujillo. Before the public net is installed, actor involvement and strategies are limited and of poor quality; leading to an ineffective and expensive service for many inhabitants of the recent settlements. The aid by constructing public basins improves this situation. Since Circulo Solidario has decreased their involvement, new possibilities for local authorities and NGOs are ample and changing. Political and financial gains are possible for those willing to invest in the recent settlements; especially since migration towards and the expansion of Trujillo continues to create new squatter settlements.

5.3 SANITATION

5.3.1 INTRODUCTION

Sanitation services are of poor quality in most of the more impoverished expansions of the Peruvian cities. The expansion of the public sewerage net is expensive and time consuming. Intermediary solutions are developed by the poor themselves, whilst involvement of other actors is scarce. This leads to a sub-optimal situation that causes illness and discomfort.

The main sources used for this section are the same ones as those for the section on water; the national census of 1993 and 2005 (INEI, 2003a; INEI, 2005a), data obtained from Sedalib (Sedalib, 2007a), the Environmental Atlas of Trujillo (MPT, 2003), and the data from the questionnaire as carried out by the author, as well as from the interviews with the various actors.

5.3.2 CURRENT SITUATION AND DEVELOPMENTS

Sewage disposal takes place in various ways. A main distinction between the various options is the use of a service that is connected to the public sewerage net, and one that is not. In the first case, an in-house connection is most common, though also public bathrooms exist. When there is no sewerage net available, various other options are used.

In the metropolitan area of Trujillo, the following sewage disposal systems are used:

Public sewerage net: individual households or collective public toilets are connected to the piped underground sewerage system. Payment is made for the connection only, not for the amount of users or usage.

Latrines: a small scale system where the sewage is disposed into an underground storage reservoir. The disposal can take place via pipes or directly via a hole in the covering element. The reservoir is made from cement, stones, wood or a combination of these materials. The reservoir is optionally ventilated. Cleaning and emptying is done by the owners of the latrine.

Cesspit: a hole in the ground in which the human waste is not stored, but dissipates into the ground over time. The hole can be either open or covered with mats, wood or a cement top. The walls of the shaft are sometimes reinforced with stones or wood.

Open field/none: close-by open areas or uninhabited ruins (former adobe houses) are used for sewage disposal. Often, users take no measures to prevent stench or other discomforts.

In practice, the differences between cesspits and latrines are not absolute; much rather a variety of technologies executed with large differences in quality of workmanship are common. The same applies for the technological differences between cesspits and the use of an open field; often a simple hole is dug and covered after use of several weeks. The main difference here is the location and ownership; either in one's garden (cesspit) or further away (open field).

These different options as they are used in Trujillo differ very much in usage: most households are nowadays connected to the public net, others use a latrine or cesspit (see Table 5.6). The extension of the public sewerage system on a large scale is something that started after 1975 (Amemiya Hoshi, 2003, p. 89) when the military government invested heavily in the poorer areas of the city, thereby interconnecting the existing lines that had already been installed after 1951. Nonetheless, coverage is still far from full, and extension of the network takes place slowly, especially in the areas that have been recently expanding, as we will see below.

The most important option for those not connected to the public sewerage net is the use of cesspits or latrines. Contemporary developments show that this use of latrines or cesspits has not decreased very much, and with 16 percent coverage in 2005 this is an important system for many. In this respect, Trujillo is different from the national and departmental situation, since in Trujillo Province in 2005 only about 5 percent of the total number of households had no service whatsoever. This is partly due to the work of the NGO Circulo Solidario, and is also due to the expansion of the city; using a type of localised (rather than the neighbouring field or 'none') disposal was required, since there were less vacant areas surrounding the new settlements.

Table 5.6: Types of sanitation used in Peru, the department La Libertad and Trujillo Province in 1993 and 2005

	1993			2005		
	Peru	Department La Libertad	Province Trujillo	Peru	Department La Libertad	Province Trujillo
Public net	35.7	40.5	64.2	48.5	50.9	74.3
Public net outside building	4.3	1.9	3.0	4.8	1.8	2.8
Septic tank ¹	-	-	-	2.8	1.8	1.5
Latrine or cesspit	20.5	21.3	18.8	22.9	25.7	16.4
River, ditch or canal	1.7	1.2	0.7	1.6	1.3	0.2
None	37.8	35.0	13.2	19.3	18.4	4.7
Total %	100.0	100.0	100.0	100.0	100.0	100.0

Notes:

1. The category 'septic tank' was introduced in the National Census of 2005 only. The variety of septic tanks in 1993 was part of the category 'latrine or cesspit'.

Sources:

1993 data: INEI, 1993a, *Censos Nacionales 1993, IX de Población y IV de Vivienda*, Lima.

2005 data: INEI, 2005a, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

The public net in the Trujillo Metropolitan area has thus continued to expand after 1993. Coverage increased significantly, but differences at district level are striking (see Table 5.7). The expansion rate was slightly slower than the migration rate, which is very visible in El Porvenir; in this case the migrant area Alto Trujillo was not fully serviced, thereby reducing coverage of the public net in El Porvenir with 5 percent, whilst the absolute number of people without any system stayed the same and the number of people using latrines multiplied by three. Those poor areas that expanded more slowly received better coverage in 2005 compared to 1993; though in La Esperanza the absolute use of latrines stayed the same.

Table 5.7: Types of sanitation used in three districts of Trujillo Province in 1993 and 2005

	1993			2005		
	Trujillo central	La Esperanza	El Porvenir	Trujillo central	La Esperanza	El Porvenir
Public net	83.8	57.4	62.0	88.9	75.4	57.5
Public net outside building	5.7	1.4	1.3	5.8	0.5	0.9
Septic tank ¹	-	-	-	0.6	1.0	1.9
Latrine or cesspit	4.6	29.2	21.4	2.5	18.8	32.8
River, ditch or canal	0.4	0.3	0.5	0.1	0.0	0.2
None	5.4	11.6	14.6	2.2	4.3	6.7
Total percentage	100.0	100.0	100.0	100.0	100.0	100.0

Notes:

1. See previous table, note 1.

Sources:

1993 data: INEI, 1993a, *Censos Nacionales 1993, IX de Población y IV de Vivienda*, Lima.

2005 data: INEI, 2005a, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

The public sewerage net has not significantly expanded from 2002 onwards in the poorer parts of Trujillo. The data on the public net connections shows that the growth of the number of connections from 2002 until 2007 in the metropolitan area of Trujillo is fully accounted for by two old districts including their richer extensions (see table 5.8). The other districts even show a decline in the number of connections, which is mainly due to massive cutting off to those that did not pay their bills for some consecutive months (see Appendix F table 6 and 7). This cutback took place at the end of 2005¹⁵, and was most noticeable in the poorer parts of the city that had expanded rapidly over the last 20 years (La Esperanza, Florencia de Mora, El Porvenir & Alto Trujillo, and El Milagro). It initially affected 6 to 21% of the households; over time many of these households got themselves connected again. Since 2002 to 2007, no large scale connecting of the poorer new settlements has taken place, thus coverage has hardly increased in any of the areas within recent settlements.

Table 5.8: Sources of growth of the number of active sewerage net connections

	Trujillo Metropolitan area	Trujillo Central	VL Herrera	Other districts
January 2002	100,752	45,946	6,680	48,126
January 2007	105,421	49,537	8,243	48,031
Difference	4,669	3,591	1,563	-95

Source:

Sedalib, 2007a, *Maestro de variables comerciales*, Sedalib S.A. Gerente Comercial – catastro de clientes, Trujillo.

These statistics show that sanitation services are especially lacking in those districts that the poorer population inhabits, where migrants have moved to over the last few decades. In the last couple of years, no expansion of the public net has taken place. Therefore, almost all of the recent settlements use either latrines, or just use the open field.

5.3.3 RECENT SETTLEMENTS

There is no public sewerage net available in any of the three selected cases. Also, none has managed to get connected to the sewerage net in the neighbouring areas, nor come up with an alternative interconnected system themselves.

In the recent settlements, the most commonly used option is the open field (see table 5.9 below). This means that often no adjustments have been made to the living environment concerning excrement disposal. This lack of adjustment can partly be explained by the lack of ownership and thereby lack of willingness to invest; squatter settlements with a less clear status are more likely not to have a latrine or cesspit installed. The case of El Milagro shows that this cannot fully be the reason; this whole area is divided into plots, and has reached a higher level of permanency of the houses, yet the lack of latrines and cesspits is still common (37%). In all cases, the proximity to an open area increases the likelihood to this area for sanitation purposes, thus a larger distance from such an area decreases the usage. Finally, there are some people that have shared solutions: some use public toilets, (on a sustainable basis only three households, the rest use toilets that fill up and will be useless afterwards), a couple of households share cesspits.

Table 5.9: Use of different alternatives for sanitation in the three cases.

	Alto Trujillo 2B	El Milagro VII	La Esperanza NJ	Total
Open field	71.7	36.7	56.7	52.9
Latrine	5.0	54.4	18.9	28.8
Cesspit	16.7	6.7	17.8	13.3
Other	6.7	2.2	6.7	5.0
Total %	100.0	100.0	100.0	100.0

Source:

Survey by author.

The latrines that have been built in El Milagro are mainly a result of individual investments made. Such personal investments are much less the norm in La Esperanza and hardly the case in Alto Trujillo. These latrines in El Milagro are often of good quality and with ventilation installed. In both other areas, the open field is the most commonly used option. This option exists in El Milagro as well (a dry river is used by many), but is less popular. The percentage of cesspits used is not very large, even though basic cesspits are easy to make. This indicates that using the open field is considered a better option than using a cesspit, or that building a cesspit is still considered considerable work and investment.

The experienced quality of the sanitation type indicates that the quality of all the types used are poor (4.2 average on a 5-point scale). Of these alternatives, the latrine is considered the best. Those that have built a cesspit find it of better quality compared to those that use the open field. Therefore, the investment or difficulty of building a cesspit is still considerable.

The main problems as they are experienced by the users differ per sanitation type. Those that use the open field consider danger (in the form of other people) the main problem¹⁶. Contamination of the plot and area is most frequently reported by those that use a latrine. Those with a cesspit consider the unhygienic situation the main problem, followed by the work involved in repairs of the cesspit.

The actions taken to improve the situation upon arrival were not many. Some people contacted the local president (13%), or some authority (7%), but most reported not to have taken any action. The public sewerage net is only installed after or together with the public water net, so that it is likely that these services are expected to be installed together. Nevertheless, the amount of people that reported an improvement of the service to NGOs or local municipalities is very low. This is

especially so when considering that Circulo Solidario has been installing latrines in many recent settlements, but hardly in these three cases studied. Where they have been installed (some parts of El Milagro), they are poorly used: the doors and corrugated iron sheets are often removed and used elsewhere, and garbage is thrown in the basin as well. In this way, trust that the situation would improve by contacting others seemed rather low. This situation is different when considering the planned actions. Many are planning to construct something themselves (37%), some will ask their local president (9%) or other authorities (21%) to take action. There seems to be trust in the authorities to be able to take action. This is different in El Milagro, where inhabitants are least likely to take any action or look for help from institutions. Many have built their own latrines here and contact with the authorities is much scarcer here. The trust in improvement with help from others is lower, while self-help is higher.

The above analysis shows that the type of sanitation services used are of poor quality, with many possibilities for improvement. Especially the most recent settlements, where no latrines have been built yet, experience this poor quality and the danger of using the open field. Self-help leads to an improvement of the situation, whilst actions from authorities and NGOs were scarce and without much result in these settlements. Apart from self-help, there are other options that have not been implemented in any of these settlements, such as shared toilets under municipal or NGO supervision. This would require some investment, but technically, creating some alternative system would not be too challenging¹⁷ as conditions (smells, flies, and direct contact with the contaminated area) would improve immensely. Such alternatives can be installed to create a much safer and more hygienic living environment, whilst contamination would be reduced.

5.3.4 ACTOR STRATEGIES

There are not a great many actors active in the provision of sanitation services in Trujillo. In general, there is a large focus on providing final sanitation services, thus getting a neighbourhood connected to the public sewerage net. With regards to intermediary solutions, particularly individual actions as well as the work of Circulo Solidario are important.

