CITY REPORT

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Metropolitan Lima and the Sustainability Challenge
Growing Cities in Growing Economies

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Metropolitan Lima and Callao

By Liliana Miranda Sara, Guillermo Takano, Carlos Escalante

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Urban Chances in Peru
Cities for Life Foro

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List of Acronyms

AML	Metropolitan Assembly of Lima
ALA	Local Water Authority
ANA	National Water Authority
APN	National Port Authority
CAPECO	Construction Chamber of Peru
CENEPRED	National Center for the Prevention and and Diminishing of Disaster Risk
COFOPRI	Commission for the Formalization of Informal Property
CONATA	National Council of Real Estate Value Appraisals
COREDES	Regional Conference for Social Development of Lima
EAE	Strategic Environmntal Evaluaction
EMAPE	Municipality Company of Toll Administration
ENSO	'El Niño' phenomenon
GPIP	Office for the Promotion of Public Investments MML
GRC	Regional Government of Callao
HIDRONAV	Directorate of Hydrography and Navigation
IGN	National Geographic Institute
IIRSA	Initiative for the South American Integration
IMARPE	Peruvian Marine Institute
INDECI	National Civil Defense Institute
INDECOPI	Peruvian consumers defense Agency
INVERMET	Municipality of Lima Metropolitan Fund of Investments
IPCC	Climate Change Intergovernmental Panel
IIRSA	Programme for Regional Infrastructure in South America
LM	Lima Metropolitan Area
LiWa	Lima Water Project
MCLCP	Poverty Fighting *Concertacion* Group
MML	Metropolitan Municipality of Lima
MINAM	Ministry of Environment of Peru
MOCCIC	'Civic Movement coping Climate Change'
MPC	Provincial Municipality of Callao
MST	Homeless Movement
MVCS	Ministry of Housing, Construction and Sanitation
MZEE	Ecological Economic Micro-Zoning
NCCC	National Climate Change Committee
OT	Territorial Planning
PB	Participatory Budgeting
POT	Territorial Plan
PRDC	Concerted Development Plan of Metropolitan Lima
PCM	Prime Minister's Council
PIGARS	Integral Plan for Solid Waste Management
RUOS	National Register of Social Organizations
SBN	National Superintendence of Real Estate Assets
SEDAPAL	Water and Sewerage Service of Metropolitan Lima
SENAMHI	National Service of Meteorology and Hydrology of Peru
SERPAR	Parks Services Administration of MML
SIGRID	Information System for Disaster Risk Management
SIRAD	Information System of Resources for Disaster Attention
SITR	Regional Spatial Information System
SMCV	Sociedad Minera Cerro Verde
SNIP	National System of Public Investment
SUNARP	National Public Records Superintendence
UNDP	United Nations Development Program
VdeL	Glass of Milk Program (Municipal)
ZEE	Ecologic Economic Zone

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Summary

The present city profile report explores the development of Metropolitan Lima (LM), the capital of Peru on a number of aspects concerning its sustainability in times of high economic growth that has occurred steadily in the last 15 years. Indeed, cities –and particularly Lima due to its primacy– have been considered as engines of economic growth that at the same time have absorbed its impacts. Peruvian cities have certainly reflected the effects of a growth oriented economic model by developing as an unplanned urban system with great inequalities between urban and rural areas, as well as between and within cities. Issues such as high physical and environmental risks, water stress, socio-spatial segregation, lack of basic service coverage, uncontrolled urban sprawl over agricultural areas based on market forces instead of planning but have constituted LM as eloquent relevant case for a detailed study.

These impacts, together with the recent transformations that have occurred in LM will be explored in accordance to the scientific framework of the Chance2sustain research project. The report will explore the set of governance schemes performing at different levels and involving different actors in order to understand how growth, urban reconfigurations, social responses, environmental processes and spatial knowledge are related in this particular case, supported by the case-studies produced by the Chance2Sustain team of researchers. Since the project aims to compare these different phenomena with international cases, this report will also refer to the peculiarities of LM and its regional/national context in order to establish its unique features.

Chapter 1 examines the different levels of government involved in the territory of LM and its hinterland and their degree of responsibility, acting in autonomous, dependent or overlapping ways. There is a special emphasis on the impetuses and effects of the ongoing decentralization process and on how planning has been redistributed among national and sub-national levels of government. Chapter 2 explores the strategic importance given to infrastructure at the national and metropolitan levels and the role that large-scale projects have acquired in order to consolidate LM's urban economy as well as the visions and agendas behind their implementations and the impacts and debates generated. Chapter 3 highlights the features of urbanization in LM, with a particular emphasis on the segregated way in which LM has developed and consolidated; explained in relation to density, housing and infrastructure endowments. The whole set of policy efforts and the historical role acquired by social organizations in order to overcome these inequalities are also deeply analyzed. Chapter 4 aims to understand the city's hydro-climatic vulnerabilities in correlation to the clear territorial distribution of inequality shown in chapter 3 and confronted with the role of water and climate change institutions. Chapter 5 confronts the visions that different actors/sectors/levels of government have on LM and a multilevel approach to spatial knowledge by public, private and civil society sectors (including CBOs[1]) and to what extent this is related with the conformation of a institutional network. Chapter 6 outlines several fiscal and budgetary issues related to the most recent decentralization wave and the structural problems it aims to tackle. It also explores the outcomes, problems and possibilities of participatory budgeting processes as a possibility to democratize budget allocation and decision-making in LM. Chapter 7 explores the different case studies that have provided empirical evidence and supported some of the analyses and statements done along the document. We close the report with conclusions and a detailed analysis of the different theme lines seen along each chapter.

1 Community-based organization

1 Introduction: Context of Urban Governance in the City Concerned

LM located in the coastal center of Peru next to the Andes Mountains and is formed by the Lima-Callao conurbation (more recently expanding to the 'Huarochiri' neighboring province). It has an estimated population of 8.5 million inhabitants and holds the fourth place on the list of largest cities in South America,[2] being 10 times bigger than Arequipa, the second city of the country. LM's hinterland constitutes the Lima Macro-region which is an articulation of networks of cities and towns settled along the four river basins that compose the conurbation: Chillon, Lurin, Rimac and Mantaro.[3] As other big cities from the South, the rapid growth of LM has been marked by rapid urbanization[4], economic and political centralization and unequal patterns of urbanization. This issues, together with a set of unresponsive urban policies have certainly set the current situation of LM, characterized by high inequality and socio-spatial segregation levels.

1.1. Levels of Government and Territorial Jurisdictions Involved in the City Region

Politically Peru is defined as a democratic, social, independent and sovereign republic. Its government is meant to be unitary, representative and decentralized, and is organized according to the principle of separation of powers into executive, legislative and judicial branches. Territorially, Peru is divided into 25 regions, 194 provinces and 1828 districts that are governed at three different levels: the national government (with 118 decentralized institutions and 50 decentralized autonomous agencies), 25 Regional governments and more than 1800 local governments at provincial and district levels.

1.1.1. National level of government

The most relevant territorial policy making processes such as water and sanitation services and energy provision, land policies or large-scale infrastructure and natural resource concessions, fully depend on the national government or are at least regulated by this sphere. Ministries responsible for designing policies do not take crosscutting decisions in relation to the referred sectors or relate to sub-national levels of government.[5]

1.1.2. Macro regional level

In general, issues in macroregionalization have not still been discussed in programmatic ways over existing departmental subdivisions and no serious proposal has been publicly debated so far since divergences between regions and departments are considered to be formidable (such as economic or geographic). The most recent effort has been the national referendum held in 2005 for approving the creation of 5 macro-regions. 15 of 16 regions voted against the proposal and the process was, once again, putted on hold. It has been recognized that the 2005 referendum process was not joined by a serious public and technical debate and the population was uninformed when they went to vote and the proposal lacked of technical solutions for reverting existing 'departmentalism' impetuses.[6] The decentralization process happened without a previous planning in order to establish the route of the decentralization within a deep transformation of the state; which means changing the social and economic conditions that organize the territory (Azpur 2005).

This means that there is not a legitimate macroregional government sphere surrounding LM or any other major city-region in Peru. Nevertheless, LM's immediate macroregional context is not difficult to determine (currently used only for research purposes) being composed by 3 independent regional jurisdictions; each of them governed by their own single authorities that constantly tend to overlap and even collide (see figure 1):

2 In: Instituto Nacional de Estadística e Informática, Perfil Socioemográfico del Perú. Censos Nacionales 2007: XI de Población y VI de Vivienda, INEI, Lima, agosto de 2008, 2ª edición, pp. 29, 30.

3 Nonetheless, there is no established macroregional jurisdiction in the LM area.

4 Urban population in Peru has increased 9.5 times between 1940 and 2007 while the rural population has only increased 1.6 times.

5 Additionally, the main branches of the central government are housed in LM: executive (presidency and ministries), legislature and judiciary powers.

6 See: http://www.larepublica.pe/01-11-2005/lecciones-y-perspectivas-del-referendum-del-30-de-octubre

- Lima
- Callao
- 'Lima Provincias' (it is a different entity whose jurisdiction includes surrounding peri-urban and rural areas at the medium and high basins of the Chillon, Lurin and Rimac rivers).

These jurisdictions include 11 provincial municipalities (Lima, Callao, Huarochiri, Canta, Cañete, Oyon, Hauaral, Yauyos, Barranca, Cajatambo and Huaura) and more than a hundred district municipalities.[7]

1.1.3. Metropolitan and provincial levels

In short, LM is governed by two regional governments:[8] the Municipality of Lima MML that is a local provincial government with regional government competences[9] and the Regional Government of Callao (GRC) that at the same time overlaps with the Provincial Municipality of Callao (MPC). The Callao territory is a unique case in the whole country, where a relatively small territory contained within the limits of a bigger one (LM) has autonomous regional government competences (see figure 1).

At the metropolitan level there is a well-recognized governance problem level between the Metropolitan Lima Province and the Callao Province. Although both are conurbated and form the same metropolitan region there exists a very limited planning and administrative relationship regarding national-sectorial, regional or local spheres which generates constant overlapping and even conflict/competition situations. Also, the neighboring Huarochiri province has been added to the decision making process regarding the LM territory (see figure 1), since the metropolitan area has recently surpassed its historic boundaries to the east (San Juan de Lurigancho district) and Huarochiri has become the main current urban growth absorption area. That has exacerbated government overlapping and fragmentation occurring in a single metropolitan city.

1.1.4. The District Level

There are 49 district municipalities in LM (42 in Lima and 7 in Callao) that tend to perform independently from each other and from higher regional and provincial levels of government. This is supported by the 1993 Organic Law of Municipalities that undermined the power of provincial governments and empowered district governments particularly in relation to their fiscal capacities. This governance shift occurred in a context of neutralization of regional political opposition by the Fujimori rule during the 1990s.[10]

Despite the past and current decentralization efforts done (at least 7 attempts) Peru is still a highly centralized country where '…dominant sectors had the capacity, and above all, the power to block and frustrate several decentralist attempts, in the framework of a very excluding society' (Azpur 2005:1). Considering LM's political and economic importance at the national level greatly related to its primacy, it is an important space of political struggle between national and sub-national governments (it concentrates one third of voters) to the point that the national government has strategically rolled back different aspects of the decentralization process that at the end of the day do not hold any truly regional perspective and even keeps relying on territorial fragmentation in order to secure political profits (for instance regarding the attributions of sectorial competences from ministries to the MML). The most important decisions and about 70% of the national budget are concentrated at the national level of government. Thus, Lima is a very important recipient of public investments from the national government that tends to even compete with local authorities (with much higher budgets). National government expenditure in LM was almost 29 times more than MML's in 2012.[11]

1.2. Planning Schemes at the National, Macro-regional, Metropolitan, Provincial and District Level

First at all, it is important to state that there is no current trend of enforcing and evaluating urban plans in Peru, which is related with the deactivation of most

7 Its direct hinterland regarding water resources includes also the neighboring regions of Pasco and Junin.

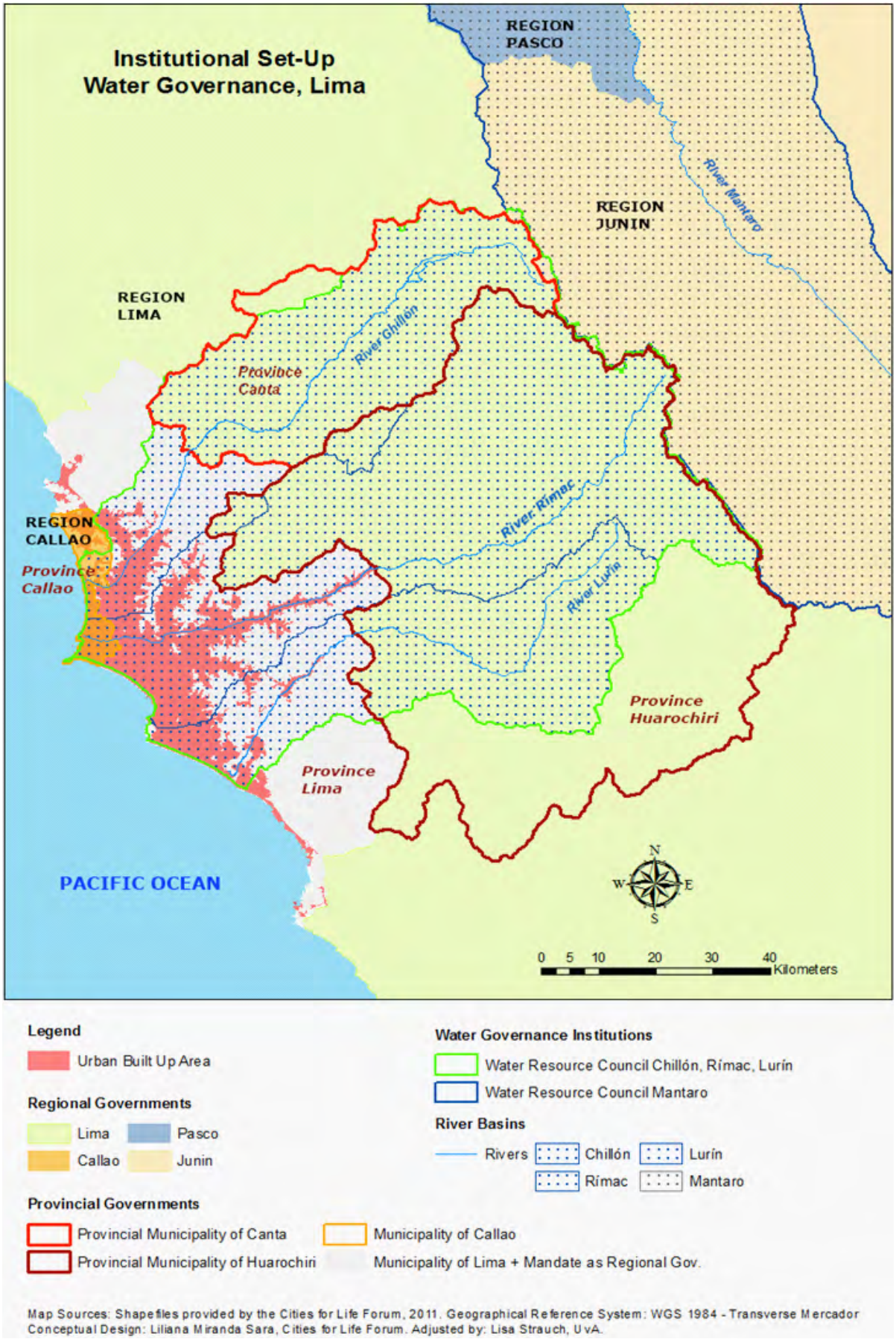
8 Mayors (district and provincial) and regional presidents and councils are elected every four years.

9 This is a unique case established by the organic law of municipalities.

10 The law that authorized the transfer of urban regulation competences from provincial municipalities back to the national government was passed only 3 days before a new mayor of Lima, Alberto Andrade, took power. He was the main political opposite to Alberto Fujimori at that time.

11 The 2012 budget for the MML was around 1742M PEN. Nonetheless, more than 50000M PEN where assigned to the Lima department during the same year, for being exclusively spent by the national government.

Figure 1: The Macro Regional Level and the institutional overlap



Source: Developed by Lisa Strauch

planning institutionality given after the closure of the National Planning Institute in 1991, occurred in accordance with the aggressive implementation of neoliberal policies after 1992. Every planning agency was closed and every planning aim was almost censored, being considered as a part of a more "socialist" wave of central command economies. The referred reform followed an ideological line that considers planning functions as 'inconvenient' and the state as a 'facilitator' for private agents' actions (Calderón 1999), limiting the role of the State to the provision an adequate environment for markets in a rather subsidiary way and reducing urban planning to pure land use zoning.

Even as national development planning was retaken with the creation and regulation of the National System of Strategic Planning CEPLAN in 2008,[12] in practical terms the country still lacks of an integrated planning system. As an institution CEPLAN still has many political and technical lacks reflected in its 2010-2021 plan that does not include proper diagnoses, analyses or strategies for reaching the expected goals.[13]

1.2.1. National Government Level

National level entities involve on issues of ecologic-economic zoning and urban land management by intervening on the property legalization or granting (selling at lower prices) of desert areas and former public facilities (such as army barracks and civil airports) to private operators for developing real estate large-scale projects with no inference of municipal or regional governments. In the same vein, the former deputy minister of Housing has promoted a national program for urban enablement that pretend to give 570000 ha of land to real estate companies for social housing purposes called 'Programa de Generación de Suelo Urbano' (urban land generation program).

1.2.2. Macro-regional level

As it has been previously said, regarding the jurisdictions that conform an hypothetical macro-region, no joint planning considerations have been taken since there is no type of institutionality at the referred level. While the national planning system (under the figure of CEPLAN) practically denies the institutional side of macro-regionalization, different jurisdictions tend to develop their own planning schemes without considering each other.

Box 1: Clashes between the National Government and the MML regarding large scale projects

In relation to large scale projects development, the 'Metro del Lima' public transportation project was made by an autonomous authority attached to the Ministry of Transports and Communications (with no relationship with the MML). Indeed the 'Metro de Lima' and the 'Metropolitano' segregated bus system (managed by the MML) are not interconnected systems yet and they might eventually compete. The line 2 of the 'Metro de Lima' has almost the same route as the line 2 of the 'Metropolitano' and according to the current minister of Transports and Communications "it is obvious that the bus line cannot compete with a train network. A bus line is doomed to fail".

There are no planning or management coincidences between LM and strategic neighboring provinces such as Huarochiri and consequently there is no kind of oversight on LM's further expansion since Huarochiri develops its own plans as well.[14]

1.2.3. Regional and provincial levels

In Peru, local governments have a limited role in metropolitan planning. The regional-provincial level, which is the natural space for metropolitan management and sub-national articulations remains in a kind of limbo. Provincial mayors perform only as managers of the capital district but not of a whole set of jurisdictions belonging to a greater territory. This process was well inserted in the Fujimori political control apparatus that aimed to cancel any institutional intermediation and the possible generation of political opposition flanks particularly under the figure of metropolitan mayors in LM.

Urban development planning in Lima occurs under the jurisdiction of two institutions; the Metropolitan Planning Institute (IMP) of the MML, and the Provincial Municipality

12 In: http://www.ceplan.gob.pe

13 See: http://peru21.pe/noticia/391712/critican-plan-estrategico-ceplan and http://elcomercio.pe/economia/332839/noticia-ceplan-no-goza-apoyo-elaborar-estrategias-al-2021

14 Also, in relation to public transport policies, overlap and competition levels have also risen between Lima, Huarochiri and Callao. The Huarochiri Provincial Municipality has authorized public transport lines to circulate on LM's territory with no type of joint consultation or decision-making. The same case has occurred between Lima and Callao in relation to taxicab permissions.

of Callao that tend to develop plans in parallel ways. They merely update district development plans (from few of them), which in some cases include comprehensive development proposals and in others are limited to zoning and land uses (land use permits issuance).

The IMP, as the most important planning institution in LM, is in charge of updating land use zoning within the Lima province. In fact, LM is the only region in Peru that counts with its own urban planning agency since 1991, that performs as an autonomous body from the MML and the national government. It initially aimed to give continuity, by permanently evaluating and adjusting the Master Plan 1990-2010. Unfortunately, both the IMP and the Master Plan have suffered a systematic undermining by authorities after the 1990s. Consequently, LM lacks of some main instruments of territorial planning such as the Territorial Plan (POT) and the Metropolitan Urban Development Plan.[15] Only Callao has developed a POT (in process of approval) being the only region in the country that has achieved this goal. The IMP is currently elaborating the POT for the Chillon, Lurin and Rimac basins, which is expected to be finished in 2013. In addition, the MML has considered necessary to reactivate planning processes and has recently approved the final version of the Concerted Development Regional Plan 2012-2025 (PRDC) that presents general strategic guidelines for policies and programs with small detail and inexistent programmatic and territorial planning contents.

15 The Metropolitan Development Plan for Lima and Callao 1990-2010 expired in 2010 and its update has not started yet (neither by the IMP nor the MPC).

1.2.4. District level

The 2003 Organic Law of Municipalities reduced urban planning to the district scale, to the point that each municipal district is able to approve its own urban development plan. The current legal framework (Organic Law of Municipalities from 2003) states that every local government needs to develop a 'Concerted Development Plan' approved by municipal authorities and civil society representatives, which is a necessary requisite for acceding to budget transfers and prioritizing participatory budgeting projects.

Nonetheless, "few local governments have the institutional capacity to prepare and approve urban development plans or effectively monitor compliance with urban land use regulations" (Endo 2010: 209) and although municipalities are in charge of providing permits for urbanization and construction, they do not participate in any aspect of urban development and housing policies (Riofrío 2010), being plans on land administration restricted to a handful of rich municipalities. The results and degree of concertation of the referred plans are mixed: from plans developed with a high degree of participation to those ones made behind closed doors by external consultants. The experience with concerted development plans shows that there are difficulties in identifying problems and possibilities, and relating them to public investment processes as well as territorial articulation criteria besides infrastructure development, which certainly feeds existing project atomization trends.

2 Main Urban Growth Strategies – The Role of Mega-projects

From strategic planning experts to corporate construction lobbyists, infrastructure development is considered as a crucial component for guaranteeing Peru's global competitiveness and sustaining national economic growth. Raw calculations of Peru's infrastructure backlog 2012-2021 are estimated in almost 88000M USD.[16] Considering the amount of funds required (around 33% of GDP) and recent public expenditure levels in infrastructure (less than 2% of GDP a year), the inclusion of the private sector through the development of PPPs (particularly through the granting of infrastructure concessions) and the unlocking of existing regulatory and bureaucratic barriers are an important part of the agenda at different levels of government. Figure 2 shows the most important projects developed under different concession schemes at the national level.

In general the only strategic initiative to develop large-scale infrastructure at the national level is named IIRSA "Initiative for Regional South American Infrastructure". It performs as a coordination mechanism for the joint development of transport, energy and telecommunication

16 In: http://elcomercio.pe/economia/1487422/noticia-brecha-inversion-infraestructura-alcanza-us88-mil-millones

Figure 2: The Macro Regional Level and the institutional overlap

Source: Developed by Lisa Strauch

megaprojects beyond national boundaries in 12 South American countries. IIRSA has a focus on enhancing regional competitiveness in order to consolidate the South American common market and its global presence as an economic block. From the total portfolio of 524 projects, 67 of them correspond to Peru, with an expected investment of USD 8.3 billion. Megaprojects like the transoceanic corridors and multimodal axes belong to this initiative. Other national infrastructure projects are related to the implementation of massive irrigation schemes Olmos in the Lambayeque department (USD 185 million) and the Majes-Siguas II in Arequipa (USD 410 million). Theses projects are inserted in the context of the increasing importance of agro-exportation within the Peruvian economic growth model.

2.1. Position of the Urban Economy Related to National and International Economy and City-centered Visions

The size and importance historically achieved by LM provides enough specific weight for making centripetal forces prevail over existing diseconomies of agglomeration. The constant feedback between LM's wealth concentration and political/fiscal centralization reinforces its disproportionate role and puts constraints to the development of other regions. In 2006, LM concentrated 30.26% of the country population, 58% of GDP, 84.4% of the banking portfolio, 4/5 of total taxation, 61% of manufacturing activities (nearly 7000 factories) (MML 2012), 55% of the construction sector output, 53% of the retail and service sectors output and 52% of GVA for 2007 (INEI 2010). While the average national product per worker was 15519 PEN in 2007, LM averages more than 20000 PEN.[17] Additionally, the Port of Callao concentrates more than 80% Peru's shipping container traffic that is increasing with the recent implementation of the South and North Piers (19% of Peru's mining exports go through the Port of Callao).

2.2. Current Role of Large-scale Infrastructure Projects in the Urban Economy

Population growth in LM has generated considerable diseconomies regarding issues such as water and sewerage (networks are around 30 and 40 years old and are experiencing constant and increasing collapses), transportation (average car speed in LM is 16.8 km/h while in Santiago de Chile is 41 km/h),[18] urban violence (there was 1 policeman for every 781 people in 2011) and public/green spaces (LM counts with only 2.9 m^2 of green area per person while the World Health Organization recommends 10 m^2).[19]

As table 1 shows, an important number of the recent large-scale projects developed in LM aim to tackle existing agglomeration problems (more than 12500M USD in less than 10 years). Recent policies on large-scale projects have targeted the elimination of diseconomies of agglomeration and the improvement of LM`s competitiveness in the global arena more than the generation of collective welfare and quality of life.[20] Expansions of the port and international airport for almost 1500M USD and the expected Line 4 of the 'Metro de Lima' that aim to connect (among other objectives) the airport with the CBD, follow the same direction.

It also can be said that megaprojects have also a more pragmatic economic aim of boosting GDP through massive and effective public investments on the construction sector. The main source of economic growth and employment in Peruvian cities is the tertiary sector in which construction and retail play a major role. Both were the most important factors of GDP growth, representing almost a 1/3 share of the 6.3% national growth rate during 2012.[21] The construction sector alone grew 15.2% in 2012,[22] which –as in many other countries– has been recognized to hold high shares of aggregate growth rates due to its value chain and employment generation capacities despite of its low productivity nature and the speculative trend that unregulated real estate sectors tend to follow, rising as a very attractive recipient for private capital. In regard to public capital, income and employment multiplier effects of the construction sector are expected to guarantee a very positive correlation between public investments on built infrastructure (seen often as large-scale projects) and GDP growth which has a strong political acceptance effect.

17 In contrast, other regions such as Apurimac reached 6682 PEN.

18 In average every person in Lima loses 4800 PEN a year due to transport diseconomies; being expected that private transit volume will increase 2.2 times between and freight transport volume will increase 2.24 times between 2004 and 2025 (CTLC 2001).

19 Ministry of Environment (2010).

20 For the Brazilian case, theories on 'corporate metropolis' follow the same line of thought (Santos 1990 as cited in Kennedy et al. 2011).

21 The construction sector has grown in approximately 350% during the last 11 years.

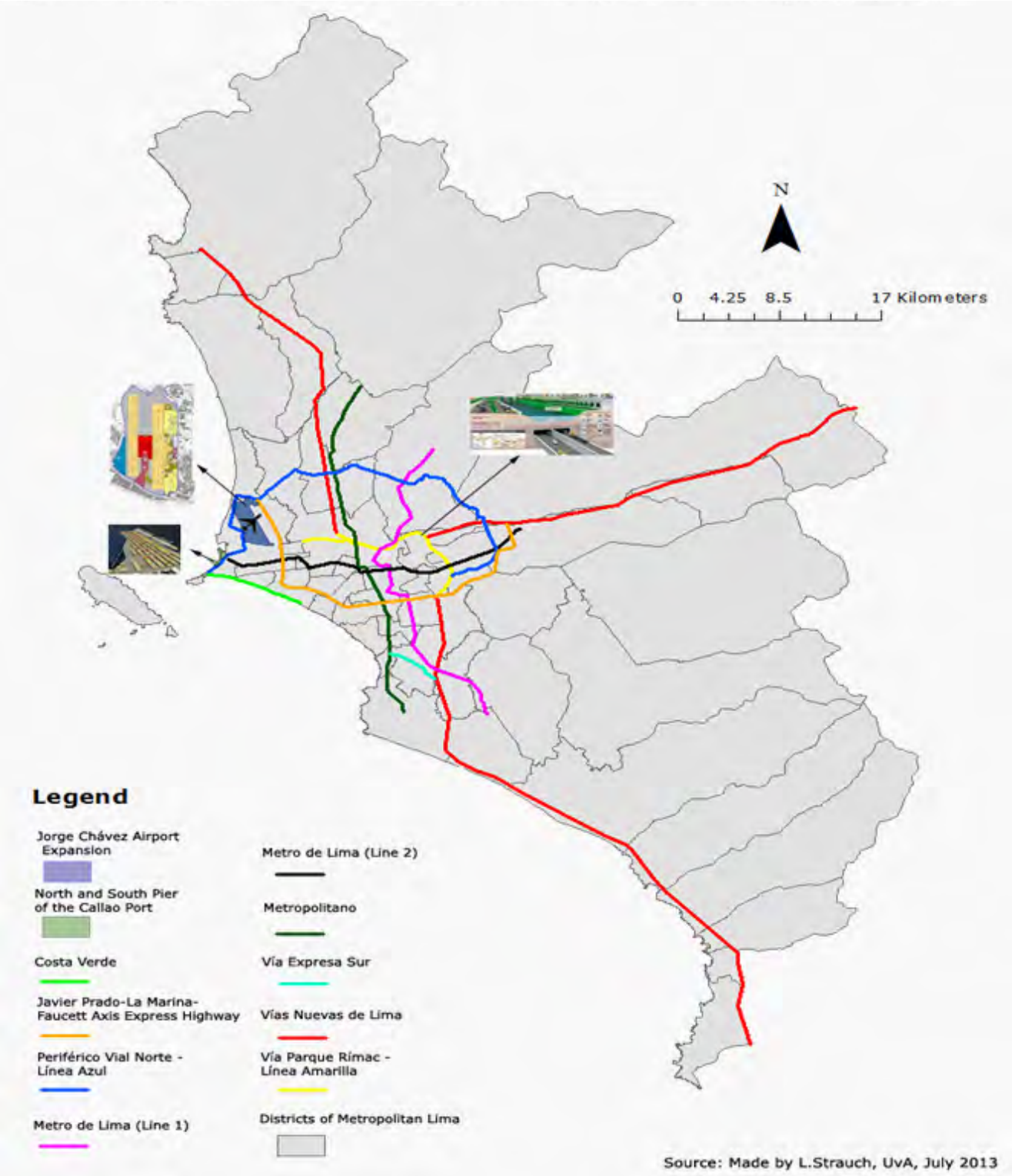
22 In: http://elcomercio.pe/economia/1541870/noticia-comercio-construccion-contribuyeron-mas-pbi-2012

Table 1: Recent large-scale projects in LM (Last 10 years)

Project	Status	Type of project	Estimated budget	Level of government involved
Metro de Lima (Line 1)	In progress	Public transportation	950M USD	National
Metro de Lima (Line 2)	Announced. To be tendered in 2013	Public transportation	5000M USD	National
'Metropolitano' Segregated Bus Lane	Delivered	Public Transportation	300M USD	Metropolitan
Via Parque Rimac	In progress	Private transportation	700M USD	Metropolitan
Vias Nuevas de Lima	Tendered	Private transportation	500M USD	Metropolitan
Southern expansion of the "Paseo de la Republica" express highway	Tendered	Private transportation	196M USD	Metropolitan
Javier Prado-La Marina-Faucett axis express highway	Announced	Private transportation	902M USD	Metropolitan
Huachipa Potable Water Plant	Delivered	Water	190M USD	National
Chillon Potable Water Plant	Tendered	Water	54M USD	National
Interceptor Norte Taboada waste-water plant	Delivered (partially)	Sanitation	230M USD	National
La Chira waste-water plant	Tendered	Sanitation	165M USD	National
Huascacocha water channel	Delivered	Sanitation	94M USD	National
Upgrading of 5000 km of pipeline from the metropolitan water and sewerage networks	In progress	Sanitation	3200M USD	National
Huachipa potable water plant	Delivered	Sanitation	281M USD	National
South Pier of the Callao Port	Delivered	International connectivity	305M USD	National
North Pier of the Callao Port	Delivered	International connectivity	307M USD	National
Jorge Chavez airport expansion	In progress	International connectivity	830M USD	National

Source: Self-elaboration based on local newspaper research

Figure 3: Recent Large-Scale Urban Development Projects in Metropolitan Lima



Source: Made by L. Strauch, July 2013, based on table 1

2.3. Debates on Large-scale Projects in LM

There are a number of skeptical approaches, very common to the development of large-scale projects in Peru and Lima: low-transparency levels, lack of relationship with existing planning frameworks, big socio-spatial and environmental impacts, adverse conditions for affected populations, and disproportionate contract terms in favor of private operators and to the detriment of citizens and current (and future) municipal administrations whose maneuvering space remains severely limited. This coincides with the international experience describer by Flyberg et al. when they refer that "megaproject development today is not a field of what has been called 'honest numbers'. (…) Project promoters often avoid and violate established practices of good governance, transparency and participation in political and administrative decision making, either out of ignorance or because they see such practices as counterproductive to getting projects started. Civil society does not have the same say in this arena of public life as it does in others; citizens are typically kept at a substantial distance from megaproject decision-making" (2003:5 as cited in Kennedy et al. 2011).

The case of the Norberto Odebrecht construction multinational

A particularly delicate case is that one of the Brazilian construction multinational Norberto Odebrecht which is "by far the first Peruvian state's contractor".[23] Only in 4 megaprojects, which include the already mentioned North and South transoceanic highways and the first stage of the "Metro de Lima" have shown over-costs for more than 60%. These set of projects together with the "Olmos" irrigation scheme (also developed by Odebrecht) were exonerated of the SNIP (National System of Public Investment) regulations by several supreme decrees. According to the former general comptroller Genaro Matute these are political decisions with no technical criteria at all. Since the SNIP does not regulate them there is no definite study and the final valuation is executed after the contract is signed.[24]

23 Las cuentas con levadura de Odebrecht. Article published in IDL-R on 30/11/2011. In: http://idl-reporteros.pe/2011/08/26/las-cuentas-con-levadura-de-odebrecht/

24 "Haciéndole el túnel al SNIP". Article published in IDL-R on 30/08/2011. In: http://idl-reporteros.pe/2011/08/29/haciendole-el-tunel-al-snip/

Regarding the `Metro de Lima´ project

Although the consortium 'Tren Electrico' that developed the first stage of the project has been denounced of running over-costs for more than USD 100 million (26.6% increase), it won the public bid for its second stage (USD 650 million contract). The granting of the concession has been also controversial since it has been stated that specific emergency decrees (issued by the president) have directly favored the consortium referred as a bidder.[25]

Box 2: Urban Segregation and Transportation Megaprojects

In fact, not only the lack but also the development of infrastructure can contribute to maintain or exacerbate urban fragmentation. Massive transportation infrastructure such as highways, metro lines or segregated corridors are common examples. Recently, one of the most important transportation megaprojects: the 'Metropolitano' segregated bus system has been very contested because of its effects on the destruction of the urban continuum at the local level in the southern district of Barranco.

Also, the first stage of the 'Metro de Lima' has produced a permanent conflict on three southern, and low income, districts of Lima (San Juan de Miraflores, Villa Maria del Triunfo, Villa El Salvador). The railroad is built on an elevated construction for most of its route, but it goes through these districts at the ground level in such a way that it performs 'as a Berlin Wall' in words of Lima's mayor Susana Villarán.

Regarding the 'North Interceptor' sanitation project

This project involved the construction of an underground pipeline for bringing wastewaters from Lima to the 'Taboada' beach in Callao (they were previously dumped into the sea and the Rimac River without treatment). Environmental organizations and authorities from Callao rejected the proposal since it aimed to dump untreated waters to the sea, being required to build a treatment plant.

25 In: "Tren Eléctrico: afirman que Alan García emitió normas "con nombre propio". Article published on 29/08/2011. In: http://www.larepublica.pe/29-08-2011/tren-electrico-afirman-que-alan-garcia-emitio-normas-con-nombre-propio

Despite this opposition, the interceptor (without treatment facilities) was opened in 2008. It generated the explosion of a social conflict between local governments and populations from Lima and Callao, considering that the project basically aimed to push untreated sewage from Lima to Callao. With the granting of a concession for the construction of the 'Taboada' water treatment plant to the Spanish company ACS, the North Interceptor will be able to be used without polluting the beaches of Callao after 2013.

Regarding the Huascacocha channel[26]

The "Derivación Huascacocha-Rímac" is a water conduction project located 170 km. to the east of LM (in the neighboring department of Pasco) and delivered in 2012. It aims to bring water from the Huascacoha lagoon at the Atlantic basin to the Pacific basin in order to guarantee Lima's water provision. Although its development involves 3 provinces and 4 regional governments, its only beneficiary is LM, by obtaining water rights from areas that do not belong to its territory and have the same –or even worse– water problems.

Local populations were not consulted or informed about the impacts of the water conduction channel that has created a physical division in their lands along its 30 km length. These populations do not count with potable water and the project has not included any sanitation development at the local level. Also, the project went from an initial budget of 76.9M USD to 99.9M USD with no clear cost explanation.

26 Based on the C2S report "CONFLICTOS POR LA SOSTENIBILIDAD HÍDRICADE LA CIUDAD DE LIMA". Cerro de Pasco: Centro Labor.

3 Unequal Urban Development; Sub-standard Settlements and Mobilization

Rapid urbanization is perhaps the most important phenomenon of Peru's modern history. It started during the 1940's together with the industrialization process experienced on great part of the region and peaked during the second half of the 20th century after the consolidation of the import substitution based economies. Cities from the coast and particularly Lima were established as potential development poles and received a massive quantity of public investment, making them attractive to a large number of migrants from rural areas due to an increasing labor demand and perceived better living conditions. According to the 2007 census, Peru has an urban population of 20,810,288 inhabitants which represents 75.9% of the national population. Peru is a country that exhibits several differences between its urban and rural areas, to the point that today 60% of all poor and 83% of all extremely poor live in rural areas. The main reason why this huge unbalance occurred, is that the economic development policy and the whole national project of those years was not matched with an urban development or a convergence policy for delaying regions that started to underperform under that incomplete national project. This has consolidated a situation of high inequality between LM and the rest of the country and within the territory of LM itself. The capital city keeps experimenting large regional differences despite the sustained economic growth in the country and its social welfare effects as it will be shown during this whole section.[27]

3.1. Population Growth, Spatial Distribution and Density

As said LM is conformed by two different jurisdictions, Lima and Callao. Lima's current population is around 7.5M inhabitants[28] and it is estimated that by 2040 it will reach 15.4 million inhabitants (SEDAPAL 2009). Its current gross density is 3174 hab/km^2.[29] The boundaries of the Callao port city are fully contained within the LM core and its estimated population is almost 1 million inhabitants. It has been projected that by year 2025, 1,151,131 people

27 in 2009, 11.5 percent of Peruvians were living in extreme poverty, compared to 23 percent in 2002 and HDI has improved from 0.738 in 2011 to 0.741 in 2013

28 In: http://www.munlima.gob.pe/ciudad.html

29 Population density tends to show very low numbers, because in the majority of the data is considering both the occupied urban (which is less than only 85.000 hectares) land and unoccupied land (see Table 2). See: PDC, MML 2012.

will be living in the area.[30] Callao is the only regional jurisdiction in Peru that is 100% urban, with a gross density of 6404 hab/km² in 2007.

Its population has increased exponentially from 0.6 million to more than 8 million inhabitants between 1940 and 2007. Particularly during the 1970's, LM has grown very rapidly due to massive migrant waves that produced informal urbanization in the north, south and east of the city, as well as formal urbanization in the central areas. This urbanization process has extinguished most agricultural land from the Rímac and Chillón valleys; and has recently starting to affect the Lurin Valley, through formal urbanization and urban speculation without major planning or control. LM has grown with an annual rate of 2.1% during the 1993-2007 intercensal period.[31] However, this rate is clearly decreasing and it is expected to be 1,2% for the next decade, meaning approximately 160000 new inhabitants per year.

Table 2: Evolution of the Urban Area in the Province of Lima

Urban Area		
1981	1993	2007
63950 Has	72208 Has	84000 Has

Source: Concerted Development Plan of Lima Province, IMP based on INEI (Census 2007)

As seen in figure 4 that points out a map of the population net density of LM 2007 (information per censal block), LM is very dense in several areas to up to 1200 inhabitants per hectare (in red). The map also evidences a clear overcrowding process particularly in the poorest central areas, peripheral areas and slum dwellings; showing an average of 3.8 persons per room (not only bedrooms).

Thus, LM –against what has been widely said– is a dense city. Its type of urban sprawl with high population density deserves particular attention since it is not based on tall buildings but on a major lack of open spaces, such as public spaces and mobility infrastructure, showing high overcrowding levels particularly on the most socio-economically vulnerable areas. The lowest densities and lowest risks can be found in its central areas where real estate and construction investments dominate. Interestingly, a higher height of buildings has been authorized exactly where the population density is lower (Census INEI, 2007); and in the areas where there are more people per room (3.8) constructive density and height of buildings tend to be lower.

It is assumed that by 2025 Lima will be a megacity of more than 10 million inhabitants.[32] Population number and density will fundamentally increase in the south, north and east peripheries where the most vulnerable people are concentrated. That increase would not be expansive or horizontal. If density keeps growing as expected, it will occur in two different ways: in the central areas through formal construction (apartment building) and in the peripheral hill areas through informal construction (self built housing). According to these trends, the peripheral areas are slumifying, overcrowding, polluting and concentrating vulnerability and insecurity (see figure 5); while central areas keep the best residential statuses, equipment, infrastructure, environmental quality, urban green spaces, security and relatively little population density but paradoxically, higher constructive density (not population density). Sadly, nothing indicates that those trends will revert so far.

3.2. Socio-economic Inequalities at City and Local Levels: Employment, Income and Living Environment

The urban development that characterizes LM is based on economic inequality which is geographically distributed in a clear way. As figure 6 points out, highest income populations tend to occupy the central-southern area of the city (yellow), lower income populations occupy peripheral territories to the north, south and east (red), and the more central areas of the city are inhabited by middleclass and mixed socio-economic populations (white). It is not surprising that issues regarding physical vulnerability, urban density, housing conditions, and basic and urban infrastructure endowments are highly correlated with the geographical distribution of poverty. Low-income populations are concentrated on informal settlements located on the periphery of the city and old neighborhoods in the city center. While the former show high vulnerability levels, the latter show high levels of deterioration and overcrowding.

Even though relative poverty in LM has diminished to less than 16% of the total population (see figure 7)[33] socio-

30 Estimation and projection of the main socio-democratic indicators for the Constitutional Province of Callao, 1995 – 2025 – GRPPAT-2011.