The company in charge of the sewerage net is Sedalib S.A., the same one responsible for the public water net. Their policy has been to focus on disconnecting those that do not pay their bills and to keep the existing services affordable. They made no investments in the actual tubes and net, but were involved in the expansion of the net as the company responsible for executing the national governmental programmes. Sedalib claimed these to be executable only if an additional connection were made to the sewerage treatment plant in Huanchaco. This has proven to be a strategically successful demand; all areas north of the city centre are or can now easily be connected to this plant. This plant has a large capacity and is not located close to the inhabited areas. Over time, also El Milagro will be connected and their plant will become extinct¹⁸. Therefore, expansion of the sewerage net will remain technically feasible in all the northern districts (Alto Trujillo, El Porvenir, Florencia de Mora, La Esperanza and El Milagro) and Huanchaco¹⁹. These are also the areas where further growth of the city via (squatter) settlements can be expected. This means that if governmental or foreign funding of expansion of the sewerage net is ensured, expansion and almost complete coverage can be established.

The extension of the sewerage net is only relevant on the longer term; on the short term (up to ten years) the inhabitants have to use alternative solutions. In this field, the NGO Circulo Solidario has

been an important player. They have placed a great many latrines of good quality²⁰ in the Trujillo Metropolitan area. For this, they received funding mainly from the Basque Government (Spain). These programmes have ended; settlements established after 2005 no longer received these latrines. These latrines have decreased much of the spread of diseases, since they were installed since 2000, when Alto Trujillo and other parts of the city had to deal with the large influx of migrants²¹. Apart from the advantages of having a latrine, there are some remarks as well. The focus of Circulo Solidario has been almost exclusively on Alto Trujillo²², an area more likely to get connected to the public net than the more separated smaller settlements. Furthermore, in all areas the latrines were often no longer functioning properly, due to a lack of maintenance and demolition for re-use of the materials. Finally, many latrines were placed soon after squatter settlements were established, so that changes in those settlements lead to large scale non-use of placed latrines.

The strategy followed for years by Circulo Solidario was to provide intermediary solutions concerning sanitation, whilst at the same time delivering educational programmes on sanitation and health, as well as the strengthening of the neighbourhood organisation. Officially, Circulo Solidario would negotiate with Sedalib to find longer-term solutions, both direct and via the municipalities (i.e. via the representative in the General Board of Sedalib). Despite good intentions and a clearly defined NGO policy, in practice only little resources and time were spent on these negotiations. This changed in 2007, when the focus shifted towards longer-term diplomacy, and the organisational aspects of infrastructure services. As a result, Circulo Solidario has become less active in the field of sanitation in general, as well as in the recent settlements²³. Furthermore, the lack of openness of the NGO in general²⁴ makes it unclear for both the local presidents and inhabitants what their prospects for receiving any service from Circulo Solidario are.

The municipalities and the provincial government have not taken any actions to provide solutions preceding the installation of the final public net. The health centres, which are run by the national government, provide information on hygiene, but do not provide practical solutions for excrement disposal in the form of information or hardware. Thereby, the government at all levels has very little involvement in the temporary solutions, whilst hygiene and disease control is one of their priorities in poor urban areas.

5.3.5 PRELIMINARY CONCLUSIONS

The lack of alternatives in the recent settlements lead to massive implementation of own-built cesspits. These are often of inferior quality, leading to discomfort and the need for regular reconstruction. Over time, latrines of reasonable quality were built by the inhabitants. The influx of new settlers did not lead to a type of neighbourhood organisation that builds temporary collective solutions concerning sanitation, nor did other actors provide intermediary solutions. Migration has thus had negative effects on the average level of sanitation provided. Thereby, the current situation in the recent settlements is rather poor where it concerns sanitation.

The strategies of Sedalib basically consist of two aspects: to demand structural improvement of the network before connecting large amounts of households, and to increase efficiency by disconnecting offenders. Up until the time of writing, this has lead to a stop in the growth of the coverage over the last couple of years, with particularly negative effects in the more recent districts. More positively; this will allow for long-term growth and large expansion of the network in those

areas where squatters have settled and formal expansions have taken place, also when these areas continue to grow.

Opportunities for involvement of NGOs or local governments exist. The setting up of shared units for sanitation for a block or several blocks seems the most promising alternative. Actors could negotiate delivering services. Investments could be made with a reasonable one-time charge whilst a monthly payment could be set up via local representatives. Though solutions are not easy to provide, they can lead to well-functioning alternatives for the currently poor situation.

5.4 ELECTRICITY

5.4.1 INTRODUCTION

The electricity networks in Trujillo cover most of the city. The technological advances and the drive to serve new areas are the main reasons for ongoing expansions. However, the coverage in the recent settlements is poor; large parts are not connected, and those areas that are connected show low coverage.

The data used for the description of the metropolitan wide coverage of the electricity net are deduced from the Environmental Atlas of Trujillo and the national census. Furthermore, strategies and developments concerning the actors involved are derived from personal interviews with employees of Hidrandina and OSINERGMIN. The data collected via questionnaires as well as observations are used for the analysis of the use of electricity in the recent settlements.

5.4.2 CURRENT SITUATION AND DEVELOPMENTS

The system of electricity supply has expanded considerably over the last decade. Thereby the coverage of the metropolitan area as a whole is good. This delivery of electricity to the households goes via different sub-networks, which can continue to expand. The households have three different ways of getting connected to the electricity grid in Trujillo. These are:

Definitive: a household gets connected to the three phase electricity grid. Per connection a transformer is installed to synchronize the phases, so that they become usable for household use. The connection from the house goes via a meter, so that the individual use is registered.

Provisional/collective: a group of houses gets connected to low current electricity net. The posts and wires as well as the installation are taken care of by the users themselves, under supervision of Hidrandina. Payment is done via a committee. The network serves delivers either tri-phased or mono-phased connections.

Clandestine: these consist of either extensions of the provisional network by those not registered, or as illegal connections/tapping from someone who has a definitive connection. In the latter case, wires are most often buried in the sand.

There is not much data on the occurrence of these different options; the census' of 2005 takes into account the possibilities and alternatives for cooking, as do the different ENAHOs, but they do not differ between these various options of electricity supply. This is a pity, because it would have allowed for a comparison over time, which could show the immense improvement of the quality of the system used for delivery of the electricity to the households.

The coverage of the system in Trujillo Province is impressive; it improved from 81% in 1993 to 92% in 2005. This means that despite the large influx of new migrants into the city of Trujillo, Hidrandina has managed to increase coverage further (see Table 5.10). Compared with the national and departmental coverage, the coverage in Trujillo Province is high.

Table 5.10: Use of electricity in 1993 and 2005 for Peru, the department La Libertad and Trujillo Province.

	Peru		Dep: La Libertad		Prov: Trujillo	
	number	%	number	%	number	%
¹ 1993	2,430,666	54.9	135,827	54.8	95,225	81.2
² 2005	4,228,934	72.2	232,552	69.7	149,853	91.7

Notes:

1. The data for 1993 is obtained via the question “Do you have electricity in your house?”.
2. The data for 2005 is obtained via the question “what type of lighting do you use?”

Sources:

1993 data: INEI, 1993a, *Censos Nacionales 1993, IX de Población y IV de Vivienda*, Lima.

2005 data: INEI, 2005a, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

The areas where the coverage of the grid is far from perfect are the zones at the city’s edges, as well as the less metropolitan districts of Huanchaco, Moche and Laredo (see Appendix H). These latter parts that are farther away from the city are getting more easily connected nowadays, as investments in the high voltage lines have followed the trend of the metropolitan area to become more interconnected²⁵. The older and more central districts show almost complete coverage, with only smaller neighbourhoods not being connected. This is different in Alto Trujillo and El Milagro (part of Huanchaco), where large new settlements are not served for years despite the increased coverage for the area as a whole. In the case of El Milagro provisional connections have been installed since 2005, so that the coverage is better now. Nonetheless, as is described in the next section, coverage is still far from complete. In El Porvenir (including Alto Trujillo), the coverage has increased only slight, to 87%. This is due to the continuous expansion in this region, where the more recent settlements are slowly and impartially connected to the grid.

Table 5.11: Use of electricity for several districts of Trujillo Province in 1993 and 2005

	Trujillo Central	La Esperanza	El Porvenir	Huanchaco
1993	93.9	75.2	82.6	61.1
2005	97.4	90.2	86.7	82.4

Sources:

1993 data: INEI, 1993a, *Censos Nacionales 1993, IX de Población y IV de Vivienda*, Lima.

2005 data: INEI, 2005a, *Censos Nacionales 2005, X de Población y V de Vivienda*, Lima.

The coverage as described above consists mainly of definite connections to the grid. The provisional projects are of a temporary nature, and are mainly used to serve the poorest areas of the city. The reasons these projects exist is because either the settlement is not structured enough to install definite post yet, or the costs of installation are too high for the inhabitants, or the area fails to apply properly for projects at the beginning of the year²⁶. The different parts of the provisional net serve large parts of the districts of Huanchaco and Laredo. Furthermore, provisional has been installed in many of the recent settlements of Alto Trujillo and El Milagro. In La Esperanza, provisional connections hardly occur (see table 3 below and Appendix H Table 3) One reason for this is that many of the previous projects of provisional electricity have now been replaced by the definitive net. Furthermore, Hidrandina prefers to install definitive connections immediately here (see section 5.4.4).

Table 5.12: Provisional electricity connections present in Trujillo Province - summarized

District	Subscribed number of users / households
Huanchaco	485
Trujillo	465
Laredo	299
El Milagro	349
Alto Trujillo	221
El Porvenir	210
La Esperanza	42
Moche	32
VL Herrera	16
Total	2119

Source:

E. Ríos, 2007, Convenios Provisionales Hidrandina, Hidrandina

As can be seen from the data, the provisional net serves only a limited amount of households. The actual number of households served can be somewhat higher; since these only concern the registered users, and not the clandestine connections. Nonetheless, the several thousand households served by the provisional net might seem negligible compared to the 150 thousand connections in the total metropolitan area. The cases presented in the next section show that the provisional net is still important in the recent settlements, where the coverage of the definitive net is imperfect.

5.4.3 RECENT SETTLEMENTS

Coverage of the public net in the recent settlements is partial; some parts of the recent settlements do not have any form of electricity available. Where the public net has been installed, this is done rather quickly after settlement. All the different types for getting electricity are used, and diversity is large also within neighbourhoods.

The three cases of recent settlements are characterized by different coverage of the various services; diversity is largest in Nueva Jerusalén; half of the households have definitive connections, some provisional and some clandestine connections. In El Milagro, the coverage is slightly lower, and provisional connections are more common whilst none is connected in a clandestine way. In Alto Trujillo 2B, coverage is low and clandestine connections are most common amongst those that have electricity (see Appendix C-7 for the cases' details and statistics on electricity).

The electricity connections have been established only shortly ago; almost all that have been connected either formally or informally did so over the last year. This is remarkable, since many of the migrants that came to the recent settlements have done so more than three years ago, up to nine years. All but one of the clandestine connections is established within the last six months, as have two-third of the provisional connections. This shows that as soon as the network and number of connections start to expand, than this includes a considerable amount of people. This does not mean that the sporadic connections lead to getting everyone connected; some take-off exists after which many more get a connection. Furthermore, there have always been some clandestine connections in Nueva Jerusalén, but they do not last long. They are either replaced by a formal connection or simply removed.

The costs for the users vary considerably among the different types of connection. The most expensive type of connection is the definitive net (24 Soles/month), followed by the provisional connection (18 Soles/month) and the clandestine connection (10 Soles/month). The share of the income spend on electricity varies little for the different used types of electricity supply. Those with a definitive connection spend 6% of their household income in electricity, those with a provisional connection 4% and those with a clandestine connection 3%. The differences are not large, and all three services are considered affordable. Differences between the costs of electricity are thereby relatively small.