31 Censo Nacional de Vivienda 2007, INEI.

32 With a moderate 1,3% growth rate (SEDAPAL 2009)

33 INEI, Census Data 2007.

Figure 4: Population Net Density per square, Metropolitan Lima, 2007

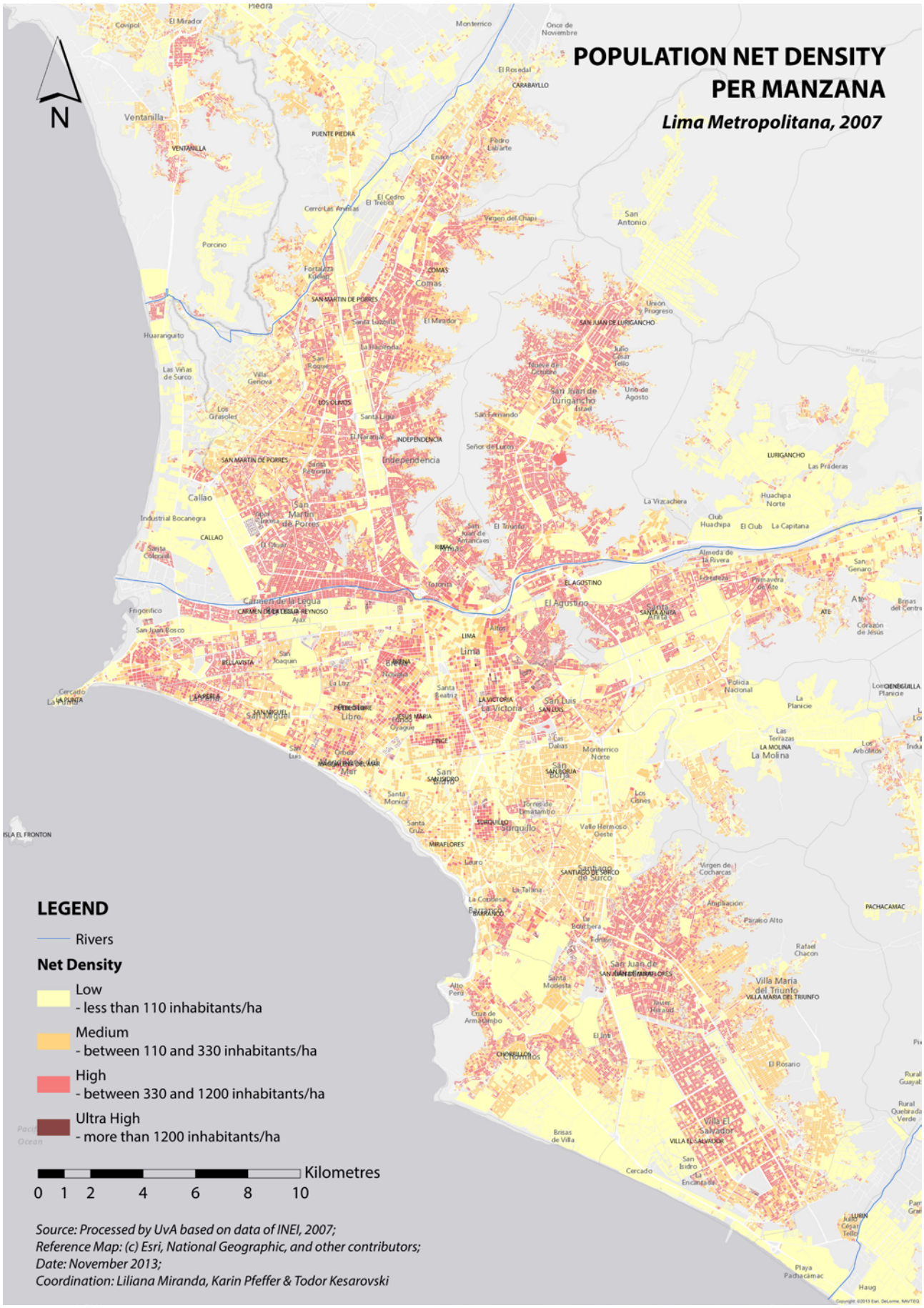


Figure 5: Population Net Density per square, City Center of Lima, 2007

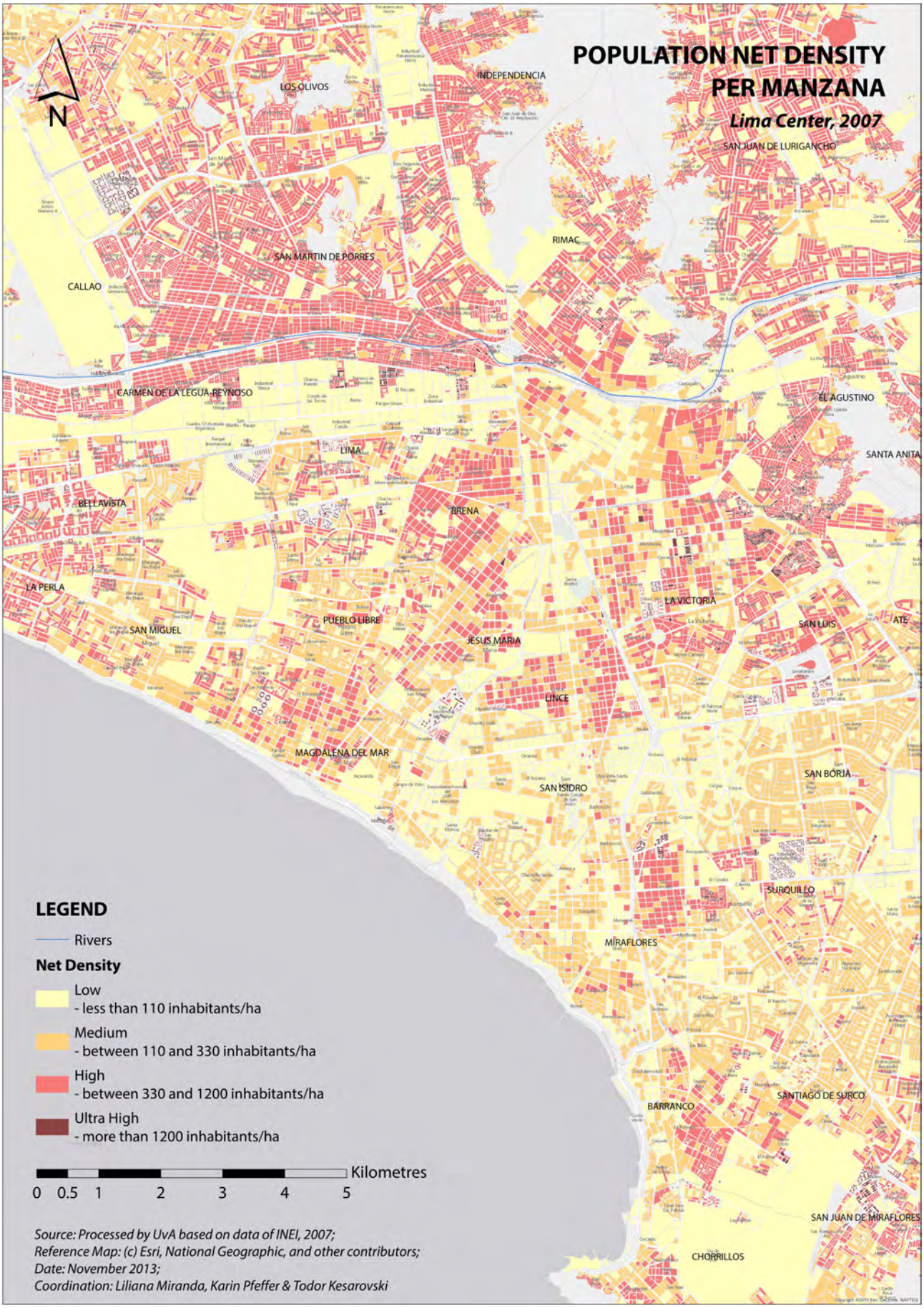


Figure 6: Poverty Map Metropolitan Lima, 2012

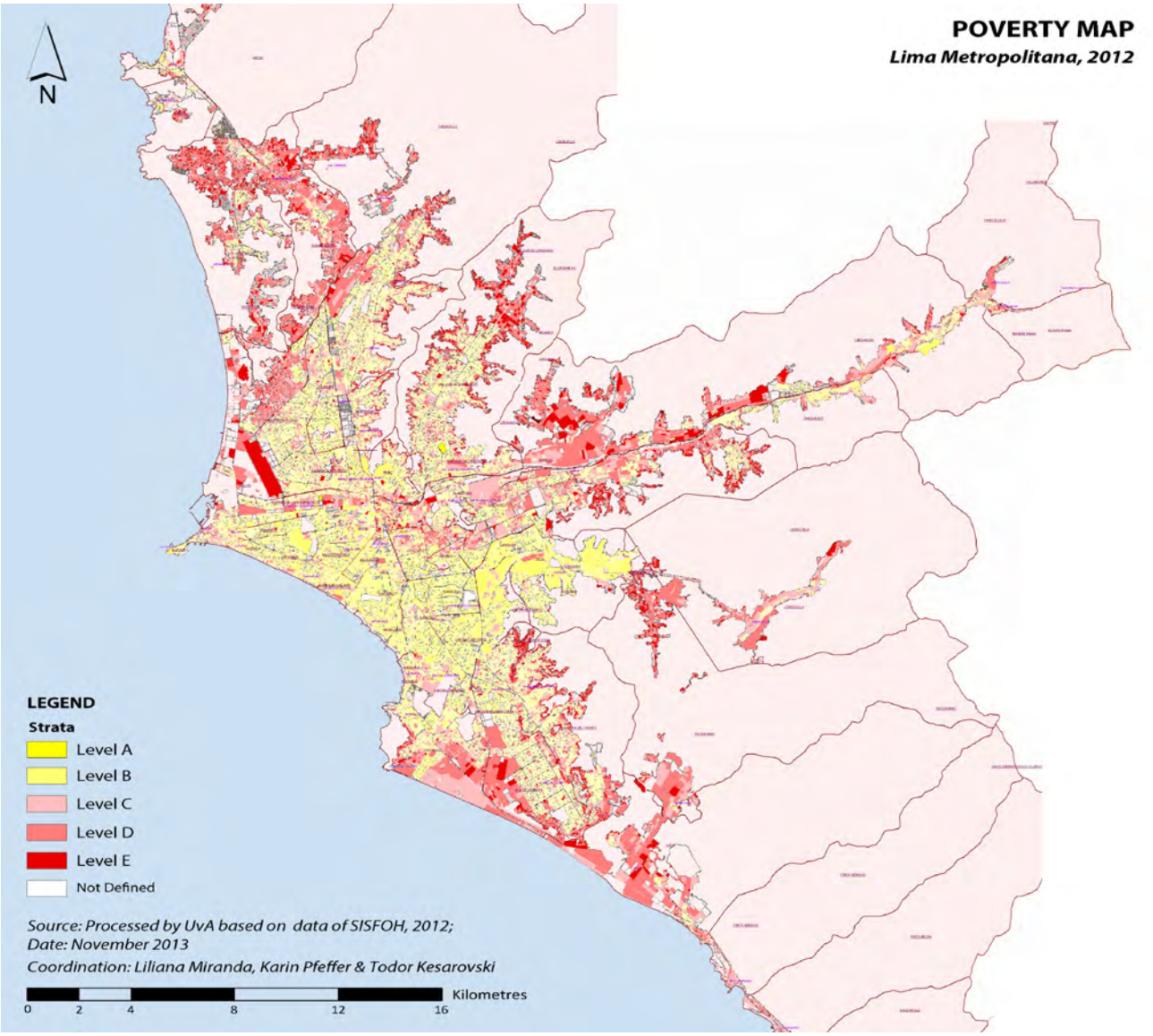
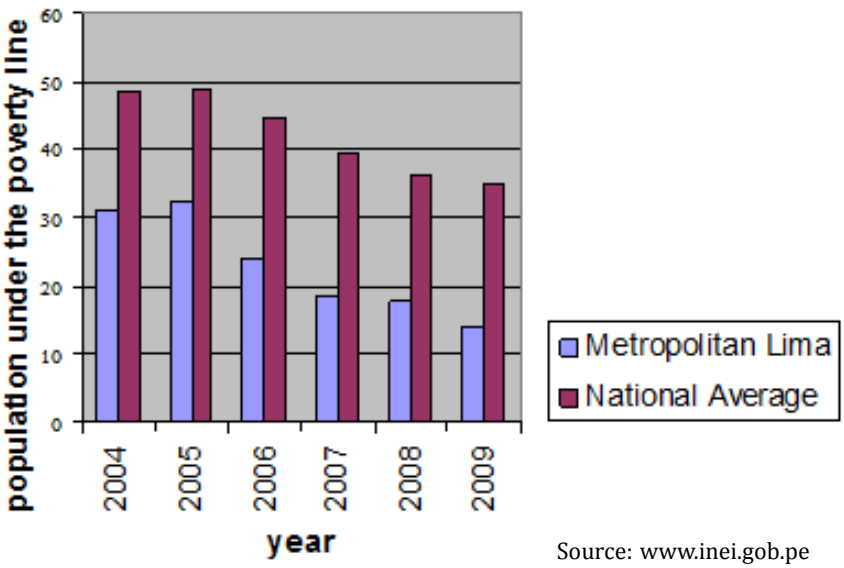


Figure 7: % of population under poverty line in Metropolitan Lima 2004 - 2009 PEN



Source: www.inei.gob.pe

spatial inequality still persists. For 2008, it is estimated that the wealthiest decile earned 15 times more than the poorest in relation to men, while the difference between the lower and higher deciles is 20 times in relation to women.[34] For the case of Lima, the wealthiest 10% concentrate 44% of total income, while the 10% poorest earn only 7.2%.[35] Despite these differences, LM has a GINI coefficient of 0.426 compared with the national rate of 0.479.[36] Although these inequalities can be easily read in relation to housing, basic services and spatial segregation, LM does not count with socio-spatial segregation related policies for permitting greater social and spatial integration and promoting mixed land uses and generating meeting spaces between different social levels. Indeed, this is not part of the agenda of the political decision spheres or the public debate.

Employment

According to the 2007 Census, Working Age Population (WAP) in Peru is 19,646,652 people. 15,379,882 of them live in urban areas and 4,266,770 in rural areas. When compared with the 1993 Census data, WAP has increased by 5,259,349 people, representing an average annual growth rate of 2.2%, which is higher than the overall population growth rate (1.6%). According to the 2007 Census, the Economically Active Population (EAP) is 10,637,880, while the non active population is 9,800,772. From the total EAP, 64.6% are male and 35.4% are female. The urban EAP has increased at a faster rate (3.4% a year) than the rural EAP (0.8% a year) (INEI). In 2008, 59.3 percent of Peruvians in urban centers worked in the informal sector, compared to 64.1 percent in 1999. The rate is highest for women at 67.1 percent in 2008, compared to 52.9 percent for men.

In 2008, the Economically Active Population (EAP) of Callao was 437004 (58.6% were male and 41.5% female). Of the total EAP, 397984 were employed (9.3% were men and 40.7% women), while the number of unemployed was 39021 (50.8% were men and 49.2% were women). In Lima, between February and April 2013 the EAP employed was 4890000 with an unemployment rate of 5.6% (54.91% were men and 45.09% were women).[37] In 2001, 53.1% of the employed population in Lima belonged to the informal sector (71.7% of the population employed in the construction sector and 83.8% of the population employed in the retail sector) (Robles N.D).

3.2.1. Housing and Basic infrastructure endowments

Housing

The housing deficit in LM is about 450000 units (more or less 1/3 of the national total).[38] Housing units in bad conditions (quality of materials, constructive technologies and technical supervision) located on hillsides, active ravines, sandy areas, and low-lying coastal areas represent 79% of that deficit (so called *qualitative* deficit of 355000 houses). 35% of them (124000) cannot be recovered, 50% (177000) lack basic services and 15% are overcrowded.[39] More than 43% of the housing deficit is composed by low-income households. The last census estimated an increase of 724221 housing units between 1993 and 2007 (2123751 in total). 78.3% of these houses are predominantly made of bricks and cement blocks and 8.9% are made of adobe and mud walls (INEI 2009; VIVIENDA- PGT 2009).[40]

Potable water and sewerage infrastructure

According to the 2007 census, 36% of households in Peru (more than a third) have no access to safe drinking water and 52% of households still do not have access to adequate sanitation services (Ministerio de Vivienda, Construcción y Saneamiento 2006). Even though numbers do not match

34 In: Diagnóstico Socio Económico Laboral de la Región Callao, Ministerio de Trabajo y Promoción del Empleo, Febrero del 2010.

35 In: Actualidad Empresarial Magazine, http://www.aempresarial.com/web/informativo.php?id=5888

36 Source: National Institute of Statistics (INEI) at http://desarrolloperuano.blogspot.com/2009/06/mejoro-el-indice-de-gini.html

37 In: http://gestion.pe/economia/desempleo-cae-ligeramente-lima-2066145

38 According to the construction chamber CAPECO, this number is more than a million for the total country..

39 MVCS (2011) Insumos para impulsar la transferencia de riesgo de desastre frente al cambio climático en el sector vivienda.

40 According to the 2007 Census, there are 7,583,140 houses in Peru. 7,566,142 are private homes, 16,998 are social housing, and 1,817 dwellings that are not suitable for human habitation (on the street, airports, ports, etc). In 2008 the quantitative backlog was calculated in 700.000 units and the qualitative backlog in 1,5 million housing units. The biggest share of them certainly belongs to the unattended low-income sectors. See: http://www.diariolaprimeraperu.com/online/economia/deficit-de-vivienda-en-el-per-es-2-2-millones_10861.html

exactly, approximately 86% of households from low-income areas and 99.5% from high-income areas are connected to the potable water network in Lima (with an average of 93%). According to projections of the last census (2007), 73.5% of the supplied population have access to water inside their dwellings, 7.4% of households have access outside their dwellings and 3.9% use public fountains. According to SEDAPAL,[41] there are 230000 houses with no water connection (more than 1 million 200 thousand inhabitants) and near 1,5 million with water rationing (about 6 hours per day).

Only 8.55% of wastewater is reused, meaning that more than 90% of wastewater produced is dumped directly into the ocean and the Rimac River (15.1% of that has been previously treated) (Ministry of Environment 2010:2). While in 1995, the supply of potable water in Lima surpassed demand in 1.44 m^3/s, by 2003 that situation was reversed with demand surpassing supply in 1.61 m^3/s (Ministry of Environment 2005:9). It is estimated that by 2040 demand will surpass supply in 13.48 m^3/s if current provision capacities do not increase (SEDAPAL 2009:28). Water distribution is very inequitable. Although SEDAPAL indicates that the average consumption per person is 250 liters in the city, consumption at the socio-economic level "A" is 400 liters per person while consumption at the levels "D" and "E" is only 60 (SEDAPAL 2009). Additionally, households without connection pay almost 10 times more than those ones with access to the public network, consuming less than 25 liters per person a day. According to the former president of SEDAPAL,[42] if every inhabitant of Lima connected to the public network saved 10 liters of water per day, 130000 people would be supplied without needing extra infrastructure, saving high costs to the national and city economy.

3.2.2. Policy regards

Peru's urban policy features represented an ultimate case for researchers and policy makers just a few decades ago, due to their progressive nature. In general, they initially tried to understand and support alternative ways of city production from very early urbanization stages. Nonetheless, this set of primarily progressive policies dissipated into a 'public tolerance' model that did not opposed and certainly set the environment for the consolidation of a *laissez faire* urbanism promoted by the neoliberal state reform given since the 1990s.

41 61% in the North, 22% in the Centre and 17% the South. In: Notes from Sanitation Advisory Group of Sedapal, Mayo 2013.

42 Presentation from Eng. Guillermo León. Project jumpstart conference LiWa, 2010.

The pioneering 13517 'Ley de Barrios Marginales' and its further use (Marginal Neighborhoods Law).

The law 13517 *'Ley de Barrios Marginales'* (1961) recognized the concept of 'self-development' supported on the relationship between the state and neighborhood movements (Riofrío, 1990). The law aimed to do basically two things: to integrate existing sub-standard settlements through legal and physical regularization and to stop further occupations by their prohibition and the creation of a new urban development scheme called UPIS (Popular Urbanization of Social Interest). UPIS aimed –at least– to provide plots with services that would be progressively self-built with public support (Riofrío 1990).

The policy basically aimed to allow the informal occupation of non-urbanized public land. Although the regularization law was passed in the early 1960s, its application was limited (it guaranteed that people would not be evicted but did not formalized land tenure). It permitted the issuing of land titles without any previous upgrading or service provision, that was politically beneficial and less costly for the government (Ramírez-Corzo and Riofrío 2006; Calderón 2006), in such a way that the 'housing provision policy became a land provision policy' (Ramírez-Corzo and Riofrío 2006:14). This philosophy still remains and has defined every policy developed onwards.

The current situation

The few remaining actions for public housing provision and ordered access to land were totally abandoned and instead of a national housing policy, independent housing programs and projects have been implemented; considering the market as the main developer. For understanding the problematic ways in which urban development visions occur and collide it is necessary to expose the legal and institutional changes that occurred during the Fujimori Administration (1990-2001): In 1992 the State dissolved the Ministry of Housing, the development banking, the mutual financing system and public programs for land access. The 1995 update of the land law abolished limits to urban expansion by eliminating municipal instruments and liberalizing the sale of peri-urban agricultural and desert land for expanding the supply,[43] and public policies related to urban poverty in Peru have not been included in the National Constitution. The current trend of the informal

43 Contrary as expected, the Land Law increased prices since agricultural land owners were able to sell land to private developers and not only to informal sub-dividers who willed to pay lower prices (Calderon 2006).

expansion process can be recently characterized by a 'entrepreneurial organization' since it has reached a stage where real estate promoters count with resources and links to different decision making spheres (political parties, judges, police, etc.), and cannot be associated anymore with the image of self-helped populations that struggle for a place in the city.

There are policies and programs for housing and upgrading of sub-standard settlements but they tend to focus on urban and legal aspects, not paying much attention to socio-economic regards. The main urban upgrading programs are the 'Barrio Mio' program from the MML and the popular housing policy (from the MML as well). For the case of the national government, we can mention the 'Techo Propio', the informal property regularization program (not very active in Lima during the last years) and water supply programs. The next two sub-sections will explore this set of recent experiences, among others.

3.2.2.1. Housing Policies

a. At the National Level:

The MIVIVIENDA fund and the 'Techo Propio' program

Housing policies for low-income sectors have been historically oriented to provide non-urbanized land, and rarely to provide or permit access to houses. While the policy of informal land regularization comes from 1961 and has been considered as pioneering in Latin America; housing policies in Peru consolidated only during the early 2000s, basically following a number of guidelines from the IADB. Despite the socio-economic distribution of the housing deficits (concentrated on low income sectors), the most important housing program is a Public Private Partnership created to provide housing solutions for middle-income sectors and invigorate the construction industry: the 700M USD 'MIVIVIENDA' Fund (My house). More than a decade after the creation of the fund, the supply effects were considerable. While in 1996, a housing stock of 600,000 m^2 was offered; this number rose to 1,400,000 m^2 ten years later (Calderón 2009). At the same time mortgage banking grew from US$ 1150 million in 2002 to US$ 34 million in 2008 (Interbank 2008 cited in Calderón 2009).

The 'Techo Propio' (My own roof) program is the low-income component of the MIVIVIENDA fund. It acquired the form of a subsidy of up to 90% of the value of houses between US$ 4000 and US$ 8000. Until 2006 only 3000 households were benefitted (Calderón 2009), being the last (failed) attempt to provide built housing solutions to low-income Peruvians.

'Techo Propio' has three operation modes:[44]

- New house acquisition. It permits to buy a house built in any 'Techo Propio' registered project. These houses cost from 20350 PEN to 51800 PEN (subsidies go from 11100 PEN to 18500 PEN depending on the price of the house).
- House construction. It permits to build a house on a plot that belongs to the beneficiary household (with a 17390 PEN subsidy).
- Housing upgrading. It permits to improve housing conditions (with a 8510 PEN subsidy).

To lower costs for the private sector, the government keeps providing well-located public land at highly subsidized prices. For example, the land of the 64 ha. 'Collique Airport' has been offered at a price ten times lower than market prices (Riofrío 2010). Zoning change negotiations were directly held between the district municipality and the national government that had declared the investment as of 'national interest' with no metropolitan municipality involvement (*ibid*).

According to the Construction Business Coalition CAPECO, from 171000 low-income houses needed in 2012, only 138 (0.08%) could be provided by formal provision channels.[45] Social housing provided by the formal sector tends to reduce habitable areas in order to reduce prices, making it more affordable to low-income sectors, but maintaining profit margins (there is a supply of 34m^2, 2 room mini apartments). Contrarily, low-income families tend to be large, holding businesses inside the houses and requiring bigger and multifunctional spaces. Formal suppliers are facing the low-income housing problem with a serious lack of creativity and knowledge of the market, building overcrowded neighborhoods since the moment of their inauguration.

The COFOPRI informal property regularization program

The Informal Property Formalization Commission (COFOPRI) was established in 1996 for distributing property titles. Considered at that time as the world's biggest tenurial regularization project, COFOPRI delivered almost 1,6 million

44 R.M. Nº 209-2012-Vivienda that approves the operative regulation for accessing to the household subsidy.

45 In: http://www.otramirada.pe/content/396-mil-viviendas-faltan-en-lima-¿quién-se-hace-cargo

titles until 2006.[46] The main assumptions of the program are based on ideas from Peruvian economist Hernando de Soto about legal recognition of the 'defective' assets base of the poor in order to include them into a market economy. Thus, a well functioning property rights system would enhance poverty alleviation and development through market solutions such as mortgage credit and land property exchange (De Soto 2000).

In spite of the massive quantity of titles provided, the expected virtuous cycle property-credit-improvement of quality of life has not been concretized (Saavedra 2006) and there are even identified cases of adverse effects due to the program's one-dimensional and isolated approach to the urban land tenure issue (Ramírez-Corzo and Riofrío, 2006; Clichevsky, 2006).

b. At the metropolitan level: The Municipal Policy of Popular Housing

It was created by the current administration through the passing of the Municipal Ordinance 1643 from December 2012 based on a proposal from the 'Movimiento de los Sin Techo' MST social movement (at the metropolitan and national level). This program aims to promote the access from low-income sectors of the city to decent housing. The specific objectives of the program are:

- to improve the dwelling conditions of low-income sectors from central areas of LM in the framework of an urban renewal strategy;
- to promote an adequate dwelling densification in low-income areas of medium consolidation, through an effective public action;
- to promote access to housing through the generation of an appropriate housing supply in new urbanizations for low-income sectors.

3.2.2.2. Neighborhood upgrading policies

a. At the national level

In relation to urban upgrading, the national government tried to timidly implement a program called 'Mi Barrio' by following once again the guidelines from the IADB. It could not reach substantial achievements. This policy has been redeveloped by the current Metropolitan Administration that has initiated a more ambitious program at the metropolitan level, oriented to risk reduction.

b. At the metropolitan level: The 'Barrio Mío' urban infrastructure upgrading program

The MML has jumpstarted the Barrio Mio program in 2012. It aims to develop urban infrastructure in 17 critical areas of Lima with an annual budget of 150M PEN (during 3 years). The first stage of Barrio Mio (300M PEN) is the development of an emergency program in irregular settlements with the highest vulnerability conditions. 971 stairways and 707 contention walls will be built in 6 districts of Lima, attending 35% of the universe identified in the 17 areas. Additionally, populations from 1053 settlements are receiving capacity building about risk management in order to develop a risk map of each settlement. A second stage will consider the improvement of main roads, planting of trees, and implementation of infrastructure such as libraries, nurseries, etc.

In relation to urban renewal of central areas, the MML has passed an ordinance in early 2012 that declares 'as of metropolitan interest' the physical and legal regularization of overcrowded plots in LM.

3.2.2.3 Social Policies in LM

In relation to the attention of the socio-economic necessities of low-income populations (that as we have said, are mostly located in precarious and overcrowded dwellings) there are direct health programs such as the 'Sistema Metropolitano de la Solidaridad' SISOL, youth and education programs such as the 'Chicos y Chicas' plan and the 'Programa Especial de Estímulos a la innovación pedagógica y de Gestión'. In relation to the national government, programs oriented to promote social inclusion prioritize rural areas in the country (where extreme poverty is located) instead of LM.

3.3. Social Mobilization and Participation in Sub-standard Settlements

The legitimation of self-development by law 13517 consolidated one of the most important structures of social mobilization *vis-à-vis* the state. Through very solid territorial organization schemes based on a representative democracy institutionality, neighborhood organizations were able to

46 As Durand-Lasserve and Selod (2007) state, if massive delivery of land titles would be an only indicator of success; then the program can be certainly considered as successful.

directly negotiate development projects with several state agencies such as district municipalities for roads, SEDAPAL for water and sanitation, etc. If direct negotiations did not work, social mobilization was a way to be heard. Local leaders were commonly recognized by state agencies as legitimate counterparts in policy and business,performing "the function of regulating and promoting urban consolidation, replacing what elsewhere is the role of formal state authorities" (Caria 2008:85). According to Ramirez-Corzo and Riofrio (2006:15) "the result of this process has been the formation of real cities, where low income families (…) could develop their daily activities and build their history".

Figure 8: Plot plan made by a territorial organization.

Source: Ramírez-Corzo and Riofrio (2006)

Spatial knowledge components

The social pact established by Law 13517 configured a development pattern through which families had to prepare and follow an urban arrangement plan similar to those ones from conventional urbanizations (with regular plot sizes, adequate road widths and a considerable quantity of land reserved for urban equipment). "Families knew that one of the requisites for recognizing the occupation was the presentation of a plot-plan of the settlement that agreed with the regulatory framework" (Ramirez-Corzo and Riofrio 2006:12). In addition, the approval of the Legal Decree 22612 of 1979 established that those neighborhoods created under Law 13517 could be recognized as ordinary neighborhoods and even districts.

This was the dominant model until the 1990s, when the instauration of neoliberalism and the implosion of political parties (and every kind of political representation scheme) had a devastating effect on traditional organization schemes and the way of accessing to the city by low-income populations. Alberto Fujimori took power and paradoxically kept relying on citizen participation, but in this case as an instrument for the consolidation of authoritarianism during the 1990s. The 1993 Constitution abolished the right to adequate housing and eliminated the 'social interest' rationale; defining a number of new citizen rights based on participation that were used to undermine existing political representation and every possibility of opposition to the regime. Also, the 1993 Organic Law of Municipalities undermined the power of local governments and re-concentrated power into the presidential figure; developing a clientelist system non-mediated by political parties. The social policy apparatus was centralized mainly by the creation of the "Ministry of the Presidency" which strategically delivered public services in order to maintain Fujimori's political clientelism apparatus. The Ministry of the Presidency managed around 20% of the total budget.

Currently, social organizations mobilize in instrumental ways more related to their own specific agendas. Organization structures have been atomized to the point that demands are covered even at household levels and the inequality topic is generally not seen by organizations that are focused on unsatisfied basic needs and in some cases, demands on human rights. Participation channels for attending social mobilization related to housing are not institutional and rather respond to the level of pressure from neighborhood organizations. For instance, if a relatively big social mobilization occurs, authorities listen to local leaders through the implementation of dialogue commissions, restricting them to extensive negotiation processes in which timeframes are extended thus requiring organizational strength to reach effective solutions.

In this context of high demobilization, land occupations are now promoted by land traffickers who act violently and very often defraud people. According to the police, there is an already identified land trafficking mafia in the city that operates in 22 districts of the city.

The 'Movimiento de los Sin Techo' (MST) in LM

In relation to cases of social mobilization with a more organic and pragmatic content, the most important movement risen in LM is the 'Movimiento de los Sin Techo' (MST).[47] It is

47 The MST is active since June 2011, and is currently the most important and active neighborhood organization in Lima. It has presented proposals to the MML and the National Congress for passing housing program laws and ordinances. It has also made big massive mobilizations to the national congress, claiming the implementation of housing programs; to the National Elections Jury in order to protest against the impeachment of the mayor and to the UN for presenting a letter, among others.

the first social movement that claims for housing rights in Peru, expanding the agenda from neighborhood organizations (historically limited to land and basic service issues). Housing has been historically seen as a task to be covered by the household and not the community sphere. Unlike their predecessors they don't claim a territory but a housing policy suitable for the urban poor.

The MST (with the technical support of NGOs) has presented to the National Congress and the Lima Metropolitan Council, normative proposals for implementing land banks and municipal housing programs. The Housing commission of the national congress has approved the law project 1000/2011-CR, proposed by the MST in order to provide decent housing

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Table 3: Mechanisms of Social Participation and Organization

Mechanisms of participation	Description /Objectives	Relevant Regulations
Participatory Budgeting	A policy and management tool through which regional and local authorities and community organizations together decide how and on what they will focus resources taking into account the objectives of the Strategic and Institutional Development Plans. These plans are directly linked to the vision and objectives of the Integrated Development Plan which is monitored by the Ministry of Economy and Finance, MEF.	http://presupuesto-participativo.mef.gob.pe/app_pp/entrada.php
Municipal Environmental Commissions	Environmental management institutions responsible for coordinating and arranging municipal environmental policy also promote dialogue and agreement between the public and private sectors. These bodies must coordinate their environmental policies with the Regional Environmental Commissions and the Ministry of Environment.	Law N° 28245 Law of the National System of Environmental Management
The "Glass of Milk" Program (VdeL)	A social program created to provide nutritional support to vulnerable communities through the delivery of a daily ration of food in order to help them to overcome the situation of food insecurity in which they find themselves.	http://apps.contraloria.gob.pe/pvl/index.asp
Social Organizations (CBOs)	Mothers Organizations, "Glass of Milk" Programme Committees, self-management Soup Kitchens, Family Kitchens, Family Centers, Mother and Child Centers and other grassroots organizations providing nutrition support services.	Law 25307 of 15/02/91 declared the work of these organizations as being a priority in the national interest.
Building Peru	National programme conceived with the aim of generating temporary employment and developing the skills of unemployed urban and rural populations living in poverty or extreme poverty through the financing of intensive unskilled labor projects and services undertaken by local communities themselves through various institutions involved in poverty reduction and national development.	http://www.construyendoperu.gob.pe/

Source: Self-developed

for vulnerable populations. This achievement required a series of social mobilizations[48] made by the metropolitan and national MST. The MST has also mobilized in defense of the mayor facing the 2013 impeachment process.

Community based schemes

Currently, social organizations primarily provide services for accessing to ongoing government social programs for food provision and employment generation, such as soup kitchens and the Glass of Milk Program (Vaso de Leche - VdeL). The VdeL Program is a good example of a local initiative that becomes national. It was informally initiated by the Municipality of Lima between 1983 and 1984 and later extended throughout the country.

For the case of LM, the National Register of Social Organizations (R.U.O.S) was established at the metropolitan level, and regulated conditions and requirements for the recognition and registration of social organizations that provide public services, undertake municipal works, and participate in security issues, among others. Under this legislation district municipalities with registered social organizations have become the main ally of the authorities on attending public safety issues, claims for assistance, or decisions of other levels of government that affect them. The community boards are recognized by municipal authorities as organizations that represent the community under the Law of the Right to Public Participation (Law 26300).[49]

48 Between October 2011 and October 2012, the MST has done 8 demonstrations, participated in public audiences in the National Congress, offered a press conference and gave several interviews to congressmen from the housing commission.

49 In: http://www.congreso.gob.pe/ntley/Imagenes/Leyes/26300.pdf

4 Water Governance and Climate Change Issues in City Concerned

4.1. The Metropolitan City of Lima Territory and Climate Configuration

Located on a pacific coastal plain at the foot of the Andean mountains, Lima is the second biggest desert city in the world after Cairo. The Lima Macro-region is an articulation of networks of cities and towns settled along the four river basins that compose the LM conurbation: Rímac (41%), Chillon (22%) and Lurin (14%), Mantaro (23%)[50] (the first two basins have almost disappeared due to urbanization). The 4 basins are fed by Andean glaciers and rainwater from the Andes (see Figure 9 for a map of the four river basins in relation to Lima).

Because of its latitude (12° south) Lima should have a tropical climate due to its proximity to the Equator, similarly to Rio de Janeiro which is characterized by warm temperatures and rainfall. But the presence of the Humboldt current (considering that LM has a 160 km coast line) changes this situation to the point that LM has a subtropical, moderate and wet climate with drizzles ("garúas") during winter. The metropolitan area is dominated by a lack of rainfall (9mm per year) and a very low river water level during most seasons (there are sufficient levels only during 3 or 4 months a year) which has forced the city to store water in huge reservoirs in the mountains on the other side of the Andes ('Marca' projects). Different from the first three basins that are located at the pacific side, the Mantaro basin is located at the other side of the Andes, and is connected with the Rimac basin through great trasvasement infrastructure developments. So, LM has surpassed the capacity of its basins to provide water resource that together with the decrease of glaciers, the constant rainfall decrease during the last 40 years in the high Mantaro basin, and the excessive use of groundwater, have resulted in a critical scenario of hydric stress.[51]

50 In: Bardossy A, Jochen S, Chamorro Alejandro, 2011. Modelamiento del Clima y Balance hídrico de Lima. LiWa project- IWS- University of Stuttgart

51 Water reserves per person in Lima (33 m^3) are very low in comparison with other Latin American cities (SEDAPAL 2011).

Figure 9: Map of Metropolitan Lima and its Four River Basins

Source: Nippon Koei, SEDAPAL, 2010

In terms of territorial configuration, the hills surrounding Lima are the lowest branches of the Andes region. The hilltops have vegetation formations caused by the rain and mist named "lomas" that have many wetlands on the highest areas being an important source of water for the three LM rivers from the Pacific basin. They are characterized by a natural system consisting of a mix of biotic and non-biotic elements that support the essential ecological processes of this area. This process has been named Ecological Structure ('Estructura Ecológica)'[52] which articulates the spatial organization of different bodies such as the 'Costa Verde', island and islets, wetlands, sand deserts and tillandsias plant vegetation, rivers, coastal ridges and many mountains surrounding the city.

52 The main author of this report has contributed to the development of a metropolitan ordinance proposal for the creation of the referred ecologic structure in 2012. It is still under consultation but its main map has been already published by the MML on their web page http://www.munlima.gob.pe/limaambiental/component/k2/item/72-estructura-ecologica .

4.2. Environmental Vulnerabilities

Climate change is with no doubt one of the most important issues related to the sustainability of Peruvian cities since Peru has been appointed as the world's third most vulnerable country to the impacts of climate change on precipitation and water availability (Bebbington & Williams 2008). In the Second Communication of Peru to the Convention of the United Nations to Combat Climate Change (UNFCCC) in 2010, the Ministry of Environment (MINAM) stated that Peru is "particularly" vulnerable to climate change, because it scores positively on 4 out of the 5 characteristics recognized by the convention (MINAM 2010) and in 2008 the National Environmental Council (CONAM), predecessor of the current Ministry of Environment, cited the following as causes of vulnerability of the country related to climate change:

- Peru has 28 of the 35 existing climates in the world, and 84 out of the 114 life zones.
- A large percentage of the population is engaged in agriculture, fishing and other activities that are directly affected by the weather.

- 51% of the Peruvian population lives in poverty, 21% in extreme poverty.[53]
- There is a low adaptive capacity due to limited financial, human and technological resources and institutions with limited capacity.
- - Peru has over 70% of the worlds' tropical glaciers and since 1980, they have lost 22% of their surface area (500 km^2), the equivalent of nearly ten years of water supply for Lima.[54]

Peru's water resources are also vulnerable to climate change as some of the country's perennial rivers are fed by glaciers that are rapidly disappearing due to climate change. The glacial melting will generate a temporary increase in flow, followed by a drastic decrease in the volume and regularity of water resources in later decades (leading to scarcity of water, especially in the coastal area of Peru) (Calvo 2009). It should be noted that, despite being surrounded by three important water sources (Pacific Ocean, Atlantic Ocean, and Lake Titicaca) the availability of water in the Atlantic basin is much more abundant than in the Pacific basin, with 97.8% of rain flowing onto the Atlantic side of the Andean mountain range, while only 1.7% flows towards the Pacific side, where approximately 80% of the population of Peru lives.[55]

The rapid growth of LM has caused a decrease in the amount of agricultural land, and the occupation of slope areas has produced a loss of local flora, fauna and ecosystems. As a result, only a few productive agricultural areas remain, especially in the Lurin River Valley that is constantly threatened by pressures from industrial and housing developments.[56] Water pollution generated by industries and mines, and the disposal of 83% of waste waters in the rivers and the sea, certainly exacerbate the problem.[57] This all adds up to the pollution of land by the inadequate release of solid waste (of domestic and non-domestic origin) in 9 dumps, situated in the basin Chillón (4), Rímac (2) and Lurín (3).[58] The ecological footprint of Lima was calculated in more than 12 million ha. (1,47 ha. per inhabitant) (Alfaro 2008). Additionally, Lima counts with only 2.9 m^2 of green area per person (Ministry of Environment 2010), while the WHO recommended minimum proportion is 10 m^2.

According to the Barrio Mio Program, there are around 3 million people living on the hillsides areas of the city (more than 20 degrees in some cases) very vulnerable to landslides (see figure 10). Those people living in other high risk areas such as river banks, slopes, floodplains and eroded areas, marine coastlines, etc. have not been counted yet.[59] There is a high concentration of domestic production and infrastructure located in vulnerable areas (airport and seaport included), a high level of reliance on hydroelectric energy (68%),[60] and a rapidly growing urban poor population with a low adaptation capacity to dwindle water resources (see figure 11 for a map of hydrological hazards of Lima). Consequently, the potentially serious consequences of climate change on water resources in Lima are very high.

Major environmental disasters (climate and water related)

Peru is strongly influenced by the presence of the El Niño phenomenon (ENSO), characterized by the presence of an abnormally warm water current for longer than 4 months. The Pacific Ocean along Peru's west coast gets warmer, resulting in increased rainfall in coastal areas. The major effects of El Niño are caused by the rising sea water temperature that generates high evaporation. Then, clouds move beyond the Andes and cause persistent rainfall in the area, which causes floods, mudslides and landslides. As it will be seen in the next table, extreme climate events are not that unusual in Lima (the main impacts of extreme rainfalls in Lima in 1970, 1998 and 2012 are outlined). The major impacts of ENSO in Lima are the destruction of houses, agricultural areas and infrastructure; and epidemics of water-borne diseases such as dengue, malaria, cholera, and diarrhea.

According to experts, climate change threats at the national level would be the increase of droughts together with the increase in frequency, intensity, duration and

53 Poverty levels have dropped significantly since this report was published.

54 Ministry of the Environment (MINAM), GEF, PNUD. Second National Communication of Peru to the United Nations Framework Convention on Climate Change. Lima, Peru. May 2010, p. 102.

55 Ministry of the Environment (MINAM), GEF, PNUD. Second National Communication of Peru to the United Nations Framework Convention on Climate Change. Lima, Peru. May 2010. Page 78.

56 In total, the IMP-MML acknowledges still 12,000 ha of agricultural areas surrounding LM (2013).

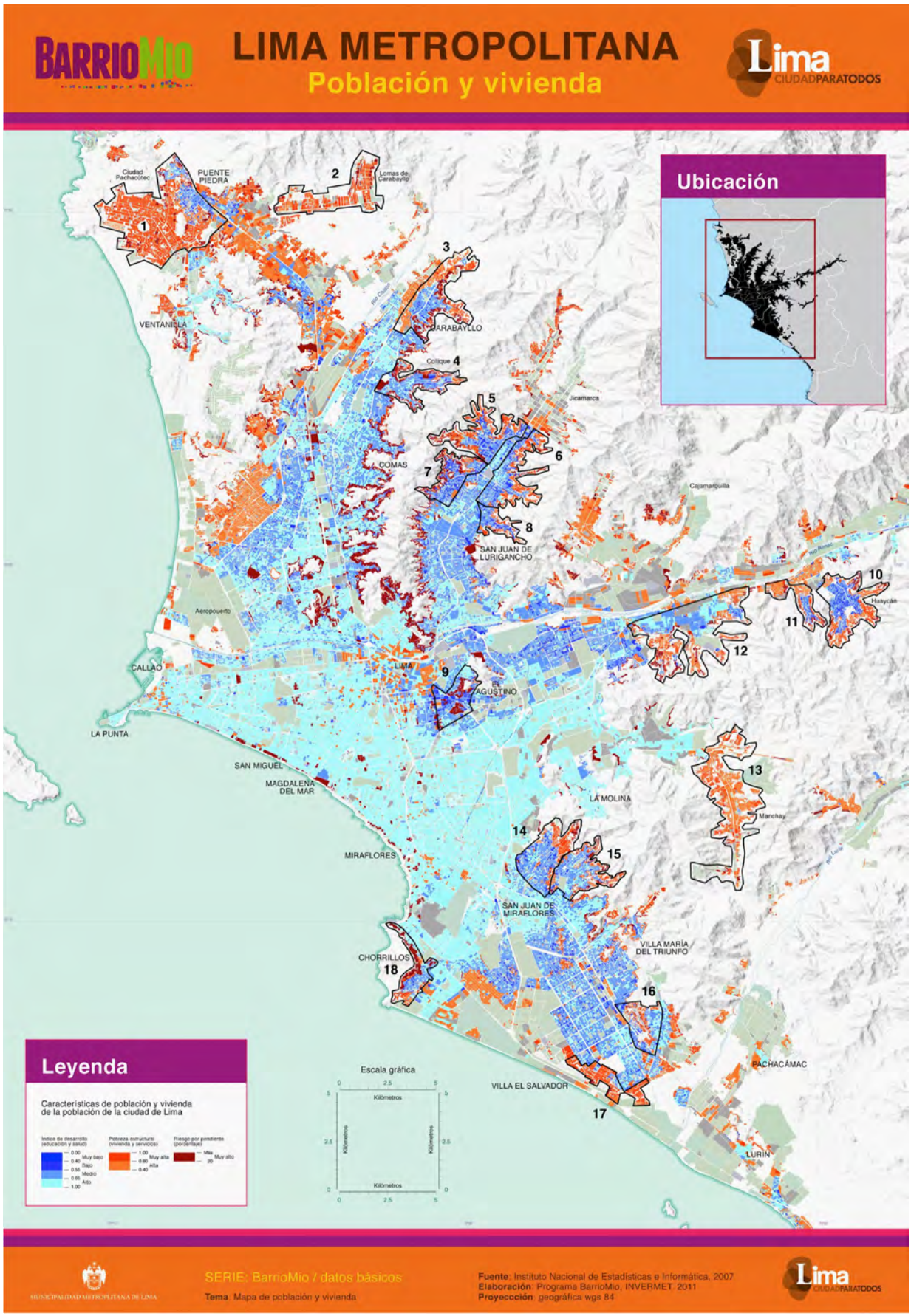
57 SEDAPAL is currently developing projects to increase the treatment capacity to 100% in the near future (La Chira and Taboada projects).