The differences in price are relatively small. This is remarkable, as there are differences in the investment costs included in the monthly bill. The monthly payment for the definitive includes the costs of installation and hardware over the first 18 months, which is more than half of the total monthly payment. These costs for poles and wires are often not included in the other two types and go up to a one-time payment of 150 soles per connection. In addition to this, Hidrandina pays part of the costs and installs public lighting (increased safety). Those paying for provisional service are sometimes paying for a buffer that is created as insurance against theft (to have money available when wires get stolen). The usage can be expected not to differ too much amongst those that have provisional and those that have a definitive connection; both are in a similar stage of settlement. This is different for those that have clandestine connections; these often consist of one wire only, so that often only one light bulb can be connected (due to low amperage).

The prices for the provision of electricity are generally appreciated to be normal to expensive (average 3.6 on a 5-point scale). The definitive connection is appreciated normal to expensive (3.4), the provisional connections are considered expensive (4.0). The clandestine connections are appreciated as expensive, at a less significant level. These data show that those that have a provisional connection (significantly lower monthly payment) find their service to be significantly more expensive than those with a definitive connection. Finally, there is no correlation between the actual price paid per month and the experienced price; the experienced price varies very much independent of the actual price paid.

Payments are made remarkably regularly; most respondents pay every month, some pay with slightly less regularity, but none of the respondents that currently receive some form of electricity pays only sometimes or never. The regularity of the payment is highest when the connection is clandestine, slightly lower when provisional and lowest when the connection is of the definitive type. When a household with a clandestine connection fails to pay, he is likely to be disconnected. Those with provisional connections have a system of collective payments, where social pressure is the key element to induce payment. Those with definitive connections do not experience immediate sanctions from Hidrandina when they do not pay; a notification is sent to the household as soon as they fail to pay within notice, and only after two months is the connection disabled. All respondents that receive electricity have always paid before that happened. Once disconnected, a new connected is cheaper to establish than getting a new one; these costs are nonetheless prevented to make by the respondents. From the above it can be concluded that the system of payment functions well in all cases; the respondents manage to pay regularly despite the high prices.

The different types of electricity services all have 24 hour coverage per day. Nonetheless, there seems to be a difference amongst the quality of this delivery when considering the amount of failures per year. They are low amongst those with a definitive connection (55% has a lack of

delivery twice a year or less, 75% four times per year or less). These data are similar to the data in the rest of the city metropolitan area of Trujillo²⁷, showing that the definitive net is of a similar quality in the recent settlements as it is in other areas. The power cuts are more often for both those with a provisional and clandestine connection; differences within these groups are large, and reported failure of service ranges from once a year to once every two days.

Upon arrival, different actions have been taken by the migrants to get electricity. Most common is contacting the local president (24%). He often went to visit the office of Hidrandina, to explain and discuss the current situation. Many others reported to have visited Hidrandina as well (18%). About one third (33%) did not take any actions at all. Furthermore; some people in Nueva Jerusalén mentioned that they stole electricity for some time, before getting connected legally. Theft was not reported in the other cases. Some statistical relations can be found; those that did visit Hidrandina are more likely to have a definite connection, and those that do not have any connection are more likely not to have gone to Hidrandina. Also, those that did not take any action are more likely to have no service at all and less likely to have provisional electricity. Finally, those that went to see the local president are more likely not to have a clandestine or definitive connection, and more likely to have a provisional connection (less significant relation). These relations show that once actions are taken by the inhabitants of a neighbourhood, for whatever reason, they are more likely to receive some service. Especially visiting Hidrandina and having the president visit the office seem to be good strategies to get formally connected to the electricity net. This can further be explained by the status of the migrants; if they are living in one of the less settled parts (*invasions*), then they are more likely not to have visited Hidrandina and vice versa. It takes some time for the squatters to settle down before they visit the office, they are more likely to do so after two years, and much less likely in the first year.

Actions by citizens to establish or improve the delivery of electricity services differ between Alto Trujillo and the other two cases; in Alto Trujillo 2B the citizens have fewer plans for actions to take. Of the actions that are planned to be taken in the three areas, saving and/or paying is most common. Furthermore, visiting the office of Hidrandina, talking with the local president, as well as getting a clandestine connection are reported. Those reporting a planned action seem to target decent means; all have proven to be successful for getting electricity.

From the above analysis, some conclusions are drawn. The recent settlements have a decent coverage of electricity, a service that is often established rather recently. The prices do not differ greatly amongst provisional and definitive, especially when the costs of installation are taken into account. This explains why those with a definite connection experience the price to be less expensive. Stealing of electricity does not often take place, it has been a strategy of only a few households, and is reported as a strategy by some. The actions of the presidents as well as visiting the office of Hidrandina seem to bear fruits; those that take these actions are more likely to respectively get provisional and definitive connections.

5.4.4 ACTOR STRATEGIES

There are only a few actors active in the expansion and improvement of the electricity network in the recent settlements. The main actor is Hidrandina, which has direct contact with the population of the settlements as well as with the local presidents and Plandemetrú. Other actors play a far less significant role in the process.

The projections and plans of the planning office of the Province of Trujillo, Plandemetru, are forwarded to Hidrandina. Hereby, Hidrandina has up-to-date information about the zones that will expand as well as information of the people that have settled²⁸. Hidrandina reported that this has a positive impact on the speed with which provisional projects are carried out, though it is finally the local president and the electrification committee that applies for a project. This shows the importance of these presidents; the president and committee are elected, and do report regularly (often weekly) to the rest of the neighbourhood. However, where it concerns the provisional net, the agreements with Hidrandina do not reflect appointments made at those meetings; i.e. a single block within a neighbourhood gets connected whilst the other parts stay without connection. Furthermore, in the case of El Milagro sector Las Molinas the progress of and payments for the projects are unclear²⁹. Here, the legal status is unclear (part of Parque Industrial) and the committees and contacts much more informal. The project could turn out to be a huge success, where the whole area gets connected at once to the provisional net; but could just as well turn out a flop, with the president and money disappearing.

The expansion of the definitive net is most promising in La Esperanza, the projects to be carried out will be mainly for the definitive net; the expansion here can be done easily and rapidly; both the population density, the level of permanence of the neighbourhoods and the costs for installation are limited. No special relation exists between Hidrandina and either the municipality of La Esperanza or any NGOs, so that the incentives to install the provisional net rapidly in the expanding areas are limited. In Alto Trujillo, the NGOs and municipality have pleaded and agreed with Hidrandina to expand the provisional net rapidly, so that coverage is established quickly in all neighbourhoods³⁰. Furthermore, the policy of the company is to get the provisional net into the recent settlements for one year and possibly two years before installing the definitive net². If projects are applied for directly at the beginning of the year, they will be considered by the project division. This division is in support of installing definitive connections rather than provisional ones. The strategy of having the provisional net installed for two years before being able to apply for the definitive net is only partly followed; the projects that show partial provisional connections (e.g. two blocks in a neighbourhood with 10 blocks) can be approved. This difference between company policy on the one hand and possible different paths in practice is confusing, and can result in formal help from NGOs and Plandemetru being more expensive and slower than connecting small parts of the area provisionally whilst directly applying to the department of projects for total definitive connection.

Hidrandina has had severe problems with the recovery of the cost after installation of a new network. This was mainly due to illegal tapping directly from the electricity lines. Since the gradual introduction of insulated wires and a tri-phased system over the last 15 years, this tapping has become impossible. Thereby, individual's theft is reduced especially in the poorer parts of the city. Other measures that are implemented are meters with extra protection to prevent fraud (installed into a brick wall, also when the houses don't have such walls) and more frequent checking of the meters³¹. As illegal tapping has become impossible, the main form of clandestine connection is via re-selling or illegally connecting more than are subscribed. This does not have consequences for the recovery of costs, since the person illegally selling to others pays for the quantity used. Thereby, theft and clandestine connections are no longer an issue for the return on investment.

Recovery of investment costs and good payment are prerequisites for further expansion into the recent settlements. Hidrandina wants to keep everyone connected rather than gain by receiving

money from re-connecting. The policy of the Hidrandina is influenced by governmental policy (they have a 30% stake, and no other direct involvement with the management (Hidrandina, 2007)) that also wants continuous expansion. Furthermore, the supervising office OSINERGMIN aims to establish competitive tariffs in Peru and to support further expansion of the coverage. (OSINERGMIN, 2007). National legislation has passed on tariffs, making prices competitive. Their office at Trujillo, however, is focussing more on the mining industry than the electricity supply within the city, and does not take action to support further expansion.³² These various elements have led to a policy of Hidrandina aimed at expansion where possible. This is indeed what is happening, even in the areas where income is extremely low (the three studied cases) most customers pay regularly. The system of quick notification and reminders keeps the rate of return high, so that the main prerequisite becomes the neighbourhoods not being too far away from other parts of the net or to have a sufficiently large population if not close by. This means that all areas where the metropolitan area of Trujillo is expanding qualify. Complete coverage of the areas not yet covered can be expected to be achieved soon.

There are no NGOs active in the field of expansion of the electricity net. The NGO Solaris Peru is recently working on the improvement of the relations between the different local presidents as well as between them and the municipality. This neighbourhood organisation could easily be expanded with provision of standardized forms and possibly even more active involvement of the NGO where it concerns the contact between the neighbourhood and Hidrandina. Improving the ease of access to and spread of information between the different parties can help the recent settlements to get connected faster. This could be especially helpful for those areas that experience a less clear legal status, or where the contact with Plandemetru is only recent.

Summarizing the above shows a positive picture: the main actor Hidrandina has a positive attitude towards expansion of the net, and helps neighbourhoods to get connected via either the provisional or the definitive net. Their strategy has led to fast expansion of the network, and can continue to do so. The involvement of Plandemetru has a positive but limited impact for the settlements; the involvement of Plandemetru does not remove the risk that come after a president and committee have been established. Smoothing these processes can be done by NGOs that work in the field of neighbourhood organisation, and also since Hidrandina is willing to expand, this can bear quick results.

5.4.5 PRELIMINARY CONCLUSIONS

The expansion of the public electricity net of Trujillo has been impressive. The coverage is much higher, and has increased considerably into the recent settlements. These settlements are mainly served by the provisional net, and both the provisional and definitive net have expanded here over the last two years. The costs for the provisional net are mainly for the neighbourhood's inhabitants; which allows the company to expand rapidly. The costs for the definitive net are partly paid for by the company, which makes this a much more attractive alternative for those living in the recent settlements. Since the system is improving, the focus of both NGOs and Hidrandina can shift towards the faster establishment of the definitive net.

The influence of migration has been a positive one; services are expanding rapidly in new areas. The recent settlements do often not receive full coverage, small parts get connected first. Still, the impact of the expansion of the net is apparent even when it is formally not installed. Public

telephones and lighting become available in the nearby areas. Thus, even the imperfect coverage of the system of electricity supply leads to improvement in the situation in the recent settlements.

The promising results with this network show that despite the risks involved for all parties, a rapid expansion of the net can be established. This can continue to serve the new expanding areas; with NGO involvement the coverage of the settlements as a whole rather than only isolated islands that have provisional, can be established. This can be done by explicitly connecting only small parts whilst applying for larger projects in the meantime, so that costs for installing provisional stay limited. Speeding up the process of getting definitive connections is beneficial for all parties.

5.5 TELECOMMUNICATIONS

5.5.1 INTRODUCTION

The telecommunication networks³³ in Peru have been expanding rapidly over the last fifteen years. New technologies as well as a continuously changing field of actors create new opportunities and challenges. These opportunities and challenges also include access to these networks by the poor population.

The data used for the description of the general developments of the expanding telecommunication sector are deduced from the various OSIPTEL documents and web pages. Furthermore, strategies and developments concerning the actors involved are derived from personal interviews. The data collected via questionnaires is used for the analysis of the use of telecom in the recent settlements. On the level of the districts within Trujillo, the information used is entirely based on the data from the questionnaires and personal observations. Official data on coverage and use of telephone and internet at district-level from the *Ministerio de Transport y Comunicaciones* and/or the operating companies was considered confidential and strategically important.

5.5.2 CURRENT SITUATION AND DEVELOPMENTS

The telecommunication services are diverse, and include television, telegram and fax services. In this research, the telecommunication services studied are limited to telephone and internet services. The use of these telephone and internet services has increased rapidly over the last fifteen years. Important differences in the type of service used, as well as between various regions and groups, exist.