58 Proyecto SIRAD, 2010, PNUD.EU.INDECI.IRD

59 In: Torres, Rommy 'Curso de Ciudades Costeras, Cambio Climático y Género'. Foro/IHS, UCV Trujillo, 2013

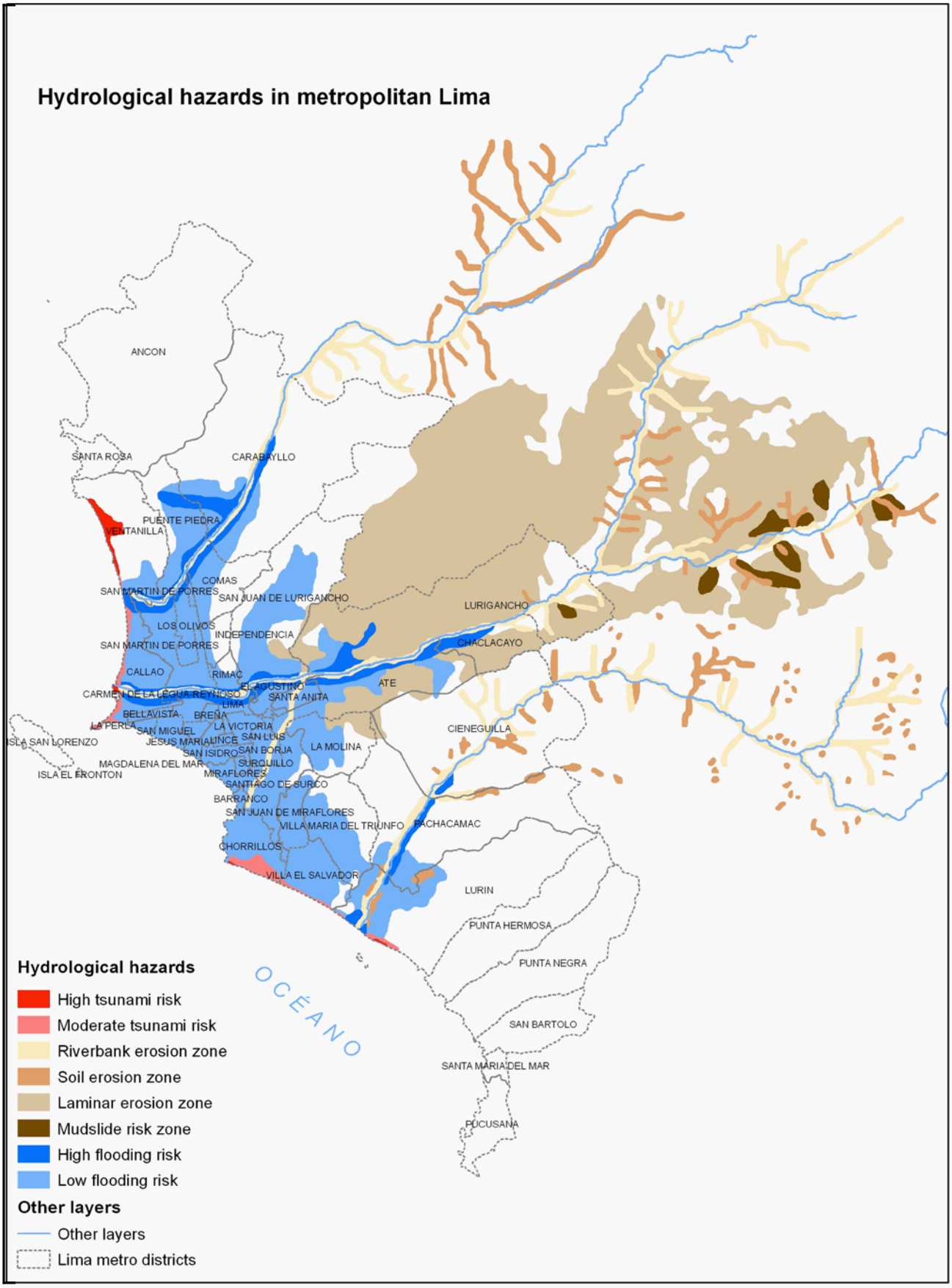
60 In: Miranda Sara (2012).

Figure 10: Human Vulnerability in LM



Source: "Barrio Mio" MML program

Figure 11: Hydrological hazards in Metropolitan Lima



Source: INEI, 2007; Sedapal, 2007; LIWA; CGIAR-CSI; T. Allende, Est. de Ciudades Focales MIRR, IMP/CENCA, IDRC; Conception: Liliana Miranda, Karin Pfeffer, Todor Kesarovsi, 2013

Box 3: The effects of ENSO at the national level.

ENSO from 1997-1998 was the largest recorded with scientific instruments, and unleashed heavy rains causing severe flooding and mudslides in the coastal area and drought in the southern highlands, and generated significant economic and health impacts. The total damage amounted for USD 3500 million. This includes direct damage valued at USD 1612 million (46% of total), and indirect damage or loss valued at an additional USD 1888 million (54%). The productive sector was the most affected, amounting for 46% of total damage, transportation was at second place with 21%, social sectors amounted for 14%, other sectors including the costs of prevention and emergency care amounted for 12%, and damage to water and electricity services amounted for 7% of the total.

unpredictability of heavy rains and extreme climate events like floods, landslides, mudslides and the 'El Niño' and 'La Niña' (ENSO) phenomena. Additionally, a new phenomenon has been detected: 'El Dana', which entails warm air arriving from the Atlantic Ocean that crosses the mountains and increases rainfall.[61] That would have been the cause of the disaster occurred in the Chosica district during the spring of 2012 at the East of Lima. Additionally, temperature (at least 2 degrees) and sea level rises (at least 1 cm per year according to the IPCC) will occur, affecting the port of Callao and the 'Costa Verde' at the Bay of Lima.

Figure 12 reflects flood, earthquake, tsunami and mudslide risks identified by the IMP on the whole Lima Macro-region.[62] As it can be seen on figures 4, 6 and 10 the areas exhibiting higher poverty levels, tend to coincide with the most vulnerable areas in terms of natural hazards. Following figure 12, it can be said that almost 50% of the LM territory is in some kind of hydrologic risk that would be exacerbated in presence of intense rainfall. These events have important social and economic effects, impacting the infrastructure of important activities like agriculture, communication networks, services and living; negatively affecting GDP.

In addition to the phenomena and processes already mentioned, the following consequences of climate change and water related disasters can be mentioned:

- sea level rises (and coastal erosion) affecting vulnerable areas including the port, the airport as well as the 'Costa Verde' area;
- -scarcity of the water supply and increased water costs that leads to increasing conflicts over water resources;
- poor sanitation as a result of water shortages and increasing floods that lead to higher rates of water borne diseases; and
- a decrease in energy supply due to the occurrence of droughts.

4.3. Water Institutionality

In relation to water governance in a context of climate change, we have identified a slow process of building new institutions under the new approach of managing water at the river basin level. Today, three years after the enactment of the new Law on Water Resources, Peru has installed only four Water Resource Councils. The process is barred by the diversity of sub-national level contexts in which it has to function.

4.3.1. The national level

The institutional framework for water resource management has been expanded through the creation of the Ministry of Environment (MINAM) and the National Water Authority (ANA) in 2008, as well as the creation of the National System of Environmental Management and the transfer of environmental competences to regional and local governments.[63] The Ministry of Environment (MINAM) replaced the National Environmental Council (CONAM). This new entity was created in search for a stronger environmental authority with capacities to attend to the large and diverse environmental problems in the country. Nonetheless it presents several management problems due to its lack of representativeness and its centralist performance. The National Water Authority (ANA) is a state agency founded in 2009 as an executive and regulatory water management entity. It has initiated a paradigm shift from a sectorial water management to an integrated management that considers the basin as its territorial unit.

In 2004 a national strategy for water resources was established and efforts are currently underway for its

61 Eduardo Calvo, IPCC, Ppt. presentation, Universidad Stuttgart 2012, Proyecto LiWa.

62 In: "Proyecto Ciudades Focales, Margen Izquierda del río Rímac" project, IDRC, IMP, CENCA

63 Originally the general water law appointed the Ministry of Agriculture (MINAG) as the authority responsible for the concession of water rights.

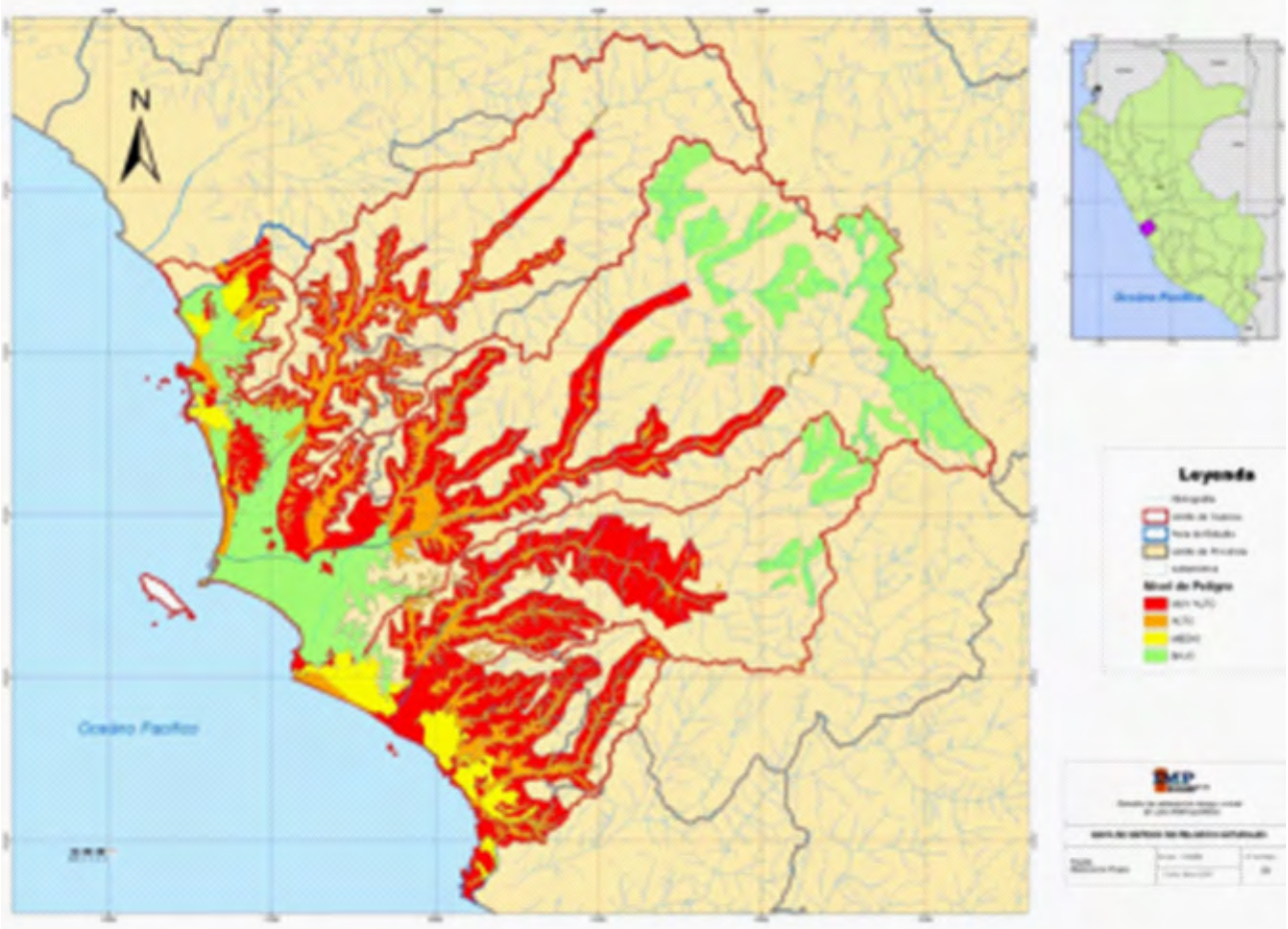
Table 4: Lima historic extreme events

Lima, historic extreme events

15 January 1970	23 February 1998	March 2012
❑ 5 hour rain, 17 mm (SENAMHI) ❑ More than 2,000 houses collapsed; Express highway flooded, 150 fires, Jorge Chávez airport damaged and the city was isolated (Huaraz, for instance, asked for an air bridge with Lima). ❑ Water fall in Armendáriz hill in Barranco.	❑ T° Máx of the ocean 24.6°C ❑ A Huayco almost reach Governmental Palace (80m). ❑ Huaycoloro river suddenly appeared and passed by all the area we visited last Sunday (Campoy, Zárate, Rimac y el Trébol de Caquetá) ❑ The Rimac river water flow raised to one meter high. ❑ Vandalism	❑ Heavy rain coming from Brasil ❑ Anomaly coming from the Atlantic, pushes the humidity towards the Andes, generating rain. ❑ Located in the border of Perú, Brasil and Bolivia. Comes from South to North. As a hurricaine travels aleatory. ❑ Gets to the mountains and raises the humidity generating the rain. ❑ 2011 happened the same but they did not reach the coast of Peru

Source: Eduardo Calvo (IPCC)

Figure 12: Synthesis of Lima Natural Hazards (earthquakes, tsunamis, flooding, erosion and mudslides)



Source: T. Allende, Estudio de Ciudades Focales MIRR, IMP/CENCA, IDRC

implementation, albeit with many institutional problems related with lack of coordination (sector and territorial). Regarding the water sector specifically key initiatives in Lima consider:

- "Agua para todos" ("Water for all"), a national programme initiated in 2006 by the Ministry Housing through SEDAPAL, has invested 163M USD in the water and sanitation sector until December 2009 (228M USD overall investment).
- The National Programme for the Environmental Rehabilitation of Watersheds (2010) by the Ministry of the Environment that aims to promote public investment projects on the treatment and reuse of wastewater;
- The construction of the Taboada wastewater treatment plant (14 m^3/s) granted by SEDAPAL and the national PPP unit PROINVERSION.

4.3.2. The macro-regional level

The Lima Macro-region's hinterland influences 5 Regional Governments and 11 Provincial Municipalities and more than a hundred district municipalities. Regional Governments are in charge of leading the Inter-basin Hydric Resource Management Council for Rimac, Chillon and Lurin, created within the framework of the General Law of Hydric Resources. The ANA has constituted the Local Water Authority (ALA) of Chillon, Rimac and Lurin[64] as the legitimate administrator and granter of water rights from the three rivers. Also, the creation of the Inter-basin Council of Rimac, Chillon and Lurin that merges 3 Regional Governments (Callao, Metropolitan Lima and 'Lima Provincias') with the ALA, would represent a legitimate institutional body for coordination and consultation (involving metropolitan, macro-regional and national authorities).

4.3.3. The city level

Water and sanitation services in LM are provided by the Lima Potable Water and Sanitation Service provider SEDAPAL, a decentralized public company owned by FONAFE at the Ministry of Economy and administered by the Ministry of Housing, Construction and Sanitation). See figure 13 for a map of SEDAPAL's area of responsibility.

64 The ANA has granted 5416 water rights for agricultural uses and 71 rights for non-agricultural uses (for human consumption, mining, industries, energy production, fishing and mixed uses).

4.3.4. The district level

Municipalities in Lima are not currently participating in decision making on water and sanitation investments in the city. Their intervention and decision capacities on city development and infrastructure location related with natural hazards are limited to recommendations on water saving or the reuse of treated waste water for watering green areas.

4.4. Environmental and Climate Change Institutionality

Since 1965, a gradual evolution of the environmental management framework has occurred in Peru, including the creation of environmental management bodies at the national level and the approval of several environmental management laws. Climate change concerns in Peru began in 1993 with the creation of the National Climate Change Committee (NCCC),[65] beginning a process of analysis and development of scenarios and mitigation plans. In 2001, the NCCC developed a document containing a description of national circumstances, an inventory of GHG emissions, a review of the environment in Peru, a description of policies, programs and measures related to climate change, vulnerability and adaptation measures, and an identification of the needs of vulnerable populations. The NCCC also established the National Climate Change Strategy (2003), which has two main strands of focus. The first is related to adaptation, developing national priorities based on studies of climate vulnerability, and the second is related to mitigation. Yet, according to the Citizens Movement against Climate Change (MOCICC 2009), little progress has been made since its adoption in 2003 and only around 13% have been implemented. Public investment in climate change to date amounts to more than 138 million PEN (more than 39 million Euros).[66] 58% of this amount are concentrated in 11 viable projects in the areas of adaptation, desertification and mitigating the effects of drought, and water resources and climate change management. Only 1% of the total investment are allocated in 9 projects currently under implementation, while 28% are invested in projects under development, and 13% are on their evaluation stage.

The current national administration is providing, with some limitations, a more extensive and better implementation of the National Climate Change Strategy.

65 Peru has signed the Framework Convention on Climate Change and one Peruvian scientist is a member of the IPCC.

66 Exchange rate 3.480 (buy). Source: Superintendencia de Banca, Seguros y AFP.

Figure 13: Map of SEDAPAL's area of responsibility

Source: SEDAPAL's official web page

In fact, former Prime Minister Salomon Lerner stated at the National Congress that "…Climate change is the biggest global environmental menace that Peru is facing and will affect the poorest rural populations in a very special way, since they depend almost exclusively on weather in order to subsist. That is why mitigation and adaptation actions will be taken, making the climate change focus compulsory to every process of development planning".[67]

A Plan of Action on Adaptation and Mitigation to Combat Climate Change was also published by the Ministry of Environment MINAM in April 2010 for public consultation. It describes MINAM's proposed strategies regarding programs, projects and priority actions in the short and medium term in relation to climate change, constituting the first approach to the "National Adaptation and Mitigation Plan to Combat Climate Change" formulated by the National Climate Change Committee (NCCC).

At the city level, the MML approved its environmental policy with the participation of the metropolitan environmental commission in September 2012. Indeed, the Callao Provincial Municipality approved its own many years ago. In both cases their proposals have prioritized water and climate risks. The environmental law mandates the creation of environmental commissions for each municipality and regional government that must conform a technical group on climate change. These commissions and groups exist in both Lima and Callao regional governments and both have developed their Climate Change Adaptation Strategies (2009-2019). These strategies have not been approved yet and their implementation remains uncertain. As a matter of fact, those instruments have not been properly matched with the risk management plans (that have not been approved yet either) or urban development plans that are out of date (the last one was developed in 1977).

The NCCC has updated the Climate Change National Strategy (ENCC) up to year 2012. Its main focus is adaptation, risk management and water. The action plan for climate change adaptation and mitigation, developed by the MINAM and the NCCC was disseminated in 2012 for consultation but it has not been approved yet.

Risk Management and Climate Change

Although regional and local governments (provincial and district levels) have competences for leading civil defense councils and developing and implementing risk management plans, institutional capacities and resources for prevention are still limited. Investments in the city do not consider prevention or consider hazard maps ex-ante. Coordination in vertical or horizontal ways is still incipient and has been systematically overwhelmed by the damage produced by most natural or anthropogenic disasters occurred during the past few years, with a few exceptions. Nevertheless, it can be said that things are improving. The Technical Group on Climate Change in Lima and Callao has been created and is functioning. However, it needs to be strengthened. Climate Change adaptation strategies in Callao (2011) and Lima (2012) still need to be approved and their priorities incorporated into Municipal and Regional budgets.

4.5. Water and Territory Policy Context/Interactions

There is no current connection between land policies and water and sanitation policies managed by SEDAPAL, since the MML has no influence on SEDAPAL's decisions, not even for prioritizing or limiting water and sanitation provision in high-risk areas, or enforcing regulations for limiting city expansion. Indeed, SEDAPAL has openly refused to consider the incorporation of representatives of the MML on its board of directors as well as the possibility of being transferred to the municipal government, as it is occurring in every other region in accordance to the decentralization process.

SEDAPAL has developed studies for determining LM's water demand to 2040, but based only on population and economic growth, meaning that projects proposed do not take social and environmental regards into consideration (local hydric demands, current land uses, etc.) as it can be seen in the Huascacocha channel case-study. Under the current deregulation regime, it is important for the Ministry of Housing (more related to real estate corporative interests that are seen as economic growth engines) to keep full control of the water company, since the MML is seen as a rather regulatory apparatus regarding urbanization and urban expansion.

Electricity

Electricity supply is administered by the Electricity Generation Company of Lima (EDEGEL), a private company under the supervision of the OSINERGMIN regulator. It generates and commercializes hydroelectric energy (through 5 plants) and thermal energy (through 2 plants). In order to generate electricity, EDEGEL controls the main water resource of Lima: the Rimac River (due to contracts

67 In: http://e.elcomercio.pe/66/doc/0/0/3/8/6/386179.pdf

signed directly with the national government).[68] There is no level of coordination or consultation between EDEGEL and MML, about the prioritization or limitation of the service provision in certain areas where the municipality may have considered the consolidation or limitation of urban uses; or even the provision of energy in case of emergency.

4.6. Which is the Key Actor´s Decision-making Capacity of Influence?

In LM there are diverse authorities with defined and overlapping competences and functions for territorial management, involving the metropolitan city and the macro-region; which results in fragmentation, disarticulation and weakening of the role of the state in the city at different scales of government. It can be argued that the main vulnerability of Metropolitan Lima is merely institutional since city and territorial management is delinked from risk, water and climate risk management. Institutions from LM have limited capacities to develop, lead and promote a climate change adaption process.[69]

Strategic decisions to be taken on adaptation and mitigation of climate change effects will probably cause conflicts between economic development, ecological quality and social demands. Although efficiency and effectiveness of strategies against climate change depend on the cooperation among authorities as well as between authorities, citizens and other stakeholders; there is a persistent sectorial approach that dominates over a more territorial and integrative point of view.

4.7. Producing Vulnerability Analyses and Scenarios; Spatial Perspectives and Participation

At the national level, climate scenarios have been generated, both at the national level and at the level of individual key watersheds, in order to develop integrated assessments of vulnerability and adaptation. In parallel, the 2003 Programme for Strengthening National Capacity to Manage the Impacts of Climate Change and Air Pollution (PROCLIM) initiated the development of scenarios in the Piura, Mantaro and Santa river basins. Subsequently, in 2007, the Andean Regional Project for Adaptation to Climate Change (PRAA) began generating scenarios for the Urubamba and Mantaro river basins. In the latter case, the emphasis was on the effects of the reduction of glaciers (with a longer projection period). More recently, in the framework of the Second National Communication of Peru to the United Nations Framework Convention on Climate Change (UNFCCC) through the development of Integrated Local Assessments (ELI), studies were conducted on the Mayo and Santa river basins, as well as a study of climate change scenarios at the national level.[70]

The study of climate scenarios for Peru, aimed to determine trends and rates of current national climatic extremes based on observed data, and also to estimate future projections to 2030 based on global scenarios. Projections about climate in 2030 assumed a high emissions scenario (A2) and were calculated based on an average for a 10 year period (2025-2035), noting the following conclusions:[71]

- Changes in precipitation levels vary across regions. On the coast and in the northern highlands, and in parts of the central highlands and southern Amazon increases in precipitation levels were registered of up to 20%, while decreases of up to 20% were registered in the northern Amazon and parts of the central and southern highlands.
- The estimated extreme rainfall shows a decrease in the next 30 years in much of the country.
- With respect to extreme temperatures, an increase in both the minimum and the maximum temperatures is expected across most of the country. The maximum temperature is expected to rise by an average of 1.6°C (0.53°C/decade), while the minimum temperature is expected to rise by an average of 1.4°C (0.47 °C/decade).
- The largest increases in temperature are expected on the northern coast and highlands, the northern Amazon, and the central and southern highlands.

68 According to informants from SEDAPAL, in 2004 EDEGEL opened the sluicegates in order to get water for electric generation, which resulted in the water reserves going straight to the ocean, leaving the city unsupplied and generating a generalized drought.

69 For instance, SEDAPAL does not count with any capacity to involve into climate change policies.

70 Ministry of the Environment (MINAM), GEF, PNUD. Second National Communication of Peru to the United Nations Framework Convention on Climate Change. Lima, Peru. May 2010 .Page 79.

71 Ibid. Page 86.

– Regions such as the south-central coast and southern Amazon did not indicate major changes by 2030 with respect to extreme temperatures.

For the case of LM, the WP4 case study aims to understand the city's hydro-climatic vulnerabilities, interactions between water governance and climate change, and the levels of perception of risk acceptance. A multilevel analysis of the institutional dimensions (government, civil society and private sector) and a multiscalar analysis of the spatial-territorial dimensions has been done (seen as a dialogue between the metropolitan city, the locality-neighborhood and the macro-region). Construction, validation and transfer of inclusive climate scenarios (bringing together different types of knowledge provided by the different types of actors, institutions and networks are part of a process of social construction of knowledge for building consensus.

Different kinds of analysis were developed and different information sources were consulted.[72] In methodological terms, the process implied the organization of a series of inclusive scenario[73] workshops and the development of interviews with the main actors from the metropolitan city and its greater territory, which has permitted to explore different types of knowledge (tacit, expert, codified, specialist) as well as the dominant discourses that each participant actor (interviewed and/or contacted) had revealed in relation to development and water (explicit and implicit).

72 Experts' workshop, SENAMHI, IPCC, PNUD, SEDAPAL, LiWa (IWS, ZIRN), MINAM, IMP/MML. Systematization of existing information: IMP, chance2sustain, FORO, INEI, SEDAPAL, among others.

73 'Scenarios are not forecasts. They represent possible futures and the multiplicity of future. They are based on mental maps and project the contexts of insecurity on decision-making, trying to have a complex and not a precise vision. They are hypothetic and do not aim to become real'. León Christian, 2011, LiWa.

5 Spatial Knowledge Management in the City: Spatial Perspectives and Participation in Knowledge Production, Exchange and Use?

5.1. Discourses and Rationales for Introducing ICT-GIS-based KM in Urban Governance; Boundaries, Work Processes, Mapping Needs

The degree of spatial knowledge penetration is relatively low. In general, organizations in charge of generating climatic, physical and socio-economic basic information useful for measuring city vulnerability, adaptation capacities and socio-economic trends, belong mostly to the national government and depend on ministries from different sectors. This hinders access and management of information since government institutions lack the ability to expand and update information. Existing information is not accessible, is too expensive or out-of-date.

Spatial information management systems in LM are partially developed; institutions have very low budgets and initiatives are fragmented. Private sector institutions that develop these instruments such as think tanks and consultants rarely share their information and sell it at very high prices. At the same time efforts are duplicated and the generated cartography cannot be matched due to the use of different geo-reference systems. Municipalities and ministries use these systems mainly for mapping purposes (services, street maps), taxation, delimitation of boundaries, zoning, determination of urban parameters and the development of big transport infrastructure projects, among others.

Spatial knowledge systems (in GIS) have the advantage of visualizing trends, impacts and territorial problems in an easier and faster way with high capacity for storing large amounts of data; and for calculating, organizing and relating statistical information within graphic media such as plans, maps, etc. ICT_GIS based systems are used in urban planning for visualizing changes on the supply of energy and water networks, the allocation of amusement facilities, and modeling urban management systems for mobility or retail distribution purposes. It is seen as a clear advantage both for specialists and authorities to be able to present their proposals with a strong technological backdrop. For planners and project developers it is essential to territorialize problems as a complement to the texts they write and the statistical tables they produce. In that sense, a system that links cartography

with databases is seen as useful for investors, officers and users, and not only for planners.

For most district municipalities in LM the urban cadaster has a well-developed GIS system, which is updated and introduces precise measurements and geo-referenced allocation of plots. However, none of them are connected to each other. The quality of the geographic information generated is essential for users, facilitating decision-making for investors, particularly where it is available via internet as it is the case in the high-income districts of Miraflores, Surco, San Isidro and La Molina as well as Callao Municipality. Having a web-based cadaster is considered to boost productivity, which implies that GIS instruments are linked to competitiveness discourses aligned with modernity and cultural patterns of global cities and globalization in general which have a great deal of influence on important sectors of LM and Peru.

The use of GIS technologies is widespread in the business sector –such as real estate–, state sectors with higher levels of modernization –such as transport, basic service providers, high income municipalities–, and academic and professional sectors linked to globalization processes and large-scale infrastructure development. One of the sectors that has more affinity with this new culture is the Ministry of Housing, Construction and Sanitation MVCS that understands its role as supporting the private sector, generating information for facilitating real estate investments. According to Luis Tagle, national director of urbanism from the referred Ministry, "today the private investor has the macro-vision of the city and the state works as a supporting entity (and) geographic information would provide tools for helping investors to confront zoning plans with infrastructure deficits".[74] This statement clearly shows the position of the national/sectoral government about who is the main developer of Metropolitan Lima and how spatial knowledge should be used in the sector of the Peruvian State with a high degree of involvement in LM's development.

5.2. Knowledge Management in Urban Planning in the City: Actors and Networks

Both (international) public and private sector actors participate in the management of spatial knowledge in LM. Public institutions belong to different levels: the national level of government that includes ministries and its main agencies; the regional level that includes the Regional Government of Lima, the Regional Government of Callao (GRC) and 'Lima Provincias'; the metropolitan level that includes the MML, the municipality of Callao and the municipality of Huarochiri; and the local level that includes 49 districts (43 district belongs to the Lima province and 6 belongs to Callao). They conform sort of a spatial knowledge institutional system in LM that is presented in table 5.

In relation to their functions, public and private actors and networks involved in activities related to knowledge management for urban planning in LM can be divided in two groups: those ones who collect and generate basic information and those ones who analyze, integrate and translate gathered data. Among the former we can mention national government institutions and some private firms, while among the latter we can mention municipalities, universities and some civil society institutions (table 6 enumerates intervening public institutions). During this section, many of the different urban planning institutions involved in specific knowledge management tasks will be introduced.

One of the national government institutions that produce basic information for urban planning in LM is the National Institute of Informatics and Statistics (INEI) that carries out population and housing censuses, and several studies such as the National Household Survey (ENAHO), the Permanent Employment Survey and the household screening system SISFOH that has a socio-economic information system of poor and vulnerable households called the General Household List ('Padron General de Hogares') for the identification and selection of potential beneficiaries of social programs. It relies on cartography for locating houses and households.

Other institutions that produce socio-economic information are opinion and market studies such as Ipsos-Apoyo and the 'Cuanto' Institute.

In relation to the production of information regarding urban and developable land the following public institutions coexist: the Superintendent's Office of National Assets SBN that administers public plots and other state-owned estates, the National Valuation Council CONATA that determines urban land values, the Superintendent's Office of Public Registries SUNARP in charge of organizing real estate registration, the Agency for the Formalization of Informal Property COFOPRI in charge of formalizing land property and generating a cadaster with formalized plots; and the Metropolitan Planning Institute IMP at the metropolitan level. The IMP and the Office for Territorial Conditioning of the GRC work together in making compatible zoning maps regarding hydrographic basins. Despite the lack of connections between Lima and Callao, the relationship

74 Interviewed on February 14th, 2013.

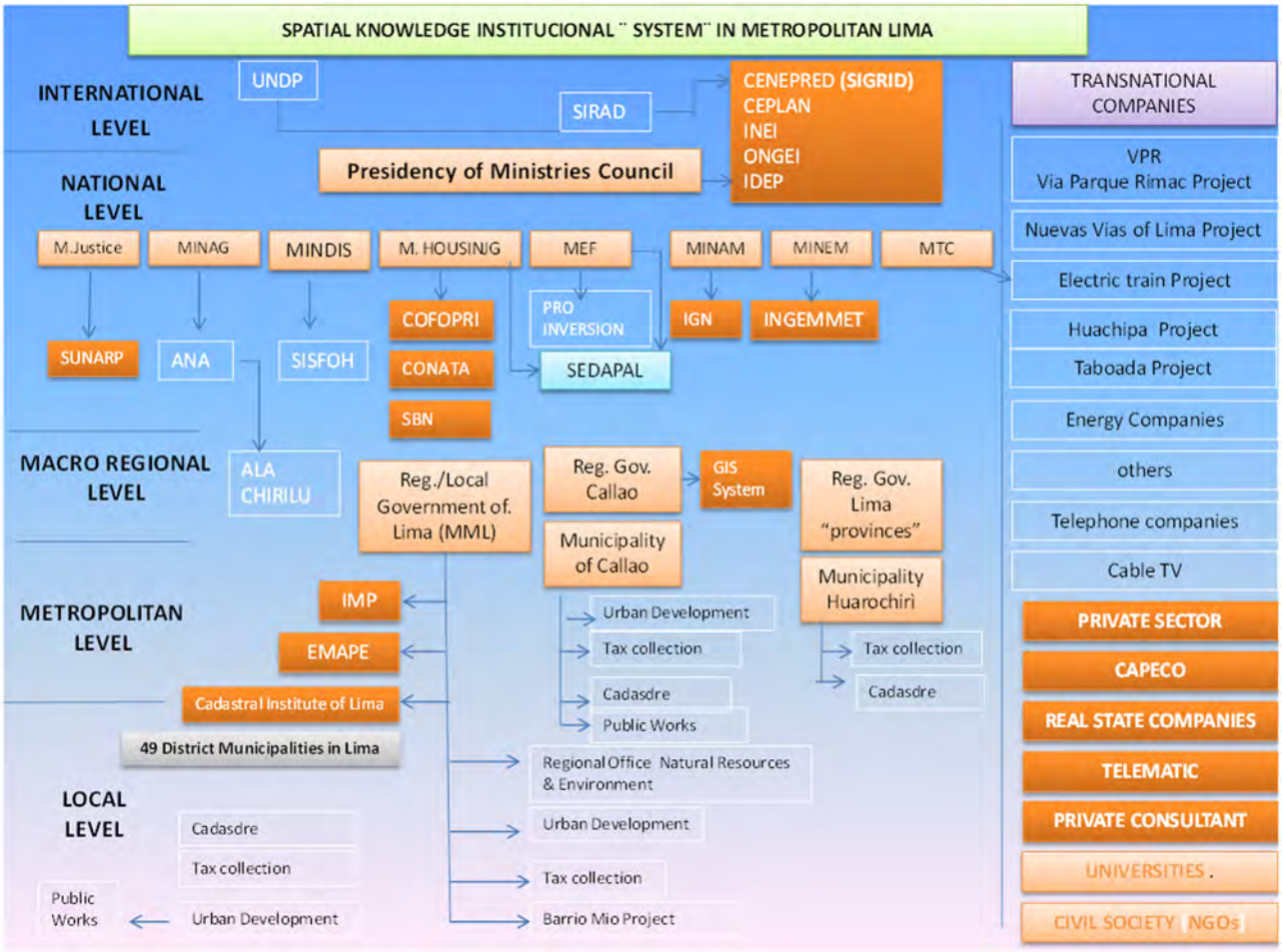
between the IMP and Callao is very strong, being supported by the fact that the IMP has developed several planning instruments for Callao.

In relation to urban cadasters, the MML counts with the Cadaster Institute of Lima, but it only works within the 'Cercado' central district (each district municipality makes its own cadaster). As it is the case with inequality among the districts' resources, cadaster quality is also very unequal. The absence of an integrated system of cadaster information across LM constitutes a barrier for an integrated understanding of its territory, since the cadaster is mainly used as a tool for property taxation and not as a territorial management and development instrument, neglecting the possibilities of spatializing the allocation of government activities according to local needs.

The Ministry of Housing also integrates cadaster databases (developed by district municipalities) with official land valuations. After signing an agreement municipalities can buy land value information based on their own cadaster maps for taxation purposes. Their idea is to eventually expand the use of cadaster now used only as a pure taxation instrument to become an instrument of territorial management and development. Indeed municipalities have to use 2% of total taxation for cadaster and planning issues but they do not, especially considering the very low existing levels of taxation and the very high operating costs.

In relation to housing, the Ministry of Housing, Sanitation and Construction is the main actor (it contains the CONATA and the MIVIVIENDA fund). The National Directorate of Urbanism from the same ministry formulates

Table 5: Spatial knowledge institutional "system" in LM.



Elaborated by Liliana Miranda and Isabel Fernandez, 2013

National government Institutions and some private Institutions which produce a geographic information system very useful for urban planning

Municipalities, universities and some private institutions of the civic society, who interpret, analyze and integrate that information

national urban regulations but also elaborates urban plans and provides technical assistance to provincial municipalities. In the private sector, the Construction Chamber CAPECO brings together construction enterprises in the country and produces information related to building prices, and carries out market studies. In relation to informal settlements, processes of formalization are held by the Commission for the Formalization of Informal Property COFOPRI that is also in charge of elaborating plot and perimeter plans, and public registration of properties. These plans are elaborated through the use of maps and GIS systems, and the configuration of a district level graphic base of urban properties and cadaster. The procedure implies the construction of a cartographic mosaic named 'territorial unity' that is incorporated to the graphic and statistical base of COFOPRI.

In relation to environmental issues, the Ministry of Environment is the most important actor. It formulates environmental norms and policies, and provides assistance for the elaboration of ecological-economic zoning. Other important bodies are the Sanitation Deputy Ministry (MVCS) and SEDAPAL that has one of the most detailed and up-to-date base maps of the city. Within the MML, the Deputy Regional Office of National Resources and Environment deals with protected areas, basins and water-hydrological resources. It has generated the first ecologic structure map in LM and the first map of public spaces and green areas of Lima.[75]

In addition there are more specialized initiatives, such as the Ministry of Environment Geoserver that processes information related to environmental issues using official data provided by various government departments. So far such data has not been standardized and can not be matched to a base map.

It is important to mention the efforts from the Ministry of Housing for generating a climate map of Peru, which is accessible via internet in order to permit project developers to apply bioclimatic design in the whole country.

In relation to vulnerability issues, the National Institute of Civil Defense INDECI formulates and supervises the National Plan for the Management of Disaster Risks and leads the SINAGRED system for executing the referred plan. Additionally, the National Center for the Prevention and

75 In: http://www.munlima.gob.pe/limaambiental/component/k2/item/72-estructura-ecologica

Table 5: List of actors Legend:

Institution	Definition	Institution	Definition
UNDP	United Nations Development Programme	**M Justice**	Ministry of Justice
SIRAD	Information System of Resources for Disaster Attention	**MINAG**	Ministry of Agriculture
CENEPRED	National Centre for Prevention, Estimation, and disaster risk reduction	**MINDIS**	Ministry of Defense
CEPLAN	National Strategic Planning Center	**M HOUSING**	Ministry of Housing
INEI	National Institute of Information and Statistics	**MINAM**	Ministry of Environment
ONGEI	National Office of electronic government and information technology	**MINEM**	Ministry of Energy and Mine
IDEP	Infraestructura de Datos Espaciales	**MTC**	Ministry of Transport and Communications
ANA	National Authority of Water	**MEF**	Ministry of Economy and Finance
ALA	Local Authority of Water	**ALA CHIRILU**	Local Authority of Water of Chillon, Rimac and Lurin rivers
MML	Metropolitan Municipality of Lima		

Elaborated by Liliana Miranda and Isabel Fernandez, 2013

Diminishing of Disaster Risk CENEPRED is in charge of coordinating, facilitating and supervising the formulation and implementation of the Disaster Risk National Plan and the Information System for Disaster Risk Management SIGRID. Also the Geo-Physical Institute studies natural phenomena that can affect the national territory, and the INGENEMET has developed a study of critical areas in danger of landslides, flooding and mudslide disasters in LM. The UNDP has elaborated the Information System of Resources for Disaster Attention SIRAD, a GIS-based web mapping service platform that links digital maps with databases on decision and intervention centers, water supply, food supply, emergency medical attention, energy supply, transport, telecommunications, potential areas for shelters, potential areas for gathering rubble and economic areas. It permits local and regional authorities to analyze the vulnerability of essential resource inventories for organizing and monitoring post-disaster recovery processes (for the case of Metropolitan Lima it is very focused on earthquakes and tsunamis, and not on climate change issues). It is based on a model developed for Quito, Ecuador. The platform has been installed in the cities of LM, Cañete, Huaura and Trujillo.

In relation to boundary demarcation: competences and processes. The National Directorate of Territorial Demarcation of the Prime Minister's Office PCM is the technical entity in charge of providing information for decision-making on boundary demarcation, and local institutions such as the IMP work together with the referred directorate. Then, boundary demarcation decisions pass through the "Territorial Demarcation Commission" of the National Congress, which tends to politicize the process, and at the end decisions are taken based on how many people go to protest to the congress.

Also, the National Geographic Institute IGN is a decentralized public agency (incorporated in the defense sector) that aims to elaborate and update basic cartography in Peru, participating in the creation, delimitation and

Table 6: Public agencies involved in spatial knowledge management for urban planning in LM.

INSTITUTIONS	Agencies	Role Description
CENEPRED	SISGRID	Information System for disaster risk management: for Lima SIRAD
Ministry of Justice	SUNARP	National Public Records Superintendence
Ministry of Housing	COFOPRI	Formalization of land property agency
	CONATA	National Council of real estate value appraisals (for defining the municipal taxes)
	SBN	National Superintendence of real estate property (state assets)
	SEDAPAL	Water Company for Lima and Callao
Ministry of Defense	SISFOSH	Poverty mapping for social programs focalization
MINAM	IGN	Geographic cartography Institute
MINEM	INGEMMET	Geology mapping, mining and concessions Institution
MEF	PROINVERSION	Megaprojects mapping
Regional Government of Callao	GIS Territorial System	Mapping of boundaries, human settlements, Ecological and economic zoning
Metropolitan Municipality of Lima	ICL Cadastral Institute of Lima	Lima "cercado" cadaster, mapping for MML offices by request (as consultant)
	IMP	Metropolitan Institution of Planning
	EMAPE	Municipality Company of Toll Administration
District Municipalities	Cadaster offices	Locating, sizing and defining owners of the real state in the district plot by plot

demarcation of territorial demarcation through the elaboration of official cartography.

In relation to the implementation of large-scale urban projects, there are many municipal agencies such as the Metropolitan Office for Private Investments Promotion GPIP promoting projects such as 'Via Parque Rimac', 'Nuevas Vías de Lima' and 'Via Expresa Sur' (see table 1), which use instruments such as synthesis plans, infographies, etc. There is also the Toll Administration Company of Lima EMAPE, that builds and administers highways and other high transit roads; and the Metropolitan Fund of Investments INVERMET that finances and executes projects and infrastructure works in the city. Both agencies – together with the Urban Development Office and the Neighborhood Participation Office of the MML– form part of the directors' board of the 'Barrio Mio' program.

5.2.1. Network Formation: networks and platforms

From the spatial knowledge point of view, these institutions contribute by providing spatial registration instruments and virtual communication systems with users. However, the various systems in place are not always interconnected; they use their own cartographic bases; they do not share the same plot or coordinated systems of cadasdral codes; their plot information do not coincide; and do not show much interest in constituting a coordinated GIS and/nor cadasdral system for LM.

An initial step on this regard is the S***patial Data Infrastructure of Peru IDEP*** that aims to integrate different public institutions that provide spatial information. It is still under construction but moving very slowly because it concerns a complex process of standardization. Its goal is to standardize and systematize cartographic and geo-spatial information from different state actors within a single platform managed by the National Government from the Prime Minister's Office (PCM). It is related to an important move towards an electronic government paradigm well established at the Latin American level. Institutions such as the National Geographic Institute (IGN), the Navy, INDECOPI (in charge of standardization) and COFOPRI are active participants.

The Metropolitan Assembly AML

The ***Metropolitan Assembly AML*** is a consultation and coordination body of the MML integrating 42 district mayors from Lima and 29 representatives from the civil society. The assembly is presided by the mayor of Lima and has the responsibility to coordinate the efficient implementation of metropolitan plans, among others. The civil society group within the AML has been very active during the current Administration and has approved the Concerted Regional Development Plan PRDC and often requested information about the execution of the plan. They have insisted on the role of the IMP in the plan's enforcement and on making it decentralized and participatory in nature. The PRDC and the Regional Disasters Plan used spatial information, together with some topics raised by the AML such as the implementation of electronic consulting for participatory budgeting processes.[76]

COREDES Lima

The Regional Conference for Social Development of Lima COREDES[77] integrates a number of CBOs and CSOs. At the end of 2010 it elaborated an agenda for Lima in the context of the municipal electoral campaign during that year. The agenda contains different aspects of the city including economic and urban development.[78] Information related to the agenda was submitted to the new administration and a number of mixed work commissions (MML and COREDES) were convened to contribute to the Operative Institutional Plan of the MML. Few of the members of COREDES have been elected members of the AML.

Poverty Fighting Concertacion Group MCLCP ('Mesa de Concertación de Lucha contra la Pobreza') - Work group on housing

This *concertacion* space was created by Supreme Decree 01-2001-PROMUDEH from 2001. The MCLCP of LM[79] counts

76 The same assembly previously worked on a political document called 'El Acuerdo por Lima' (Agreement for Lima) that was presented by the mayor in 2011.

77 COREDES belongs to the National Conference for Social Development (CONADES) that is a national scale meeting space of networks, organizations and citizen movements in the country.

78 The agenda was composed by a series of programmatic proposals that Lima's civil society (concentrated in COREDES) proposed to the candidates for metropolitan mayor. It included topics such as urban management; soil, housing; habitat and vulnerability; economic development and employment; capacity building; security; environmental management and climate change; fight against corruption.