The telephone calls in Peru are made via the following services:

Landline connection: A telephone is connected to the electricity net, and uses either a landline wired connection or (more recently via Telefónica) a wireless device.

Mobile phone: Mobile phones with either pre-paid or monthly contracts are sold commercially. Limited-user networks are offered as well (Nextel) for business. Charging can be done on any socket via an adaptor.

Public phone: public phones come in three varieties; on the street, via per-minute renting out of a mobile/landline connection, and via cabins on landline connections with an attached timer.

Internet calls: Phone calls via internet in public cabins or a domestic connection are not registered. They are not included in the below analysis. (The use of internet is treated separately below.)

The use of these telephone services has been tremendous, especially since its privatization in 1994. In the whole of Peru, the use of landlines has increased from less than a million in 1994 to 2.5 million in 2007. Much more spectacular is the growth of the number of mobile connections;

growing from one-twentieth of a million in 1994 to 12 million in 2007. (See Appendix I Tables 1 to 3 for exact figures) The coverage show that the number of mobile phones in Peru is much higher than number of landline connections in 2007, as is shown in table 5.13 below. Furthermore, the number of public phone connections has increased to more than double the number of 1999. The number of landline connections is now more than one and a halve times as large as 1999. (OSIPTTEL, 2007) These data indicate that the sector has been growing tremendously, and though the number of all type of phones is increasing, growth can be expected mainly in the use of mobile phones. There are important differences between the different regions of Peru. As can be seen in table 1, the density (number of connections per 100 inhabitants) of La Libertad is slightly lower than Peru, whilst the density in Lima in 2007 is about twice as high as that of La Libertad. Even if the phone use in La Libertad is concentrated in Trujillo, the number of phones as part of the population is still lower compared to Lima. Trends are very similar, with the mobile phones appearing rapidly over the period last few years.

Table 5.13: Density of different telephone services per 100 inhabitants for Peru, Lima and La Libertad

	Landline			Mobile			Public		
	Peru	Lima	La Lib.	Peru	Lima	La Lib.	Peru	Lima	La Lib.
1995	4.5			0.3					
1999	6.3	13.2	5.2	4.1			0.3	0.4	0.2
2003	6.7	13.8	5.9	10.7	23.3	9.5	0.5	0.8	0.5
2007	9.0	17.5	8.6	43.7	74.1	39.6	0.6	1.1	0.5

Source:

OSIPTTEL, 2007, *Indicadores Estadísticos*, accessed from website, Lima.

Since landline connections and public phones are often used by more than one person, their number is not a sufficient indicator. Therefore, the access of households to different telephone services is considered, and is displayed in table 5.14 and Appendix I). The differences are best described by looking at the coverage of those that have either a landline or a mobile phone available. Again, Lima has a better coverage than Peru's average, as well as the other urban areas. Furthermore, the coverage in the other urban areas and that of Peru was at the same level in 2001, but since 2001 the coverage in the group other urban areas has improved more. Finally, landline or mobile phone access was hardly existent in the rural areas, a situation that has changed since 2007. Still, the difference between urban and rural areas is striking; the urban areas (both Lima and the rest of the urban areas) have a far better coverage and continue grow faster in absolute terms. The cities outside Lima have shown a tremendous growth over the last year, more than half of the households has a phone available now.

The growth of access to telephone services is influenced most by the increase in mobile use. Also, the number of households that only have access to a landline connection has been slightly declining in all urban areas. Therefore, the challenge for those companies offering landlines in improving or maintaining their share is obvious. (Gallardo, López and Gonzales, 2007) Possibly, the difference between Lima and other urban areas can be explained by better coverage of the provider in Lima. Over the last three years, the two main providers of mobile telephone services in Trujillo (Claro and Telefónica, see next section) have covered the entire city and all its districts, and coverage has thereby improved significantly. This result has been most significant in the northern part of

Trujillo, and especially there where recent settlements are (Alto Trujillo, El Milagro, parts of La Esperanza)³⁴.

Table 5.14: Household access to either landline or mobile phone in Peru, Lima, other urban, and rural areas

	Peru	Lima	Rest Urban	Rural
2001	24.4	52.6	24.4	1.0
2002	25.4	52.2	27.1	1.0
2003	26.1	53.3	28.7	0.7
2004	31.7	66.1	35.4	1.7
2005	35.7	74.0	39.8	1.6
2006	41.9	76.4	50.6	4.5

Source:

Gallardo, J., K. López and C. Gonzales, 2007, *Perú: Evolución del acceso, la cobertura y la penetración en los servicios de telefonía*, OSIPTEL, Lima.

There is a statistical link between the income and the use of telephone services. For 2004, the density is about 8 percent at an annual income of S/.2,000 (corrected for PPP) for landlines and about 10 percent for mobile phones, whereas for an income of S/.12,000 this is about 37 percent and 18 percent respectively for an income of S/.12,000. The relation between income and density is strongest with mobile phones. Compared to other Latin American countries, the density of phones in Peru is lower than can be expected at these prices. Those with a higher income only show a marginally higher density of phone connections in Peru, whereas in the rest Latin America this difference is large³⁵. (Gallardo, López and Gonzales, 2007) This shows how much the Peruvian telephone market and its networks are functioning at a suboptimal level; partly due to the fact that developments in Peru are more recent, so that the network is still maturing. In the section on the strategies of the actors, an overview of the investments made in the Peruvian telephone sector and the basic problems related to this are discussed.

Internet services in Peru have also developed tremendously over the last decade. Internet services are available in Peru since 1991. Until 1998, dial-up (commercial and personal use) and ISDN (commercial use) were the only modes of access. The number of companies that offered these internet services was limited, and only two of them possessed an international backbone connection. Since 1998, other providers were able to enter the market, and new technologies were introduced. (OSIPTEL, 2003b, p. 43-54) Until 1999, almost all connections were made via dial-up modems. Since then, other technologies have become more important. The use of dial-up connections increased until 2003, and has been declining since then. Nowadays, the most common connection types used to access the internet are ADSL³⁶, WAP³⁷ and still dial-up. The total number of connections has increased to one million. Furthermore, a large part of the population has access via public cabins³⁸, which are registered as one connection only. (OSIPTEL, 2007a; see also Appendix I Table 4).

An interesting article by Fernández-Maldonado on the telecom network in Lima discusses how developments affect the situation of the poor in Peru. As she reports on the case of Lima, the costs of having a personal connection are significant. The poor do not consider the possibility of getting a telephone or internet connection; this is due to the high monthly billing. Therefore, they use out-of-the-home facilities; an extensive system of public phones and internet cabins has created barriers

for those that want an in-house connection in these poorer parts of the city. She claims that this has led to large parts of the poor population being highly unsatisfied about the telecom services offered; especially since the tariff structure (high monthly payment, low price per usage) favours those calling more. Furthermore, developments in the telecom market have led to urban splintering, with parts of the city of Lima becoming fragmented and more isolated. (Fernández-Maldonado, 2005) The situation concerning the use of telephone services is similar in Trujillo, but the availability is high and the splintering does not at all take place. This will be shown in the next section. Where it concerns the use of internet, the splintering does take place.

In the case of Trujillo, the number of internet cabins has been increasing over the last couple of years. Most are located in and around the central part of the city and close to the mayor educational institutes³⁹. In the other districts of the metropolitan area of Trujillo, internet is less common, and often close to either the central square (*Plaza de Armas*) or to other business. Internet cabins exist in the central areas of La Esperanza, El Porvenir and Florencia de Mora. In the coastal district of Huanchaco, tourism has boosted the presence of public internet cabins. In all other districts, the appearance of internet cabins is scarce and prices are higher⁴⁰. There have not been any studies on the use of internet in Trujillo; this makes it hard to quantify the use of the internet cabins. Nonetheless it is safe to say that an increased number of people access the internet via public cabins. Despite this general trend, isolation from internet services takes place; parts of the city are not able to access the internet. On the other hand, many secondary schools have in-house internet connections, which create possibilities for future growth in all areas.

The nation-trend of a rapid increased in the use and coverage of telecommunications is taking place in La Libertad and Trujillo as well. Nonetheless, the use of phones is still behind the use in Lima, and the net is has only recently been extended so that the whole city is covered. Further growth can be expected in the use of all types of connections, toward a majority of the people having a phone available. Where it concerns internet, the availability is highest in the more central, richer or touristy parts of the town; internet is only scarcely available in many of the poorer and faster developing areas.

5.5.3 RECENT SETTLEMENTS

The situation in the recent settlements is best understood by considering the three case studies. These show that the use of landlines and mobile phones is behind the city's average, and that internet is used by only a small part of the population in the recent settlements. Despite this, almost every inhabitant uses the telephone regularly as a means of communication. The attitude towards obtaining a phone, as well as the high appreciation of the telecommunication services shows that they are part of increasing the quality of life of most of the inhabitants of the recent settlements.

Most of the households living in the recent settlements do not have their own telephone connection. About 60% does not own any phone, 36% owns a mobile phone and only 3% has an in-house landline phone. (For an overview of the statistics used in this chapter, see appendix C part 8.) It is required to be connected to the electrical grid before a landline can be installed, which is the main cause for the small amount of landlines installed. Those that are not connected to the electricity grid (in any form) are more likely not to own a telephone. On the other hand, the ownership of mobile phones cannot be explained by having electricity or the lack thereof. Also, there is no significant link between age and phone ownership. Income has a clear link with

ownership of telephones; those that have a monthly household income of S/.500 or higher are more likely to have a phone (especially strong link with landline). There are differences between the three cases studies; those that settled in Alto Trujillo are more likely not to own a phone; those in El Milagro are more likely to do so; most likely a cell phone. This difference cannot be explained by the time that people have been settled, neither by their former locations. It might be understood by the vicinity of relatives and work, which could explain why the ownership of telephones is higher in El Milagro. The above indicates that ownership can best be explained by income and the availability of electricity, far less by other variables. Furthermore, the use of landlines is very uncommon in these settlements; their appearance is very low compared to the rest of the city.

As seen before, coverage of telephone services is much higher than ownership, as public phones are available. Most of the people living in the recent settlements make telephone calls; about 93% uses it regularly. The most popular way of making phone calls is via public phones (44%) or cell phones (40%), much less common is the use of a family member or friends phones (8%). This indicates that those owning a mobile phone use it, and that these are not shared beyond the household.

There is a small group of people that do not make phone calls⁴¹, about 8% of the total number of respondents. They do not own phones because they considered them to be too expensive⁴². Characterizing the ones that did not make any phone calls is hard; the main characteristic that they share is that they seem more likely to be found in the squatter settlements, thus where the use of land is informal and its status often unclear. Nonetheless, they do not typically show a link with any one of the other characteristics as identified in the questionnaire. Thus; neither their origin, former locations, moments of migration or district of settlement, nor their age, income, household size, connectivity to electricity or any single other characteristic shows to be significantly more appearing amongst those that do not make phone calls⁴³.

The quality of the services offered is considered reasonably well. Overall, the telephone services are appreciated good, with 82% of the respondents qualifying the service as very good or good. Most of the people that have a cell phone consider the quality to be very good (43%) or good (42%) too, hereby significantly more people consider the quality of the cell phone service very good compared to the total average. The other options that are used (public phone, family, friends) are appreciated less, they are considered good to normal. It is very likely that if the network, the payment facilities, topping-up or other services were of poor quality, then these responses would have been different. The operating companies thus provide a decent service to those living in the recent settlements.

The appreciation of the price for making phone calls varies widely. On a five-point scale, very few people consider the price to be very cheap all (2%), all other groups are mentioned often (cheap 33%, normal 18%, expensive 21%, and very expensive 26%). More details are found when the appreciation of the price and type of phone are considered; those with a cell phone are very unlikely to find it very expensive, yet more likely to find it expensive. Those that use the public phone are very likely to find it very expensive. No link was found between income and appreciation of the price. An interesting detail in the responses is that many reported that they always paid the same price, namely a fixed S/.10, S/.20 or S/.50 every time, and that this hadn't changed. This and follow up questions show a clear lack of knowledge about the actual prices per minute per region. The fixed amount is the price paid for topping up one's account, for which the number of available minutes has increased with all providers over the last three years. This can indicate a lack of awareness, which in turn might hamper proper functioning of the market in the

recent settlements. Overcharging or more competitive deals might go unnoticed by these consumers. On the other hand, few users of mobile phones respond to have experienced an increase in the price, and many reported a decrease; this shows that they are aware of the changes in prices. This response is different from those that use a landline or public phone; they do not respond such a lowering of price. This can indicate that the prices of use of the public phones have gone up in these recent settlements. With more than half of the population using these phones this is a relevant element for further research.