79 As a concertation space, it does not count with specific members, but participants that represent a series of public institutions and social organizations that exchange information and sometimes reach some level of agreement.

with a working group on housing where representatives from the MML, districts municipalities, national government agencies such as COFOPRI and INDECI and several NGOs have an active participation. They are discussing intervention strategies of the Metropolitan Popular Housing Program of the MML and the 'Kuelap' project in the 'El Agustino' district that would be the first pilot program of low-income urbanization on hillsides. The Popular Housing Program presented to the MCLCP geo-referenced data for identifying possible plots for urban renewal, estates in ruins, monument estates, land uses and quantitative housing deficits (block level). That space also has a working group on water and environment, among others.

Environmental Networks

When referring to knowledge management, the environmental sector is one of the most advanced. In relation to hydro-climatic knowledge management there are programs and projects from:

- national entities promoted by the Ministry of Environment MINAM and the Lima Metropolitan Municipality MML (Office of Services to the City / Environment Deputy Office GSC/SMA) and the Office for Parks Administration SERPAR;
- the Provincial Municipality of Callao MPC and the Lima and Callao regional governments;[80]
- district municipalities (for instance, the climate pact between San Borja, Pueblo Libre and Miraflores, signed on September 2012);
- research projects by the 'Servicio Nacional de Meterología e hidrología del Perú' SENAMHI, 'Instituto del mar del Perú 'IMARPE,[81] Chance2Sustain, LiWa (with the participation of SEDAPAL, MML, the NGO Fomento de la Vida FOVIDA, National Engineering University UNI, FORO, among others)[82] and several universities ('Pontificia Universidad Católica del Péru PUCP among the most renowned);
- technical cooperation projects by UNDP and AVINA;[83] and from CSOs such as The Cities for Life Forum and the 'Movimiento Ciudadano Frente al Cambio Climático' MOCCIC, among others.
- a multi-sectoral team convened by civil society and governmental representatives that developed the Environmental Atlas of Lima[84] (initiated in 2002 and published in 2009).

Another initiative for spatial information management is the Liwa Tool, a computerized model for water flow under development by Ifak as a member of the German-Peruvian team of research institutes working under the Liwa research project.[85] One of the most important contributions of this study was the standardization of thematic information, which enabled data comparison (see Miranda Sara and Baud 2014).

5.3. Knowledge Building, Use and Contestation, Exchange

Processes of construction, use and exchange of spatial knowledge are influenced by contradictory trends. On one hand, there is the introduction of new information technologies in the context of globalization. The introduction of ICT-GIS systems in urban governance belongs to a technological revolution experimented by the whole world, in the context of a global economy that relies on telecommunication and information.[86]

Public entities have Internet-based consultation systems such as COFOPRI that has a free on-line service that permits users to check the situation of their plots and their records. Another important system is the online cadaster that contains information about land status for developing urban and rural development plans, transport, environment, security, taxation, etc. Access via internet is free or preferential by public and private sector actors as well as the general public. The SUNARP has a web-based information system of registered estates named Virtual Registry Tutor, and the SBN has an integrated system of

80 The Regional Strategy of Climate Change of Callao has been approved and its second update is in progress.

81 See: http://www.imarpe.pe

82 A computerized water flow model system http://www.lima-water.de/

83 Latin American foundation supported by the VIVA trust fund created by Stephan Schmidheiny for promoting sustainable development through an alliance between private companies and philanthropic organizations.

84 See: http://www.geoserver.itc.nl/lima/start/start.html

85 See: http://www.lima-water.de/

86 Another group which is very prone to use new communication technologies is the new generation of children and youngsters from all social levels, as it can be evidenced from the large numbers of internet cafes in the country and particularly in LM. Nonetheless, greatest part of this interest is related to amusement purposes and to a much lesser extent to more academic purposes. Thus, there is a pending task to take advantage of that interest for new technologies, but relating it to greater social challenges.

geographic information and numeric databases that enhances the management of cadaster information and more efficient administration.

On the other hand, there is a persistent 'secretism culture' related with low levels of transparency and sharing, especially from government representatives and consultants. There are cases when information is hidden for securing real estate investments in hazardous areas (i.e. the 'Costa Verde' which is a high risk area because of earthquakes and tsunamis); and opposite cases when information on hazards is intentionally used to undervalue land for securing investments through less expensive reallocations and expropriations, like the 'Linea Amarilla-Via Parque Rimac' case as it will be seen in case Chance2Sustain case-studies on mega-projects and on sub-standard settlements.

Additionally, there is the fear that information might empower new actors against existing local leadership, undermining existing investment dynamics secured by some agreements between private operators, social leaders and the local government. For instance, during the LiWa tool construction process, SEDAPAL limited access to their information to the IMP and other institutions, despite the signature of specific agreements for those purposes back in 2005. This can be related to a lack of trust about possible further use of the information by the IMP, a divide between water and land policies, and the referred secretism culture. The suspicion of sharing information is the fundamental problem facing the buildup of a multi-sector platform for information exchange and knowledge construction, One reason for this concerns the cost of information and lack of institutional continuity: from high levels of rotation of public officers to land trafficking mayors and powerful economic groups that prefer to keep information well hidden.

Each election in LM represents a complete change in the composition of the high level technical and political team for each Municipal and/or Regional Government and/or National Government if authorities are not reelected. This implies a complete absence of a continuous process or methodology of knowledge accumulation in the public sector. City officers do not have expertise for daily use of geographic information; and when managers' capacities are developed, they leave the institutions (sometimes taking all the information with them) because of the high rotation levels. Considering this problem, civil society institutions tend to function as a kind of repository database of experiences, and it is very common that new administrations go there after elections to request information about their districts. Interestingly, members from the local community claim their right to include upcoming authorities into the process; recognizing and legitimizing their presence and openness to transfer knowledge. In general social leaders have a very strong tacit knowledge on how to deal with public agents within political spaces while technical institutions (such as the already mentioned DESCO and CENCA) provide technical and financial information for supporting their discourses.

5.3.1. Knowledge Construction in Urban Planning

In relation to the construction of urban and spatial planning several actors (some of them international) participate by developing local, regional, national and international regional integration megaprojects (such as IIRSA among others) as shown in table 7. Nevertheless, it can be said that the different levels perform in rather independent ways. There remains a strong disconnection between municipal and regional bodies and service providers when defining land use and implement infrastructure, being also a constant interference of judiciary courts. LM lacks of territorial planning technical spaces well articulated and in coordination with national level sectors.

There is neither an integral nor unitary vision of the city as a whole. The dominant rationale has not given any priority to long term planning, but has consolidated market orientations through several deregulation policies (in the form of administrative simplification instruments), the weakening of regional and local institutionality (even as a part of the decentralization process), and the reliance on megaprojects as city development engines that have exacerbated conflicts and generated corruption problems in a context of non-sufficient instruments of urban and territorial management.

As a matter of fact, big real estate operators and private investors (supported by well recognized lobbyist and consultants) hold the clearest 'pro-growth' vision of LM with no counterdiscourses from spaces such as social organizations that remain very atomized and maintain their focus on immediate house and neighborhood scale issues. Figure 14 points out a dominant vision from private sectors operators (through a consultancy paid by the VEOLIA French infrastructure and environmental services provision firm). It relies on the re-development of new centralities, the real estate exploitation of the 'Costa Verde' and South Lima sea-fronts and the implementation of a whole new 'self-sustainable' city of almost 35000 ha on the southern part of the city (right hand side of figure 14).

In the same vein, figure 15 shows the official vision to year 2025 published almost 3 years after the URVIA-VEOLIA vision. It legitimizes it by relying on the referred policentrality[87] and proposing 'coastal border' developments on the 'Costa Verde' and Southern Lima and a 'self-sustainable' expansion in the same southern quadrant of the city. Despite the celebrated participatory and 'concertative' nature of the plan, the referred map has not been developed during the participatory process and no technical information has been provided in relation to both megaprojects. It is expected that the Urban Development Plan (still in progress) will provide technical support. Although the PDRC relies on reorganizing the existing core of the city, it is also pushing for the development of massive quantities of new urban land for an already sprawled city, with unknown future effects on the remaining Lurin Valley. The southern area of Lima will be the main area of contention between farmers and speculators. Today the desert invaders are not homeless poor migrants. New invaders are the new rich and big real estate consortia whose growing power has consolidated with the reduction of a huge eco-park in the South of Lima from more than 8000 ha to 1700 ha (Ludeña 2010:47).

The current planning vacuum becomes a very complex issue especially when the 'Graña y Montero' group, the biggest construction firm in Peru is planning to develop a so-called satellite city bigger than 8 km^2 in the referred area with no apparent concern for self-sustainibility. Developing pure strategic guidelines with

87 "The traditionally monocentric structure of Lima has started to desapear with the creation of the first deconcetrated development poles, largely driven by real estate laws before the guidelines of an always incompetetent and unefficient urban planning" (Ludeña 2010:76).

Table 7: Who does what in spatial planning in Peru?

	(INTERNATIONAL) NATIONAL	(MACRO) REGIONAL	LOCAL LEVEL	
			PROVINCE LEVEL	DISTRICT LEVEL
MACRO INTERNATIONAL PROJECTS (IRSA: transoceanic etc.)	X	X		
CONCERTED DEVELOPMENT PLANS	X	X	X	X
NATIONAL TERRITORIAL DEVELOPMENT PLAN 2004-2013	X			
NATIONAL PLAN OF URBAN DEVELOPMENT (MVCS)	X[88]			
TERRITORIAL DEVELOPMENT PLANS (Macro, middle and micro ZEE, EAE)	X	X	X	
LAND MANAGEMENT PLANS (Watershed programmed, brokers, intermediate cities…)			X	
URBAN DEVELOPMENT PLAN (Zoning Scheme, Risk Management Plan, PIGARS, Road and Transports plans, etc.)			X	X
RURAL DEVELOPMENT PLAN				X
HUMAN SETTLEMENTS DEVELOPMENT PLANS				X

Source: Self-developed

88 Only one National Urban Development Plan was done by the MVCS decades ago but it has never updated.

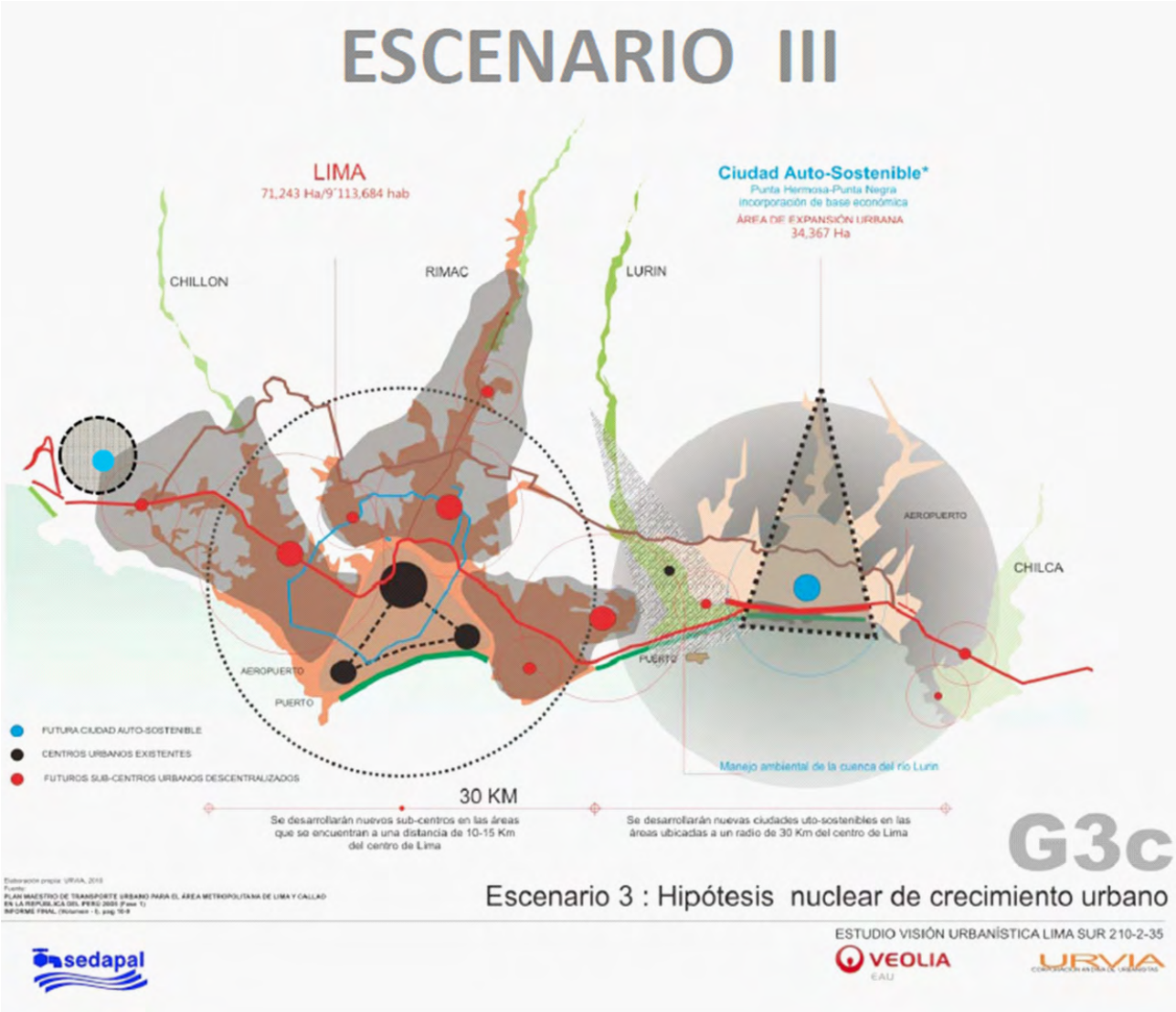
no further technical backup or social support, such as the PRDC's on the south of Lima carry the risk of loosely permitting –instead of regulating– ongoing market-led unregulated initiatives.

Territorial Planning in LM ('Ordenamiento Territorial' OT)

IMP is currently elaborating the OT plan, taking as a unit not only the urban tissue of Metropolitan Lima but also including its 4 river basins (even considering the Mantaro river basin). The plan is currently under development for the Chillon and Lurin basins, where a number of workshops have been held with all district municipalities from these areas to prepare the proposal. After the conclusion of the plan a new series of workshops will be executed in order to validate the proposal. At a first stage, the Lurin plan is about to be finished in July 2013, and the Chillon plan will be finished by the end of 2013.

Such planning processes are supposed to go beyond rather rigid economic-economic zoning (that remains at a diagnosis phase), implying a level of collaboration (through agreements) with LM's neighboring provinces. Indeed the IMP is working with the territorial conditioning office of the GRC for standardizing the already developed zoning in Callao with planning at the river basin level. However, when formulating the Territorial Planning Plan POT a number of

Figure 14: LM's future vision from the private sector to year 2035



Source: Florez, R. 'UNA VISIÓN DE LIMA AL 2035' Presentation at the "PLANIFICACIÓN DE LAS CIUDADES, TRANSPORTE Y CAMBIO CLIMÁTICO" seminar. November 2010.

information problems have risen in relation to environmental management. Among them we can mention:

- The very first ecologic mapping has been done only a few years ago and the hydrogeological map is already 30 years old with no update at all.
- The National Authority of Water has not made any studies about groundwater supply in Lima (despite the fact that it is the most important water resource of the city).
- The Civil Defense Institute has no geographic information about hazards and vulnerabilities. There are several versions of the hazards map, but any of them has been formally approved by INDECI, the MML or the MPC.

After the approval of the Ordenamiento Territorial OT proposal, a platform that aims to standardize the use and sharing of spatial information would start operating (to be developed as a project of the new PRDC). For the Rimac and Chillon basin areas in Lima and Callao, an agreement

Figure 15: 'Lima Policentric City'. MML-PRDC's vision on LM to year 2025

Source: MML (2012)

between INEI (National Institute of Statistics) and SEDAPAL has been signed in order to establish a common cartographic base. The main strategy is to conform a nucleus that would progressively expand to a management information system and promote the use of metadata at the level of the public apparatus in Lima. At this moment, agreements have been only done with respect to cartographic standards and do not yet represent an integrated system.

An important issue is that these kinds of activities are dependent on political more than technical decisions; and current relations between offices respond to very specific interests instead of being open to institutionalized information platforms. For example while the IMP is currently coordinating with SEDAPAL; the mayor of Lima is claiming a chair on SEDAPAL's board with a clear denial from the central government. Also, when the national government realized that transferring territorial planning OT functions to the MML would have an important empowerment effect regarding land policy decision-making, it decided to stop the transfer process from Environmental Ministry to MML.

Box 4: Corporative pressures on Territorial Planning (OT) regulation

For more than 10 years the OT law of Peru is still waiting for approval, seeming to be that it is not occurring due to the pressures from corporate and mining powers at the national level. While in rural areas, mining corporate power tends to influence big part of policy making related to the territory, for the case of LM this role is accomplished by real estate lobbies that tend to undermine every regulatory barrier and publicly available information in the same way as mining companies do. Nevertheless, since 2013 the MML has started to regain land policy powers from real estate lobbies by developing the territorial plan of the Chillón and Lurin river basins (it would be finalized this year) and has started to develop the Urban Development Plan of the province of Lima.

The Plan of Incentives for Municipal Management

A different kind of initiative comes from the Plan of Incentives for Municipal Management (Law 29332-2011) held by the national government. According to this policy, an economic incentive of 1 million PEN was offered to each municipality that would have identified physical risks in their jurisdictions. 1200 out of 1800 municipalities responded to the plan during 2012. For those 1200 municipalities, an extra 1.5M PEN were offered to translate that information into mitigation plans and 700 responded which is considered by the Ministry of Housing a great success.

Even though the response from local governments has been massive, no appropriate guidelines about the required information have been designed (no indicators, variables and not even definitions of danger or vulnerability) and the quality of the information given back to the national government is very mixed. Also, the provided incentives can be used in discretionary ways and not for dealing specifically with risk and vulnerability issues.

5.4. Spatial Knowledge Produced through Citizen Participation Processes

Knowledge components of the 'Barrio Mio' program for upgrading sub-standard settlements

The 'Barrio Mio' program aims to build urban infrastructure in marginal areas. The first step of the project is to reduce physical vulnerability by building stairways and retaining walls. After the first phase, several integral urban projects will be executed by using participatory planning techniques, such as the construction of roads, parks, sport infrastructure in accordance to the populations' needs.

For developing its intervention model, Barrio Mio has developed an urban poverty map (see figure 10) based on information from the 2007 census and systematic fieldwork gathering geographical data from those dwellings settled after the census. It has characterized the poorest populations according to their unsatisfied basic needs, but has also applied the GINI inequality index. 17 territories with relatively independent urban structures (a more or less defined core for programmatic purposes) were identified in peripheral areas of the city (most vulnerable). These areas were identified after analyzing demographic (INEI) and physical/geographical variables of the city. The aim was to build a model for prioritizing actions on a technical basis. The model would avoid political manipulation of investment prioritization; and 'anticipate the demand from the city', so that higher levels of organization/reaction capacities would not overpower real urban problems, and lead to biased decision-making processes.

When information on stairways was incorporated into the model, including the slope threshold for deciding where to build a stairway, the slope variable was crossed with a variable of existing stairs previously made by the community. This indicated the slope threshold assigned by the people and became the official one. The correlation indicated that those settlements with slopes steeper than 30% would necessarily need a stairway and those settlements with slopes between 24% and 30% would be on a transition stage (decisions on intervening in this range would be considered second priority and linked to other variables). The current identified limit for building on slope areas is 47%.

The 2012-2025 Concerted[89] Plan for the Regional Development of Lima as a learning process (PRDC)

The new Metropolitan Administration has considered it necessary to reactivate planning processes, by jumpstarting the new Concerted Development Plan 2012-2025 (PRDC)[90]. In general, the plan proposes development guidelines for the city and will be the basis for more specific planning schemes, aiming to merge two different kinds of assessments: a first academic one made by consultants and technicians; and a second one made in a participatory manner. On this basis, the technical team integrated the knowledge produced in various ways and generated the definite plan. Nonetheless geographic tools were not used in a systematic way beyond some specific topics such as transport, security and urban development (public spaces, urban equipment, among others).

In methodological terms, the PRDC tried to identify certain areas of the city with relatively similar features for the analysis: Central Lima, South Lima, East Lima and North Lima and Callao (see figure 16). After this initial territorial subdivision the population from these areas was convoked through the citizen participation office of each municipality and the mass media. Then, two parallel participatory processes and their eventual convergence were designed in order to merge sector and territorial dynamics. First, participants from different sectors (private sector, sub-national and national government, CSOs, universities and NGOs, the Church, territorial leaders, citizens, etc.) were convened to discuss a proposal about the vision of each five sectors. Second, a number of thematic meetings (sector-oriented such as education, transport, health, security) were convened in order to recognize specific issues on the referred territories. Despite the big efforts to open dialogue in the widest way possible, two fundamental groups for the future configuration of the city such as real estate operators and land traffickers did not participate in the plan's formulation process.[91] The first group generally uses more direct mechanisms for expressing its points of view, and the second group remains marginal to regular processes due to its illegal nature.

TThere are several networks that bring actors together linked to several topics within city planning. Unfortunately the process of formulation and follow up of the PRDC does not have an institutionalized space that may group different actors. From that perspective, the neighborhood consultation system of the 2013 MML participatory budgeting is an important achievement. The implementation of the system consisted not only of internet access, but also the installation of computer stations in public spaces such as parks, shopping areas, municipalities, the implementation of capacity building workshops, and the participation of public figures.

Other local experiences

Despite these efforts, citizen participation processes in LM have not been focused very specifically on building spatial knowledge (neither in the process of construction of the PRDC or the electronic consultation mechanisms referred to earlier). However, there are very relevant local initiatives regarding the construction of community maps for risk management. These maps not only contain information about risks, but constitute an instrument for stimulating the population to take actions for risk reduction.

Another aspect related to citizen participation and the follow-up of urban transformations and the performance of public institutions occurs around several ICT-based observatories such as 'Lima como Vamos'[92] that follows-up

89 The term 'concerted' is related to the fact that the plan has been approved by different local actors that have participated on the its formulation.

90 According to the national legislation, concerted development plans are focused on the populations and propose general guidelines, while urban development plans are focused on the city and imply more specific projects and instruments.

91 Considering that they do not take part of any similar process.

92 'Lima Como Vamos' –together with institutions from Arequipa and Trujillo– form part of a network of 70 similar institutions from different Latin American cities the Latin American Network for Just, Democratic and Sustainable Cities and Territories. These initiatives aim to improve city management with an inclusive, sustainable and ethical perspective.

Figure 16: Operative areas of the Regional Concerted Plan of Lima

Source: IMP/MML

quality of life variations in LM. It is promoted by private sector institutions such as the Catholic University of Peru, Radio Programas del Peru (broadcasting), the 'Asociacion Civil Transparencia' (third sector) the German International Cooperation Agency GIZ and the 'Asociación Atocongo' (CSR). NGOs such as the Urban Observatory DESCO[93] and 'Info Vivienda' from CENCA[94] also have initiatives.