The changes that people have planned to make are mainly related to getting or adding a connection (67%). Those that have a mobile phone are not likely to add another one for the household, and are very likely to get a landline. Those that do not own a phone now are likely to get a cell phone, and unlikely to get a landline. This shows that there is still great potential for landline connections, as people with a mobile phone are willing to get a landline next to it. This is also driven by recent offerings of landlines by Telefónica (see next section).

Internet services are used much less in the recent settlement; most inhabitants of the recent settlements do not use the internet (76%). Those that use it mainly use it in public cabins (93%) and some at a family members place (7%). They value the quality as good to very good (overall average 1.7 on 5-point scale). Only one person qualifies the service as of poor quality, and four as normal; the rest (91%) values it as good or very good. The price is considered cheap to normal, with very few finding it very expensive (4% only). There is a link with income and internet use; those that have a higher than average income (S/.500 and higher) are more likely to use the internet, whilst those that have the average income (S/.250 – S/.500) are less likely to use it (for the lowest income group, less than S/.250, there is no correlation). These above described figures show that the services are of good quality, offered at a decent price. Nonetheless, the service is not often offered in the recent settlements. This might have to do with the investment costs, which can be large for those living in the recent settlements. Nonetheless, given the usage (about one quarter of all people), appreciation, expected growing usage and increasing neighbourhood size (both migration and births), the return on investment can be expected to be good especially on the longer term. Providing small loans (micro credit) or letting computers can be both profitable and useful in the recent settlements.

These statistics on the use of telecom in the recent settlements shows that despite the limited infrastructure, most people use phones. Also, the lack of full coverage of the electricity net is one of the reasons why landline connections are not common. It does not significantly influence the ownership of mobile telephones, and does not influence the use of internet. There are possibilities for expansion of the mobile phone coverage, number of landline connections, and internet services offered.

5.5.4 ACTORS STRATEGIES

The privatization has had tremendous impact on the Peruvian telecommunication sector. Therefore the most important developments in the Peruvian telecom sector concerning the actors are described here. Attention is paid to the strategies of the actors involved as well.

The privatization process in Peru shows many similarities compared to other countries in Latin America. The process of privatization contains two main elements; the opening up of the market,

and the privatization of former state monopolies. In Peru, the privatization of the state monopoly happened in 1994, four years later than Mexico and Argentina but four years before Brazil and Panama⁴⁴. It was not until 1999 that the market for other providers was opened up; most other Latin American countries maintained a longer exclusive period. (OSIPTTEL, 2003a) Since the opening up of the market, the number of service providers that have entered the market via concessions is limited. Concerning landline connections, the privatized Telefónica is still by far the largest operator, and in most parts of Peru the only operator. This is also the case in Trujillo, where only in June 2007 some competition had started. (OSIPTTEL, 2007b) The mobile phone market has been extended with the introduction of Nextel in 1998 and Claro/TIM in 2001, operating next to Telefónica. The total number of connections of Claro/TIM has been increasing rapidly since their introduction. Nextel is only marginal competition for these other providers (see Appendix I Table 6) and is operating in niche markets such as their Direct Connect network⁴⁵.

The governmental policy towards telecommunication is based on two pillars; getting the telecom market function properly, and invest in the rural areas which will otherwise not be connected. These investments in the rural areas are the only large investments made by the government, and all fall under the subsidiary programme FITEL (OSIPTTEL, 2005). This policy towards rural areas is not about to change, as political support for the programme FITEL is very high and private investments in the rural areas still very limited⁴⁶. The functioning of the market in the urban areas is supervised by the supervising agency OSIPTTEL (*Organismo Supervisor de Inversión Privada en Telecomunicaciones*). Their main means of intervention is via the creation of maximum prices. These are set regularly, and have a binding impact for the operating companies (OSIPTTEL, 2004b).

Most of the work of the supervising agency OSIPTTEL is dedicated towards problem solving for existing customers, like the other supervising agencies. Here however, the customer base is much more diverse in the sense that people with any income level or location can be customers. Furthermore, the policy of OSIPTTEL is to keep the prices low; this is in line with the demand of the poorer population. Thereby, there is no need to focus more on new customers; this is done sufficiently. There are possibilities for interaction with OSIPTTEL; before important decisions are made, public debates are held on the topic. These are typically busy, but not visited by the local president of the recent settlements, neither by the authorities of the various municipalities. This can be because these decisions that are made for the functioning of the market in the city are discussed at a more general level; it does influence the inhabitants in a particular neighbourhood the same as it does most others. This sets it apart from the public meetings of the other supervising organisms (Osinermin, SUNASS) where lively debates on the lack of services were held. This illustrates that those living in the recent settlements do not feel excluded or forgotten where it concerns telecom services.

One of the main concerns in the telecommunication sector in Peru is the low level of investment. Shortly after the privatization, these investments have dropped and steadily declined (see Figure 1 of Appendix I). (OSIPTTEL, 2004a, p. 11) According to the telecom companies, these low levels of investment are a result of the maximum tariffs, so that profit margins are too small and leave little room for investment where the need is not high. In the urban areas, coverage is high so that investments can remain small. In the rural areas, subsidiary programmes exist, so that it is not worth investing privately. On the long term, investments of maintenance will rise for especially the landline network. Especially the company Telefónica will have to deal with this⁴⁷.

Landline connections are more common now than five years ago, but the share of landline connections is declining rapidly over the last few years, as is explained in section 5.5.2. Apart from the earlier mentioned maintenance costs, this is another reason why the companies offering these services are challenged to come up with technical innovations. In the case of Telefónica, the introduction of a new type of landline connection has led to new possibilities. This 'radio'-connection works without a telephone grid, and can thus be installed much easier in recent settlements. Salesmen go door-to-door as a neighbourhood or block has been connected to the power grid, offering these phones with pre-paid cards⁴⁸ or contracts at rates below pre-paid mobile phone rates. The number of these phones sold in Trujillo in 2007 was around 200 per week over the period January 2007 – April 2007, the largest growth in a single city outside Lima⁴⁹. This will allow further growth of the landlines without creating future maintenance costs. Thereby, an additional service can be offered, which seems in demand also by those living in the recent settlements (see previous section). Furthermore, these are the only service offered at home in recent settlements; mobile phones or mobile phone contracts are not advertised or sold there. This aggressive strategy of going door-to-door is likely to continue to yield good sale results for Telefónica.

The telecommunication sector is functioning well, with prices being lowered by OSIPTEL and competition starting to appear more. Though the amount of companies is still limited, there seems to be sufficient competition; this is illustrated by the introduction of the telephone by Telefónica; this is done at a low price to expand their market. The low level of investment does not seem an immediate problem for Trujillo, coverage is good and competitors are operating in all areas. Thereby, the task of OSIPTEL should be here to keep the market functioning, and to facilitate the introduction of new approaches and products. This could lead to very high coverage and quality in the case of Trujillo, where many households are still willing to change their current telecom situation.

5.5.5 PRELIMINARY CONCLUSIONS

Telephone calls are common way of communicating; almost everyone uses either via mobile or public phones. The opposite is true for internet use; only a small group of people uses the public cabins where internet is offered. These different telecom services are decent; there seem to be few problems with these in the recent settlements. Privatization has made it possible for many Peruvians to get a phone, and more continue to do so. Public phones become quickly available as the expansion of the electricity net continues, and many whom don't have electricity use mobile phones. The impact of migration is visible with the introduction of the new phone by Telefónica, which aims at those living in recent settlements: it does not require the installation of a landline, and is cheaper. Overall, the telecommunication services offered are of good quality, and coverage of various networks increases rapidly.

The actors involved should continue to focus on the introduction of new technologies and the lowering of the prices of the existing services. The telephone recently introduced by Telefónica can continue to gain importance, and can be a valuable addition for those that already have a mobile phone. Responses from other providers are likely to follow, and can lead to a wider variety of services offered. With this, possibilities for the poor are likely to increase and improve as well. NGOs could get into the field of micro credit to facilitate the developments in the recent settlements, where possibilities for small scale internet business or phone services are there. Overall

the prospects for the quality of the telecom in Trujillo are bright, and the current situation for those living in the recent settlement at least decent.

5.6 HOUSEHOLD WASTE

5.6.1 INTRODUCTION

The proper collection and/or disposal of household waste is an important element in the creation of a healthy living environment. In many neighbourhoods in Trujillo, the system of collection is inadequate, leading to a situation where garbage is lying on the streets, burnt by individuals or buried in public areas. This is especially the case in the more recent settlements.

The collection of waste is a subject little studied in Peru. The main source for the recent settlements in this chapter is the data collected by the author. For the other parts, the information is derived from observations and interviews with the various municipalities and other actors, as well as from the Environmental Atlas of Trujillo (MPT, 2003). There are questions concerning waste included in the ENAHO or census of 1993 and 2005, and barely any (scientific) writings on the waste disposal in Trujillo.

5.6.2 CURRENT SITUATION AND DEVELOPMENTS

The system of the collection of household waste in Trujillo consists of sub-systems, every district (i.e. municipality and 'populated centre') has its own collection system. The main connection between all these collection systems is their shared recycling and dumping places.

In the metropolitan area of Trujillo, there are various ways in which waste collection is dealt with in households;

Garbage truck: a truck drives a fixed route at a regular interval (most places weekly, some daily). The garbage is put along the roadside and thrown in by the workers. The trucks have a compression device. Furthermore, trucks visit the containers (3 m³) that have been placed throughout the city, mainly close to markets.

Formal cleaners: municipal public servants and private workers visit public areas daily, mainly the city centre and central parts of the districts (central squares). These workers are paid by the hours worked.

Informal collectors: roaming the streets with tricycles and carts, they sort out the valuable bits of the garbage that will be collected later by trucks. Furthermore, metals (tins, wires, batteries, etc.) are collected during daytime at the house. These collectors are paid for the amount of garbage per type brought in.

Individual solutions: garbage is thrown in open places close to the living space and on the streets. Furthermore, on-site burning and burying of the garbage is also common in the poorer parts of the city. These individual solutions are especially used in the recent settlements, as well as the more rural areas of the province of Trujillo.

Most of the waste produced in the province of Trujillo derives from the central district Trujillo (about 65%). Also, most of the approximately 100 containers used at strategic places are in the

district of Trujillo. The same accounts for most of the 166 (year 2000 approximation) workers, that clean public areas daily. The number of formal workers increased further in 2007 when special cleaning teams started to operate in the city centre of Trujillo. (MPT, 2003)

As mentioned, these different systems are connected via the central recycling and dumping places. The waste collected by the garbage formally (mainly by trucks) is brought to the garbage dump (outside the urban area) in the district El Milagro. The waste collected by informal collectors is brought to one of the many recycling centres in El Milagro (within the urban area) from where the enterprise takes over and either recycles the materials or sells them to others. El Milagro therefore has a central function as a collection and distribution centre.

The garbage dump has been in existence since 1989, and since then the amount of garbage processed has doubled. The garbage comes mainly from Trujillo (73%) and Victor Larco Herrera (9%), La Esperanza (11%) and Florencia de Mora (6%). (MPT, 2003) This shows that in the areas outside the oldest and richer parts of the city, the municipalities and appointed private companies collect considerably less garbage. This is due to the fact that most services and shops are located in the city centre; that well-off people produce more waste, and because of the inadequacies of the collection system in the poorer areas.

From the above, it is clear that the system of collection as it is currently operating is not very diverse, especially not in the more recent settlements. Information on changes in this system have not been published nor investigated properly.

5.6.3 RECENT SETTLEMENTS

The situation in the most recent settlements of Trujillo is characterised by a sub-optimal functioning collection system, which is operating in most of these settlements. The existence of decent roads is the most important prerequisite for the municipal trucks to operate in a settlement. This is especially important since these settlements are located at the edges of the city, where the sandy soil and slopes of the hills make visiting hard.

In the cases studied, the garbage is collected by the municipal trucks in most of the settlements. Coverage is partial only in the squatter settlements where settlers arrived less than a year ago, and even there about half of the households have their garbage collected. This does not mean that the coverage is perfect, as the trucks only visit the main road and do not pass along all the houses. Nonetheless, those that receive this service perceive the quality as good to normal (2.4 on a 5-point scale). Between the three cases, there is a difference in the interval of collection; in Alto Trujillo 2B the truck visits once a week, whilst in Nueva Jerusalén (La Esperanza) and in El Milagro the truck visits about twice a week. In these latter two areas, the intervals are irregular and respondents found it hard to give exact times of visit of the truck. Nonetheless, this irregularity had no significant impact on their experienced quality. This data on visits shows that when the truck starts operating in an area, there is no difference between the more recent settlements and the older ones (i.e. between the cases and the other parts of these districts). (For an overview of the statistics of the three cases, see Appendix C section 9)

The small amounts of waste per inhabitant and its type (mainly organic), are not a sufficient incentive for informal collectors to pass through the streets. They do sporadically roam through the

garbage that is thrown away on the hillsides (various settlements in La Esperanza) or in dry rivers (El Milagro). This is by far not enough to prevent contamination, flies, and metals from oxidising. This pollution is mainly but not exclusively caused by those that are not serviced by municipal trucks; about half of them throw their garbage away in the field, and one quarter uses some type of dump where the garbage is burnt or covered with sand at times. Some others throw it either on the street or burn it on their own plot. This dumping and use of the open field is very visible, and is done at places right at the borders of the neighbourhoods (Nueva Jerusalén and Alto Trujillo), at open places within the neighbourhoods (Nueva Jerusalén and El Milagro), or at the dry river and open areas slightly farther away from the houses (El Milagro). Furthermore, the garbage is not piled neatly, nor are any measures taken to keep it in place (such a holes, walls, or similar); thus the garbage spreads over a relatively large area. This same area is used by those that have no sanitary facilities at their disposal, and is often inhabited some weeks or months later by new migrants; thereby exposing themselves and future inhabitants to disease.

There is a high level of awareness of the problems caused by throwing away garbage at those areas; the inhabitants that do not have municipal collection services are generally unsatisfied with their way of disposing garbage (4.1 on 1-5 scale). The main problems that they mention are almost all related to the unhygienic situation; contamination (58%), spread of diseases (12%), smell (12%), flies (7%), and the dirty situation in general (4%). The other problems reported are the distance and danger (combined 7%). This notion is especially interesting, since preventing the worst effects of the contamination can be done by taking some simple measures.

Despite the unsatisfactory situation, the actions taken shortly after arrival of the inhabitants of the recent settlements are limited. Most people did not contact anyone, nor did they arrange anything themselves to dispose their garbage properly. Of those that took action, most went to talk with the mayor, the municipality or the local president. Of the actions taken to get rid of the garbage by own initiatives, burning the garbage on a regular basis was the main solution. This is generally done by small groups of some families within the neighbourhoods; actions were not taken by a whole block together, nor was there presidential interference. In general, support and participation in neighbourhood cleaning events organised by NGOs was limited.

The planned actions on what to do to change the current situation consists mainly of getting the municipal truck to visit; either by visiting the mayor (42%) or by consulting the local president (8%). Most people, however, are not planning to take any actions to change the current situation. This is slightly more the case for those whose waste is collected and less the case for those whose waste is not. Hardly any planned actions for setting up a more durable system were mentioned. The presidents of the various neighbourhoods of the cases said that the garbage was not their main priority, mainly because they considered themselves unable to change the behaviour of those throwing away garbage.

These above characteristics of the behaviour and attitude of the people living in the recent settlements show that when the municipal waste collection trucks visit an area, the service is perceived much better than before. When these trucks do not visit, the neighbourhood actions taken are very limited, though awareness of the severity of the problems is high. Individual actions (taken or planned) are limited, as are expectations from and of the local presidents. The municipality is therefore the most active participant in improving the system, of which the most is expected.

5.6.4 ACTOR STRATEGIES

The main actors in the systems of waste collection and disposal are the municipal governments; they work on a permanent base in neighbourhoods on this topic. The sharing of information is limited, and contact with neighbourhoods' citizens and their local presidents far from adequate.

The municipalities of the central district of Trujillo, as well as in Florencia de Mora have appointed a company to take care of the household and public waste. These contracts have been appointed via concessions; in both places a Brazilian company operates under a 15 year contract. In the city centre, the company started operating in 2007; those defending the stakes of the informal workers claimed that no action was taken to transit these workers to different jobs, or provide any alternative. The experience in Florencia de Mora is promising; the collection system and the punctuality of the garbage trucks' visits have improved.⁵⁰

In all the other districts, a different approach is taken. The municipalities do not want private sector involvement, and keep the system operating under municipal flag. The topic of waste collection has high priority for most municipalities, also because of the possibilities for additional taxation⁵¹. In La Esperanza, two high-quality trucks were operating within 8 months of the appointment of the new municipal government, and the garbage collection is done without an additional direct tax for the citizens. In Alto Trujillo, the collection is arranged as soon as the roads are of sufficient quality and contact with NGOs (Solaris Peru and Circulo Solidario) is intimate. The growing pile of garbage that had been there for years at a large uninhabited space, was removed shortly after the 'populated centre' gained a status independent of El Porvenir.⁵²

The dedication of the municipalities does not directly translate to their contact with the recent settlements. Though migrants plan to contact the municipality (see previous section), the municipality rarely communicates with them. The municipalities do not deal with personal quests concerning waste collection⁵³; this contact is supposed to go via the local presidents. The various local presidents have no idea how the municipal decision making process takes place, nor how long it would take before the collection trucks would come to visit the areas. Furthermore, the municipalities do not provide any incentive for inhabitants of the recent areas to prevent pollution, though both parties consider this pollution to be a serious problem.

The NGOs that are active in the field of waste disposal are Solaris Peru, Circulo Solidario and DEECO. Solaris Peru focuses on the contact between local presidents, and the exchange of information, by way of meetings where the municipality is present as well. They have started these meeting too recently to draw conclusions, and operate only in Alto Trujillo. The actions of Circulo Solidario consist of cleaning days, where it desires neighbourhood organisation and participation to increase. These days are organised in a top-down manner where the NGO announces a time and date of the event. The inhabitants of the recent settlements seldom participate, and do not see this as a solution to preventing pollution from getting out of control, as the meetings seem too infrequent for that. If the NGO wants to ensure the success of the system then either more frequent involvement or an organisation of these days where the NGO has a less active role, is required. DEECO uses a more responsive approach, with public campaigns in favour or against policy measures concerning ecological issues. Their role is still limited. The impact of these NGOs is still rather limited, and can increase when cooperation with settlements improves.

The central function of El Milagro in the system of waste disposal and recycling does not translate to a more important role of this municipality in these processes. The companies operate mainly without municipal involvement, and no special arrangements are made to facilitate the involvement of other companies. Its central function is mainly a result of the accessibility (along Pan American Highway) and the available space and plots in what later became an urban area. This could be further exploited; the municipality of the populated centre of El Milagro or any NGO could take initiatives to expand and improve the recycling facilities in the growing market of waste recycling. This could provide additional income for the municipality and help prevent pollution in other areas.

5.6.5 PRELIMINARY CONCLUSIONS

The system of collection of solid household waste is lacking in some parts of the recent settlements. Problems with contamination occur in these areas, and very few actions are taken to provide intermediary solutions. Here, the work of NGOs is not adequate, and neighbourhood organisation non-existent. The municipalities dedicate serious resources and time to improve the system of household waste collection, via the expansion of the area where trucks collect this waste. Migration has neither lead to massive implementation of alternatives, nor to rapid expansion of the existing infrastructure. Thereby, the current situation in many of the recent settlements is poor and collection inadequate.

A further expansion of the role of the municipalities is possible, better communication with the representatives of the recent settlements and intermediary solutions could be provided. The building of roads plays a vital role in the collection system; both NGOs and local governments could take a more active role in the construction of these roads. Planning is a vital element in the quick implementation of neighbourhoods in the collection scheme; communication with Plandemetru is vital here. Both NGOs and municipalities should get involved in organising the implementation of intermediary solutions.

6 CONCLUSIONS

6.1 MAIN CONCLUSIONS

The conclusions of this research are summarised by answering the central research question:

“What is the impact of contemporary migration of the urban and rural poor on the quantity and quality of urban infrastructure services in Trujillo, Peru?”

The main answers to the research question are:

- The migration towards the poor areas of Trujillo has led to an increase in the coverage of infrastructure services;
- Migration has not led to a decline in the quality of the infrastructure services provided.
- Migration and rapid development of recent urban areas has led to the implementation of alternative infrastructure services.
- The coverage and quality of the infrastructure services differs greatly; the poorest are sanitation and solid waste disposal services.

Focusing on the process of migration and urban growth, the following is concluded:

- Rural-urban migration has continued to contribute to much of the inter-departmental migration patterns;
- Urban-urban migration towards the poor urban areas of Trujillo has not increased;
- Most of the urban growth of Trujillo is due to internal growth;
- Most of the migration towards the recent settlements is sequential migration;
- The horizontal expansion of the metropolitan area of Trujillo has continued by way of recent settlements, and can be expected to do so over the coming years.

The process of settlement in the recently inhabited areas has the following characteristics:

- Infrastructure services are typically provided as the last step in the process of settlement;
- Squatter settlements are often rapidly formalised by Plandemetru;
- There is still sufficient vacant land for further horizontal expansion of the urban area of Trujillo;
- Reasonably high levels of permanency of the dwelling are reached within three years of settlement, independent of the legal status of the settlement;
- The provision of services depends only to a limited extent on the legal status of the settlement;
- The inhabitants of the recent settlements consider the lack of infrastructure services the most important problem of the inhabited area.

The different infrastructure services that have been considered in this research are those for water, sanitation, electricity, solid household waste, and telecommunication services. Conclusions concerning these services are the following:

- Alternative solutions differ very much in quality, and are often considered poor;
- Alternative solutions are most visible in the provision of water;
- Consumers pay high unit prices for the provision of alternative services;

- Electricity and telecommunication networks follow the poor urban area expansion quickly;
- The electricity provider Hidrandina supplies via temporary networks in the recent settlements, which speeds up the delivery of electricity services;
- It takes about 5 to 10 years before water and sewage networks are installed in recent settlements;
- The provision of alternative technologies via NGOs has stopped, while it used to be important in the provision of water, sanitation and solid waste disposal;
- There are no exceptional difficulties for serving the poor concerning investment recovery, losses due to stealing or reliability of payment when infrastructure services are provided in the poor urban areas of Trujillo;
- The continuous growth of the city has led to the introduction of a new type of telephone technology;
- The collection of waste is dependent on the municipalities only; differences between them are large.

Conclusions concerning the influence of the various actors are:

- The influence of the national government on the developments of the city is small;
- The provincial planning authority is the most important actor in the process of settlement;
- The provision of infrastructure services can be done faster when better interaction between the providers and the planning office;
- NGOs can play a significant role in the process of neighbourhood organisation;
- For obtaining infrastructure services, inhabitants of the poor recent settlements often rely on their local president;
- NGOs are hardly involved in the processes concerning the provision of infrastructure services in Trujillo.

6.2 POLICY RECOMMENDATIONS

The research has analysed the impact of migration on the infrastructure services in Trujillo. By including actor involvement and linking this to the recent developments, insights into the possibilities and bottlenecks for local authorities and NGOs were identified. This way, the normative goal of this research is reached.

“Give recommendations to NGOs and local authorities to improve the delivery of infrastructure services to the urban poor in Trujillo, Peru“

The most important recommendations for NGOs are the following:

- Supervision and aid with the process of obtaining services helps the inhabitants in recent settlements significantly, and can speed up the provision of the services;
- More involvement in the recent settlement can easily be established by contacting the local presidents;
- The need for alternative solutions for infrastructure services continues to exist, especially shared temporary solutions should be considered;

- Willingness to pay for the provision of infrastructure services is high in the recent settlements, working together with the private sector is possible;
- Documenting and publishing the progress and achievements of authorities and service providers can be a positive incentive for further investments;
- Plandemetru is positive about cooperating with NGOs, and is capable and willing to provide detailed information on developments;
- The municipal management of neighbourhood organisation can be improved via NGO involvement. Bringing together the respective public servants of the municipalities can yield significant synergy.

For the municipalities of the various districts, the following recommendations apply:

- More contact with local representatives is required to organise the process of obtaining infrastructure services;
- The management of the organisation of neighbourhoods at the municipalities can benefit from NGO involvement and contact;
- Contact with other municipalities should be extended to the level of public servants, especially where it concerns the neighbourhood organisation department, and the planning department;
- Private sector involvement should be considered for solid waste collection.
- The levelling of land should take place at an earlier stage, so that infrastructure can be installed more easily and alternative solutions provided.

6.3 FURTHER RESEARCH

The methods used in this research have proven to be successful for analysing the complexity of interactions between migration, urban development and infrastructure services. The surveys that were carried out in the recent settlements provide data for Trujillo that has not been collected before, and can be extrapolated to other Peruvian coastal cities. The interviews with the different authorities, companies, and NGOs provided detailed information on the quantitative processes. These aspects of the research have contributed significantly to the insights and results of this research.

The main limitation for this research was the limited availability of recent data on migration. The publication of the National Census of 2007 will overcome this limitation. Thereby, the data of the three neighbourhoods can be compared with the other parts of the metropolitan area of Trujillo. Furthermore, the developments of Trujillo can be compared with other coastal cities, something that was not possible to do with the existing data until now.

The detailed information from the infrastructure providers Sedalib, Hidrandina and Telefónica allows a highly-detailed spatial analysis of the services in the metropolitan area of Trujillo. Especially Sedalib and Hidrandina are willing to share their data for research purposes. Combined with spatial data from Plandemetru, a quantitative analysis is very well possible. Combined with the Environmental Atlas of Trujillo, this can provide a benchmark for other cities that are yet to experience the processes of development that have taken place in the metropolitan area of Trujillo.

Finally, the involvement of students and staff from universities in field-research has not been significant over the last years in Trujillo. This should change, and possibilities for comparing detailed data with census data are plenty. The collection and carrying out research with NGOs, Plandemetru, Sedalib or Hidrandina can provide a significant learning experience for the students. Most of the scientific research focuses on Lima. Scholars in Trujillo should publish more academic writings, as the developments concerning urban infrastructure services to the poor in Trujillo provide an interesting case in Peru and Latin America.

NOTES

CHAPTER 1:

¹ Statistics on urbanisation are generally collected via census-data. Thereby, the 'urban' corresponds with the definition used in each country, which varies widely. See Appendix I.

² Different definitions are used to assess one's origin, being either place of birth (i.e. census data), place of residence 5 years ago (most common) or derivations thereof (other data).

CHAPTER 2:

¹ It should be noted that it is a tendency towards zero marginal productivity, rather than a situation where the value added of employees actually equals zero. It is argued by Amartya Sen that the withdrawal of employees would cause others to work harder, introduce new technologies or reorganize their productive system in different ways (Ranis, 2004).

² This is especially remarkable when one considers the different definitions used; not only do they differ between countries, but also over time within countries. This might lead to the conclusion that the overall effect of the definition used on the national level is of limited influence. A different, and less likely interpretation could be that the use of definitions might have led to similar urbanisation patterns in all countries.

³ A point of caution is made by the authors of the article, stating that "*little information is available on measures of infrastructure quality and investment efficiency across countries*". They therefore had to rely on indicators of asset stocks and spending volumes.

CHAPTER 3:

¹ The term is used to describe the urban area of Trujillo, without most rural parts. For more information, see <http://www.munitrujillo.gob.pe/PlanifCatastro/planifica/paginas/planDesMet3.htm>

² Some neighbourhoods in La Esperanza were visited with civil servants from the municipality and with the water truck driver of the municipality of La Esperanza. Visits to Alto Trujillo were made with Plandemetru and the NGO Intervida, mainly to observe their work and methods. During the phase in which questionnaires were tested, students from the UPAO came along in the case study of El Milagro. Also, other parts of El Milagro were visited with employees of Plandemetru.

³ In respect to the cross-tabs and Chi-square function, it should be noted that strictly speaking an expected count of 5 is required to calculate Chi-square, and for at least 80% of the expected frequencies. This is not always the case for the tables presented in Appendix C. However, when the observed and expected frequencies in these cells are both small, than the consequences on the total are limited. In all of the presented tables, the conclusions are the same when these cells are included or omitted.

⁴ Attempts to work together with students did not result in the required results. This was due to the experience required for carrying out surveys, the limited available time of students due to classes, limited discipline of the students in showing up at appointments, and limited financial resources for compensation.

⁵ There was one particular case that showed how social desirability can influence the quality of the survey. This was on 9 July 2007, after having completed all but two of the 60 surveys to be carried out in Alto Trujillo 2B. The mayor of the Provincial Municipality visited the recent settlements to hold a speech and to be in touch with the population. He was accompanied by managers of Plandemetru and several journalists. As I went to listen to his speech and ask him some questions afterwards, I was greeted warmly by the people I knew, and was invited for the dinner prepared by the neighbourhood of Barrio 2B. On return two days later for the last two surveys, I found that answers were explicitly skewed, where high expectations of "the mayor that had always been great to them" were provided. Only after several attempts did I find two respondents that had not seen me that day and was I able to complete the surveys for Alto Trujillo.

CHAPTER 4:

¹ Utia Chirinos, José Vicente, Architect, June - July 2007.

- ² Variables on place of birth and migration movements were included in the censuses of 1972, 1981 and 1993. They were not included in the 2005 census. They were included again in the 2007 census, which is yet to be published.
- ³ No proper research on the size of migration patterns has been carried out after the 1993 census. However, these can be expected not to have increased, as the Shining Path was pacified (for a long time a source of migration away from the Central Andes) and there were no natural disasters of irregular proportions after 1993. This is not to say that there were no natural disasters (especially the phenomenon El Niño hit hard in the mid nineties), but just that they were not having a bigger impact compared those of the earlier decades.
- ⁴ The difference is that in Trujillo Province, the provinces of Poroto and Simbal are excluded. They are excluded in the Metropolitan Area of Trujillo. Due to their relatively small population, this does not make a large difference for the statistics as shown in this section.
- ⁵ Rosner (1999) indicates that the influence of terrorism on migration towards the district El Porvenir did contribute significantly to its growth during the 1980s.
- ⁶ It is important here to remember that a person is considered a migrant when having a different district of birth compared to the actual situation. Statistics on the origin of the inhabitants, on the other hand, show a generalized picture for the whole population of a district, showing the place of birth as a department only.
- ⁷ The main exception here is Nuevo Indoamerica, which did not receive any formal status since its existence. Also, some invasions in the Industrial Park of El Milagro (property of the Regional Government, whereas all other areas are part of the Provincial Municipality) were not guided by Plandemetru.
- ⁸ Interview with Héctor Benavides Rullier, executive director of demography, INEI
- ⁹ In these steps, the movement within the department of birth is often not taken into account. This is due to underreporting of these moves from the respondents, who often don't consider moving from a village to a local town as migration, especially when this happens when they are young.
- ¹⁰ Dividing the total number of people by the number of plots gives the average household size per district in the 2005 census. The average household size for La Esperanza and El Porvenir is 4.2, the household size for Huanchaco 3.3. El Milagro thus stands out from Huanchaco, but not from the districts that are close by.
- ¹¹ The poverty line is set at 1.08 international dollar, whilst the extreme poverty line is set at 2.15 international dollar. The PPP conversion factor of 2004 for Peru is 1.50. This means that a daily income of $S/1.50 \times 1.08$ is on the extreme poverty line. This is an income of $S/49$ per month. Conversion factors can be found at http://devdata.worldbank.org/wdi2006/contents/Table4_14.htm.
- ¹² Nelly Amemiy Hoshi is a former head of the planning department of the provincial municipality, Plandemetru. The work referred to here is her MSc Thesis as carried out at the UPAO.
- ¹³ Gamboa Cabel, José, director Parque Industrial Regional Government, April 2007.
- ¹⁴ Utia Chirinos, José Vicente, Architect, July 2007
- ¹⁵ Acuña Peralta, César, mayor Trujillo Province, July 2007.
- ¹⁶ In this specific case, the people that had torn down the wall were warned by the claimed owner of the block, telling the invaded squatters to leave, and threatening them to come back with arms. Two weeks later, some armed people appeared, threatening the squatters. The police had been warned before, and was therefore present quickly, after which the ones threatening left running, leaving a gun behind. (various sources, amongst which José Gamboa Cabel and the local representative of Los Huertos and Los Libertadores)
- ¹⁷ The prices reported are between $S/.300$ and $S/.700$. This included some basic material (adobe blocks) that can be used for construction.
- ¹⁸ Being mainly the programmes Mejoramiento Integral de Barrios (MiBarrio), La Calle de MiBarrio, y Mejorando Mi Pueblo. For a full overview of the programmes from MVCS see http://www.vivienda.gob.pe/direcciones/urbanismo_programas.aspx.
- ¹⁹ Interview with Avanibar Medina, Luis Alberto, programme manager MiBarrio Ministerio de Vivienda, May 2007. The information on projects carried out is also available via http://www.vivienda.gob.pe/direcciones/urbanismo_proyectos.aspx.
- ²⁰ Interview with Tagle Pizarro, Luis O., national director of urbanism Ministerio de Vivienda, Construcción y Saneamiento, May 2007.
- ²¹ This became clear in the interview with Tagle Pizarro, Luis O., national director of urbanism Ministerio de Vivienda, Construcción y Saneamiento, May 2007. He referred to the constant pressure from international organisations, politicians and other pressure groups,, combined with attractive benefits from keeping the a rural population as a driving force for such policy.
- ²² Regional Government, conversations with various employees of the Planning Department.

²³ The possible differences could be when dealing with external actors, such as banks. However, studies between the years 1998 and 2004 show that the possession of a property title does not lead to an increased use of private banks loans. The current use of mortgage loans from those with a property title is around and below 1.5% for the period 2000-2005. (Calderón Cockburn, 2007) Thereby, those with a property title do not use it for these purposes, and thus possible benefits are not present.

²⁴ Interviews with various employees of Cofopri, amongst which Jaramillo Quevedo, Milagros, executive assistant COFOPRI, June 2007

²⁵ interview with the Mayor of Alto Trujillo, William Alfaro Charcape, and other representatives of the municipality of Alto Trujillo, June 2007.

²⁶ Concerning the levelling, the lack of coordination has led to a highly undesired case. The inhabitants of several recent settlements of Nueva Jerusalén applied directly to the driver of the machinery to do some levelling at the time that he was working on a close-by public area. They paid the driver, and expected part of this money to be returned by the municipality. The authorities of La Esperanza claim that it neither their machinery nor their driver was present, and claim that they used machinery from and paid to the neighbouring municipality (Florencia de Mora). This conflict has not been solved, and both parties involved (inhabitants and municipal office) are frustrated by the lack of coordination from the other party.

²⁷ Canchaya Alvarez, Ketty Olived, Social Organisation Solaris Peru - Intervida, June 2007

CHAPTER 5:

¹ The Rio Santo that streams towards Trujillo is highly polluted and thus not used for drinking water. The Rio Moche is used for drinking water via the project Chavimochic.

² About 50 m³/second can be transported by the main canal, of which about 1 m³/second can be made available for drinking water via the net (MPT, 2003).

³ Interview with Gustavo Aparicio, March 2007, technical division Sedalib, Trujillo.

⁴ Conversation with Marco Arroyo Flores, general director PE PlandeMetru, March 2007.

⁵ One person is made responsible for the payment for the water used on one particular tap. Registering of households on the list of users is free, and no costs other than for the use of water apply once the tap has been installed. When thus monthly bills are paid to Sedalib, it is of little concern for Sedalib what the exact number of families is that is using a tap.

⁶ Alto Trujillo is part of El Porvenir in the tables.

⁷ Several interviews with employees of the technical division of Sedalib, April 2007

⁸ Combining these three areas is done on a simple sum basis. There is no correction made for the difference in size of the three case-studies (60 questionnaires in the case of Alto Trujillo 2B, 90 questionnaires in both the other cases).

⁹ These two households were located in El Milagro. The households themselves paid for the tubes after which an employee of Sedalib installed them for a small fee. In front of the house, the usage meter was installed normally and charging happens via the regular formal way. Their employment type or living situation or plot was in no way different from others; their individual applications had simply been approved by Sedalib. These cases can indicate preference or even corruption, though from the conversations there were no signs that bribery had taken place.

¹⁰ Several interviews with Giovanna Fernández Sánchez, representative of the decentralized office Trujillo - SUNASS, April – July 2007.

¹¹ Edgar Alfredo Alcalde Otiniano, Supervisor and analyst 'Centro de Perdidas' Sedalib, June 2007.

¹² Several day trips along the distribution points took place with Immanuel, truck driver Municipality La Esperanza, February to July 2007.

¹³ Conversation with the truck driver working for Acuña, May and July 2007.

¹⁴ Acuña Peralta, César, mayor Trujillo Province, July 2007

¹⁵ Taking place in December 2005, the figures were only reportedly lower from January 2006 onwards. This means that it was not part of the annual report by Sedalib of 2005 did not take these figures into account, and, more important the reduction in the number of connections took place after the National Census of 2005.

¹⁶ Most of the respondents were women. They often report that they cannot let their children go alone to the open field. Especially at night, they consider it dangerous for themselves too. The danger experienced varies from alcoholics and drug addicts that throw stones to rape and murder. Despite this, conversations did indicate that hardly anyone knew of cases of rape or murder in the area where they were living.

¹⁷ Such intermediary solutions can come as a shared toilet from which a pipe connects it with a closed basin where all excrements are collected and filtered (either chemically or more eco-friendly), as a toilet with a pipe going deep into the soil, or any type of system where dried excrements would be collected at certain times.

- ¹⁸ Interview with the project department Sedalib, various people, June 2007
- ¹⁹ Interview with various employees technical division Sedalib, March 2007.
- ²⁰ These latrines consist of a lavatory in a cabin with door and roof, all made from blue painted corrugated iron, a cement floor, a cement reservoir and a 150 mm pipe for ventilation.
- ²¹ Interviews with Rosa Linares, supervisor 'Asistencia de cooperacion al desarrollo' Circulo Solidario, June and July 2007.
- ²² Latrines have been placed in Moche, El Milagro and La Esperanza as well, but on a much smaller and less reliable base. In those areas, responses about the latrines were far from positive.
- ²³ Interview with Marlene Perres, director Programme management Circulo Solidario (until May 2007), March 2007.
- ²⁴ This lack of openness shows in a variety of ways; the last yearly report dates of 2004, the website is malfunctioning for almost a year, emails are not responded to, visiting the office of Circulo Solidario is only limited possible and the personnel of Circulo Solidario has very little time for citizens of Trujillo. Especially Marlene Perres provided me much information during her interview, other then from her information was hard to obtain.
- ²⁵ Interviews with Eleazar Ríos, director Projects Hidrandina, May and July 2007
- ²⁶ Conversations and interviews with Justo Estrada León, sales manager Hidrandina, May, 2007
- ²⁷ Interviews and data-analysis with Wilar Saguma C, control and maintenance, Hidrandina, June 2007
- ²⁸ Conversation with Ruby Pelaez, planning north-west Trujillo Plandemetru, April 2007.
- ²⁹ The progress is visible only since the local president has paid engineers to make the required maps, and has bought and installed posts of good quality. Further official documents were lacking, and a time path could not be given by the president. Hidrandina mentioned not to know the exact details of the situation in this case, and had certainly not formally agreed on any projects to be carried out (Justo Estrada León, see note 2).
- ³⁰ Interview with Eleazar Ríos, director Projects Hidrandina, June 2007
- ³¹ Interview and data analysis with Saguma C., Wilar, control and maintenance, Hidrandina, May 2007
- ³² Interview with Javier Ramos Campos Mosquera, regional supervisor Trujillo office Osinermin, April 2007
- ³³ In this thesis, the telecommunication sector is limited to the telephone and internet sector.
- ³⁴ Interview and data analysis with Lucia Valenzuela, technical assistant FITEL Ministerio de Transportes y Comunicaciones, May 2007.
- ³⁵ In this analysis, a correction is made for geographical differences, population density, human development index and GINI-coefficient.
- ³⁶ ADSL stands for Asymmetric Digital Subscriber Line/Loop
- ³⁷ WAP stands for Wireless Application Protocol. This technology is used to access the internet via mobile phones.
- ³⁸ At the time of writing, no indicators on the amount of people getting access to the internet via public cabins were present. Since the use of internet is included as a variable in the national census of 2007, these data will be available soon. In 2001, the amount of public places to use the internet is estimated to be around 2000, and has increased rapidly since then (OSIPTTEL, 2003b, p. 50-51).
- ³⁹ Such educational institutes are the universities (Universidad Privada Antennor Orrego, Universidad Nacional de Trujillo and the Universidad Cesar Vallejo) as well as other private schools.
- ⁴⁰ The description for internet cabins in Trujillo is based mainly on the author's own observations only. Though formally registered, the information on the number of public cabins was not easily obtained, and those data available were in line with personal observations. Some observations; La Esperanza has about 40 public places (500+ computers) from where internet can be accessed, El Milagro has only one place (5 computers), and Alto Trujillo has only some public internet cabins (< 25 computers).
- ⁴¹ Unlike most other questions, this question was asked to the individual. The ones that reported not to make phone calls all (but two) reported that their husband/partner did not make phone calls either.
- ⁴² This was reported as the reason by 17 respondents without phone; one reported there was no network available so that owning a phone would be useless.
- ⁴³ The group of people that do not make phone calls includes only 18 people. Therefore, it is harder to determine a statistically significant relation. Also, indications for such a relation are rare; amongst them are the current situation regarding the status of the settlement (squatter settlement yes/no), and the age (more likely to be under 15 or over 55 (five groups, 15-24, 25-34, 35-44, 45-54, 55+ years).
- ⁴⁴ Nowadays, there are state owned companies only in Colombia, Costa Rica, Ecuador, Paraguay and Uruguay.
- ⁴⁵ This network allows businesses to have one-on-one connections at very low rates. This type of direct connect phones is often referred to as walkie-talkies. The coverage of this network is along the coastal line of Peru and in some cities in the Andes only; thus excluding most rural areas, and all of the Amazon basin (and thus Iquitos).
- ⁴⁶ Interview with Palomares Sartor, Claudio, coordinator FITEL Ministerio de Transportes y Comunicaciones, May 2007
- ⁴⁷ Interview with Eyasta Hermoza, Efrain, director zone Trujillo Telefónica Peru, June 2007

⁴⁸ The costs for the pre-paid card and phone are S/. 35, and can be used for free during a one-month trial.

⁴⁹ Interview with Eyasta Hermoza, Efrain, director zone Trujillo Telefónica Peru, June 2007

⁵⁰ Interview with Juan Carlos Gonzalez Hidalgo, executive director Municipality of La Esperanza, March 2007

⁵¹ Conversation with Fernando Bazán Pinillos, mayor Huanchaco, February 2007

⁵² Interview with William Alfaro Charcape, mayor of Centro Poblado Alto Trujillo, June 2007

⁵³ The municipalities deal with the households on a one-on-one base, but only as far as it concerns payments to the municipality.

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BACKGROUND LITERATURE

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INTERVIEWS AND CONVERSATIONS

PUBLIC SECTOR INSTITUTIONS:

- Acuña Peralta, César, mayor Trujillo Province, July 2007
- Alfaro Charcape, William, mayor of Centro Poblado Alto Trujillo, May 2007
- Arana Ysa, Vladimir, director of the environmental office Ministerio de Vivienda, Construcción y Saneamiento, May 2007
- Arcondo Huanaco, Bertha, executive director of system development INEI, May 2007
- Arroyo Flores, Marco, (former) general director PE PlandeMetru, several meetings February - July 2007
- Avaniabar Medina, Luis Alberto, programme manager MiBarrio Ministerio de Vivienda, May 2007
- Bazán Pinillos, Fernando, mayor Huanchaco, February 2007
- Benavides Rullier, Hector, INEI, executive director of demographics, May 2007
- Campos Mosquera, Javier Ramos, regional supervisor Trujillo office Osinergmin, April 2007
- Castro Cruz, R., architect Municipality of Huanchaco, February 2007
- Esquivel cisterna, P.C.M., public relations Municipality La Esperanza, February 2007
- Fernández Sánchez, Giovanna, representative of the decentralized office Trujillo - SUNASS, February - July 2007
- Gamboa Cabel, José, director Parque Industrial Regional Government, March – July 2007
- Gonzalez Hidalgo, Juan Carlos, executive director Municipality of La Esperanza, March 2007
- Jaramillo Quevedo, Milagros, executive assistant COFOPRI, June 2007
- Molina Abanto, Marita, technical division, COFOPRI, June 2007
- Palomares Sartor, Claudio, coordinator FITEL Ministerio de Transportes y Comunicaciones, May 2007
- Peláez, Ruby, planning north-west Trujillo PlandeMetru, February - July 2007
- Serrano Hernández, Cecilia, PE PlandeMetru, March 2007
- Tagle Pizarro, Luis O., national director of urbanism Ministerio de Vivienda, Construcción y Saneamiento, May 2007
- Valenzuela, Lucia, technical assistant Ministerio de Transportes y Comunicaciones, May 2007
- Viteri Falcón, Arturo, regional co-ordinator Trujillo Office Fondo MiVivienda, June 2007
- Zárata Castañada, M., head of the 'neighbourhood participation' office Municipality of La Esperanza, March 2007
- Zaldivar Revoredo, Carlos, analyst '*SIP Formuladora*' Sedalib, June 2007
- Palomares Sartor, Ministry of Transport and Telecommunications, May 2007
- Sra Carmen, Nurse of the Bellavista Clinic in La Esperanza, March 2007

COMPANIES:

- Alarcon Quispe, Julian Octavio, supervisor Strategy and Planning, Hidrandina, May 2007
- Alcalde Otiniano, Edgar Alfredo, Supervisor and analyst 'Centro de Perdidas' Sedalib, June 2007
- Chico Barrantes, Diego, director public relations, May – July 2007
- Chumbes Campos, public relations Hidrandina, May 2007
- Eleazar Ríos, director Projects Hidrandina, June 2007
- Estrada León, Justo, sales manager Hidrandina, April 2007
- Eyasta Hermoza, Efrain, director zone Trujillo Telefónica Peru, June 2007
- Fuentes Dios, Carlos, public relations manager Hidrandina, February – July 2007
- Gustavo Aparicio, technical division Sedalib, February 2007
- Salvatierra Vergel, Joel, supervisor cadastre, Sedalib, February – June 2007
- Saguma C., Wilar, control and maintenance, Hidrandina, January – June 2007
- Vasquez Muñoz, Juan Carlos, manager of property registration (*catastro*) Sedalib, February – June 2007
- Vidal Verriao, Juan, analyst property registration (*catastro*) Sedalib, February – June 2007
- Vocanegra, Jaime, Sales manager, Sedalib, February 2007.

NGOs:

- Alvarado Cáceres, Elvira, manager Educational Office Solaris Peru - Intervida, June - July 2007
- Arcos Cuachos, Silvia, CESEL Peru, May 2007
- Canchaya Alvarez, Ketty Olived, Social Organisation Solaris Peru - Intervida, June - July 2007
- Linares, Rosa, assistance of 'Asistencia de cooperacion al desarrollo' Circulo Solidario, May - July 2007
- Mindreau, B.L., Care Peru, specialist in training, May 2007
- Padilla Bartra, Fernando, Projimo, February 2007
- Perez Morales, Marlene, director of programmes, Circulo Solidario, March 2007.

INDEPENDENT/OTHER:

- Utia Chirinos, José Vicente, Architect, June - July 2007
- Miranda, Javier, University Teacher, several conversations February – July 2007
- Gil Vallejos, Carlos, former representative San German El Milagro, April 2007.