Community-based knowledge reactions to large scale projects. The MIRR and the LA-VPR large-scale project.

Community-based knowledge is used in relation to large-scale projects; the case of the MIRR facing 'Linea Amarilla-Via Parque Rimac' megaproject is emblematic. For residents from the MIRR, the fact that they have never been consulted or properly informed, is a violation of their citizen rights, which made them contest the project by using the following knowledge-based negotiation mechanisms:

- Surveys: neighborhood associations get involved in surveying the settlement as a tool for generating independent and community driven information
- Writing letters to the municipality to demand information
- Neighborhood councils organize informative workshops and assemblies where residents voice their concerns.
- Distribution of leaflets and newspapers written by residents/ leaders/ lawyers
- Shift from protest/confrontational phase to a conversation/legal phase: community protests give way to technical legal matters,[95] establishing relationships with lawyers who offered legal expertise for challenging the contract
- Price calculations of their houses (independently of the evaluations made by the MML and the company)
- Fighting "Ordenanza 1020" at the constitutional court in a alliance with a group of opposition congressmen

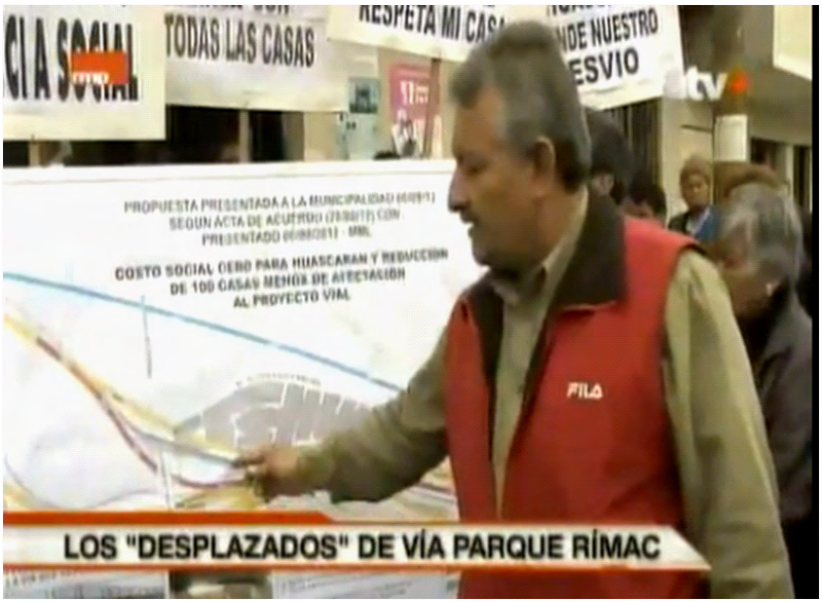
At the Huascarán neighborhood (Right Margin of the Rimac River), the majority of the population completely rejects the implementation of the project given that the settlement is consolidated and not exposed to environmental or physical risks. The residents demand the construction of an alternative route, given that there is ample space between the river and the first line of houses, making their own proposal for an alternative route for the highway.

93 The Urban Observatory DESCO is a web based virtual platform that contains information on public space and risk management (vulnerability maps for risk mitigation plans) for the districts of South Lima.

94 'Info Vivienda' summarizes news about housing, water and sanitation and urban development topics. It is used for following up the current urban situation and discussing it with the population where CENCA works (San Juan de Lurigancho district).

95 Importantly, this change of space has a negative effect: neighborhoods have atomized and tend to technically negotiate in parallel.

Figure 17: Social Leader from the 'Huascarán' neighborhood showing their proposal for changing the layout on TV



Still capture from 'RMP program from 21/11/12

Source: http://play.tuteve.tv/videogaleria/listado/111614/2012-11-22-21112012

5.5. Conclusions

LM is divided into two jurisdictions that at the same time are divided into one provincial municipality with regional government competences in Lima, both regional and provincial governments in Callao and 49 district municipalities. This fragmentation and absence of integrated and interconnected information systems constitute a serious barrier for developing integrated spatial planning and management at the metropolitan level. Authorities and officers are concentrated in their very own small territories, losing the metropolitan perspective and a real comprehension of problems affecting the whole city.

Although the production of sector-based knowledge belongs to national government institutions (that indeed concentrates the highest investment capacities in the city), at the end of the day local actors integrate knowledge through a more territorial view, incorporating it into the urban planning approach. Nonetheless, the lack of an articulated geographic information database undermines the possibility to reach an integral view of the metropolitan territory. At the same time, the dominance of a centralized and sector-specific management from the national government fragments the city's future development. This is evidenced by the small willingness to share data and the absence of a common cartographic basis. SIG mapping would permit an integrated understanding of different types of territorial knowledge at different scales, from different sector and disciplinary focuses related to the same city (macro-regional/inter-basin, metropolitan city and neighborhood).

There are several networks engaged in formulating and following public policies, but their use of spatial knowledge tools is rather limited. Although experiences of construction of community risk maps are the most relevant, their articulation to metropolitan and district information systems is still a pending task. Despite the importance of the use of information systems for decision-making and city management, the willingness to build integrated spatial information systems and to invest in strengthening capacities on that regard is not perceived. The dominant logic of these services is the provision of information, not the democratization of decision-making in the city.

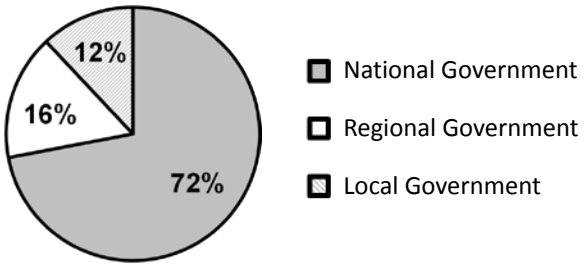
The use of spatial knowledge instruments for city development is limited to public institutions in charge of cadasters, land registries, real estate investors and corporations, and private consultants. In relation to civil society and social organization actors this is still incipient. In planning terms, we can see that in Peru and especially LM, there is a constant lack of coordination and several conflicts between sectors, levels of government, and between the public, private sector, the civil society and the community in general have risen during the last 20 years. This situation claims for the urgent update of the Master Plan for the Urban Development of LM and the implementation of a transparent information system that would guarantee the equal access to territorial information.

6 The Role of the City Government Finances and Venues of Participation within the Decentralization Process

6.1. Budgetary Considerations

Peru's budget is distributed according to the different levels of government (national, regional and local) meaning that there is no defined budget for cities or metropolitan areas as unitary entities. According to the Law on the Public Sector Budget, national budget for the 2010 fiscal year (N° 29 465) was almost 82 thousand million PEN allocated to National, Regional, and Local Governments, and distributed as follows:

Figure 18: Distribution of the Public Budget by Level of Government



Source: Law on the Public Sector Budget for the 2010 Fiscal year (Nº 29465). Graph developed by author.

As it can be seen on the figure above, even though Peru began a process of decentralization in 2002, the current public budget allocation is still highly inequitable, with 72% being allocated to the national government, while only 16% is allocated to regional governments (25 governments) and 12% to local governments.

6.1.1. At the regional/province level

The spent budget of the MML (regional and provincial governments) was around 1580M PEN in 2012, which is one of the highest in the country in gross terms. Nonetheless, when referring to per capita terms, MML's budget becomes the lowest (around 185 PEN per capita). In relation to Callao (regional and provincial governments) the total budget for 2012 was around 1270M PEN (around 1270 PEN per capita). A simple comparison show a significant divergence in budgets between the contiguous Lima and Callao administrations.

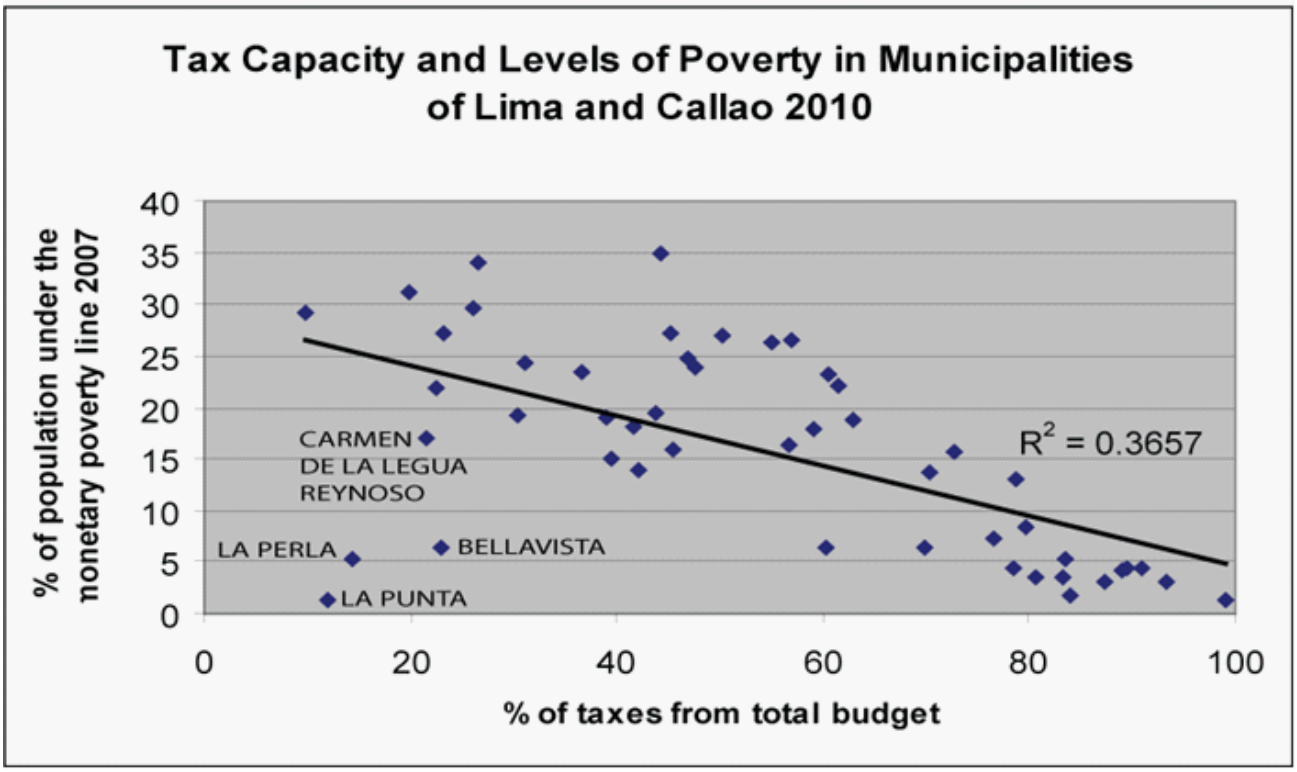
In relation to budget composition, 77% of the budget from the MML is self-generated income, which reflects a high degree of fiscal autonomy. Contrarily, the Callao Regional Government has a rate of around 16.5% of self-generated income, being highly dependent on national government transfers related to port and airport taxes.

6.1.2. At the district level

Great part of the power and wealth at the subnational level remains on the district level, particularly in Lima where district municipalities represent 2300M PEN of spent budgets in 2012 (around 60% of total budgets spent in Lima). In relation to Callao district budgets represented only 234M PEN in 2012 (around 15% of total budgets spent in Callao).

Similarly to existing national level budgetary inequalities, differences between total budgets and budgets per capita among district governments in Metropolitan Lima and Callao are clear. While in 2010 districts like Rimac spent 109 PEN per capita, other districts like San Isidro were able to spend 2430 PEN. At the same time, while the San Isidro district is able to cover more than 99% of its expenditure with self-income, 76% of Villa Maria del Triunfo's budget was covered by transferences from the national government. It is important to remark that districts from Callao are relevant when speaking about high dependence on transfers –in this case from customs taxes as it has been stated– which reflects on lax tax policies. The La Perla district for instance received transferences up to 85.7% of their 2010 budget.

Figure 19: Tax Capacity and Levels of Poverty in Municipalities of Lima and Callao 2010



Source: MEF, INEI

In general, those municipalities that have better socio-economic situations have higher budgets, which makes sense since higher income districts are able to collect more taxes. Figure 19 hereby confirms that correlation: districts with lower income populations have lower tax collecting capacities and less possibilities of investing with their own means.

6.2. Citizen Participation in the City: Participatory Budgeting Processes?

Participatory Budgeting (PB) is a new approach to governance that has been implemented in Peru since year 2000 in various municipalities nationwide. In 2003, community participation was institutionalized at the regional and local government levels as a part of the decentralization process initiated by the Peruvian government. Inclusive tools and processes such as the Concerted Development Plans (PDC) and Participatory Budgeting (PP) were established.

The Framework Law of Participatory Budgeting defines the PB process "as a mechanism for equitable, rational, efficient, effective and transparent allocation of public resources, which strengthens relations between the state and civil society. To this end, regional and local governments promote the development of mechanisms and strategies for public participation on budget planning, as well as in monitoring and overseeing of public resource management." In that sense, "participatory Budgeting is not a management tool, but a management process"[96] that involves actors both internal and external to public institutions, promoting public commitment and participation on the development process. It is locally understood as a policy and management tool through which regional and local authorities and community organizations decide together how and on what they will allocate resources, taking into account the visions and objectives of Strategic and Institutional Development Plans monitored by the Ministry of Economy and Finance MEF. According to the current legal framework it aims to:

- Increase the efficiency of expenditure according to planning considerations
- Reinforce the relationship between state and society
- Involve the population on the actions for accomplishing Concerted Development Plans
- Establish priorities on public investment
- Reinforce the follow-up and citizen control of public administration.

6.2.1. Overall Performance

PB's results and levels of participation are diverse, starting by the point that in general very low shares of the municipal budgets have been decided through participation (only 5.4% of total district budgets in Lima and Callao). For instance, while 32.2% of the total 2010 budget of the Puente Piedra district corresponded to participatory projects, this percentage reached only 0.4% for La Molina (one of the richest districts). This helps to confirm the fact that at the district level in Lima, those municipalities with lower average consumption capacity have more participatory funds as a percentage of total budgets (See figure 18). The slightly convex trend curve tells us that the proportion of the participatory budget share grows faster as income tends to constantly decrease.

In addition to its design problems, achievements of PB are being currently undermined by the structural problems of the bigger decentralization wave. These problems are generally related to the technical/political weaknesses of subnational governments that are fueled by recentralizing national government policies and mechanisms. The design and general management of the process have been historically held in a top-down manner by the Ministry of Finance and responsibilities have not been shared to other sectors or levels or government. Important steps back in the process are held mainly from the Ministry of Finance, which is commonly against PB.

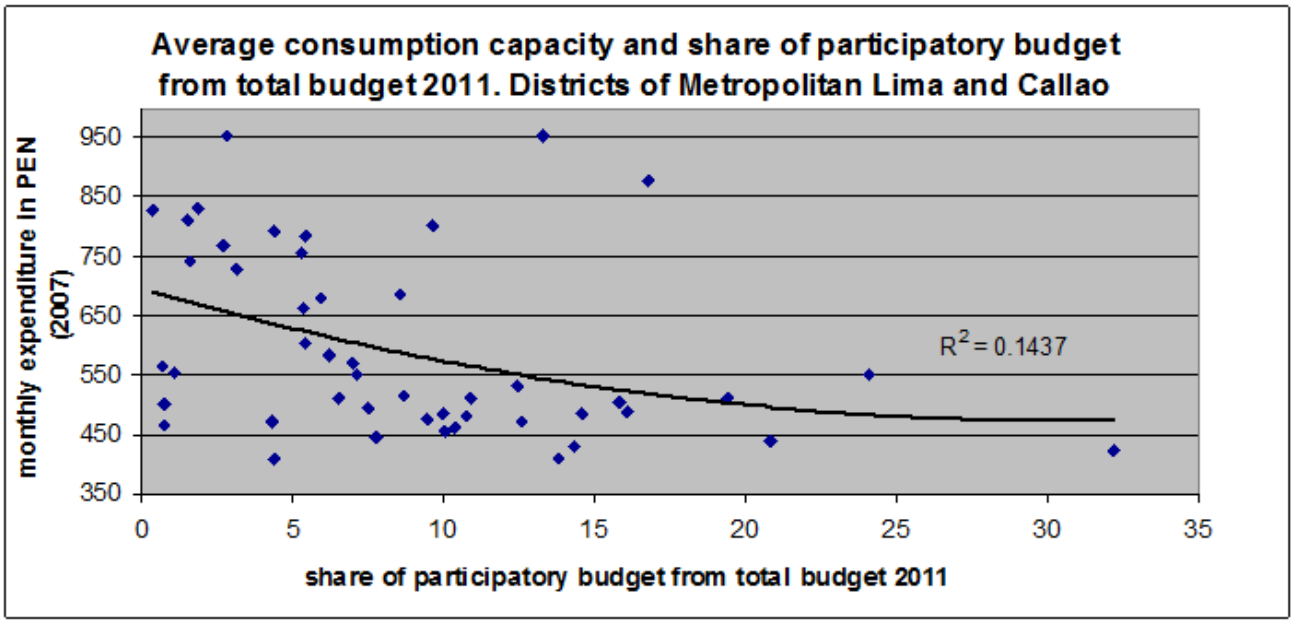
It should be noted that, while in Peru there are various mechanisms of participation in national and municipal governance, most of them are not processes that have a significant impact on the core decision making processes of the municipal government but relate rather to participation in decisions on small investment projects and public works such as: sport facilities, local health or community centers, placement of tracks and trails, public and ornamental landscaping, etc.

The 2012 Metropolitan PB (MML) process considered a budget of around 39M PEN,[97] which represented less than 2.5% of the total spent budget in 2012 and 11.1% of the budget for capital expenses. This means that regarding large public investment projects and public works that will directly

96 Grey, Carlos. Module III "Participatory Budgeting" from the course Public Management of Development, Pachacámac-Anc-Invent Group, Lima, August 2003.

97 http://www.munlima.gob.pe/images/stories/gerencias/Region/Resultados_PIP_Viables_PP_Lima_Metropolitana_2012_al_30-Nov-2011.pdf

Figure 20: Average consumtion capacity and share of participatory budget from total budget 2011. Districts of Metropolitan Lima and Calloa



Source: MEF, INEI

affect the living conditions and environmental health of the population, these participatory mechanisms do not apply. For example, for all the large public investment projects currently being implemented in LM, neither the National Government nor the MML consulted or invited the community, including the 'Metropolitano' bus system, the Taboada Wastewater Treatment Plant, the Huachipa Potable Water Treatment Plant, the 'Linea Amarilla-Via Parque Rimac' project, the 'Metro de Lima' project and the Huascacocha channel, among others.[98]

6.2.2. Connections with local development planning

Differently from pioneer PB experiences (as that one from Porto Alegre-Brazil), it was decided to link PB with local planning in the Peruvian experience. However an evaluation that permits to know the level of accomplishment of this relation has not been done yet and an initial assessment says that the level of communication between these two instruments has been rather weak. In urban spaces, municipal PB Projects are decided in very discretional ways and over a very small portion of total municipal budgets. Indeed discretional behavior exists in both sides (government and local leaders) since many times, local leaders approach to the municipality with specific projects that have not been participatorily decided. Currently, leaders are asked to bring an assembly act signed by the neighbors, guaranteeing that the project presented has been discussed at the local level.

6.2.3. Strengths and possibilities of the Instrument

In spite of these problems, PB still has relevance since it contributes to generate transparency and fiscal responsibility (at least for the percentage of budgets assigned). It has also permitted a group of civil society actors (from Local and Regional Coordination and Oversight Committees whose main functions are the follow-up of the concerted plans and the PB process) to achieve important knowledge about the process and the way the State performs. Nonetheless, the degree of representation of these actors is very limited.

It is important to mention that the current municipal administration has democratized the call for participant agents, but it is still oriented on the construction of small works, mainly roads with relatively small budgets, and it is not involved in topics related with the management of urban land.

98 Differently from mining projects where Environmental Impact Studies (EIA) are mandatory (with strong social components) for starting their development, regulations on infrastructure megaprojects indicate that no 'social license' is necessary for approving and starting the projects.

7 Case-studies

7.1. WP2. The 'Línea Amarilla-Via Parque Rimac' Express Highway

"Via Parque Rimac" is a large-scale transport infrastructure project that aims to merge transportation (connecting 13 districts of the city on the east-west direction through a 9km. highway along the "Rimac" River) with public space issues. Its main publicized objective was to reach the international airport from 'Surco' and 'La Molina' (LM's richest districts) in 18 minutes. The case-study evidences the use of several PPP instruments that at the end of the day benefit private operators in the long term, affecting further municipal administrations. These instruments legitimize projects through the signature of contracts with very low public awareness levels.

The project scope has changed through 2 different municipal administrations: Luis Castañeda's, (2003-2010) and Susana Villarán's (2011-2014). During the first period it was named 'Linea Amarilla' and it aimed to develop only the 9 km highway (with 2 km underneath the Rimac River nearby the historical center area). The project was presented to the Metropolitan Council on March 2009 through an existing PPP management mechanism called 'iniciativa privada' (private initiative) by the OAS Brazilian contractor.[99] Three months later, on June 26th, the project was declared as 'of interest' with relatively no hesitation and six months later it was granted to OAS through the direct granting mechanism ('adjudicación directa'). Work was expected to begin in May 2010.

Even though the operator officially stated that the project was considered as the first road infrastructure megaproject that held a highly participatory process, affected populations have stated that the project was planned without the neighbors' agreement. Lots of contestation to the project rose, from suspicions about the transparency of the concession to demonstrations from affected populations from the 'Margen Izquierda del Rio Rímac' MIRR area (*Left Margin of the Rimac River*) who were never consulted about their eventual reallocation (more than 1000 families).[100] This conflict suspended the project until the Castañeda Administration mandate finished in December 2010.

When the new administration (claimed to be more socially oriented) took power in 2011, a contract renegotiation process started in order to modify the project and include a more integral intervention perspective. In addition to the original components of the project (only a road and tunnel) the renegotiation of the concession implied the recovery of 6 km of the Rimac riverfront, the development of a 25ha. park and two new road interchanges.

To achieve these new goals, budgets were raised from 571M to 703M USD and the concession period was extended from 30 to 40 years. In the renegociation process it was also decided that 7% of the toll income would be transferred back to MML, diverging from the original contract that provisioned for the MML to give up 100% of that income. The number of affected families was reduced from 1350 to 950 families, and the minimum compensation increased from 5000 USD to 30000 USD. Two social housing complexes "Acomayo" and "Patio Unión" were specifically implemented in order to provide houses to those families that voluntarily would decide to be reallocated.

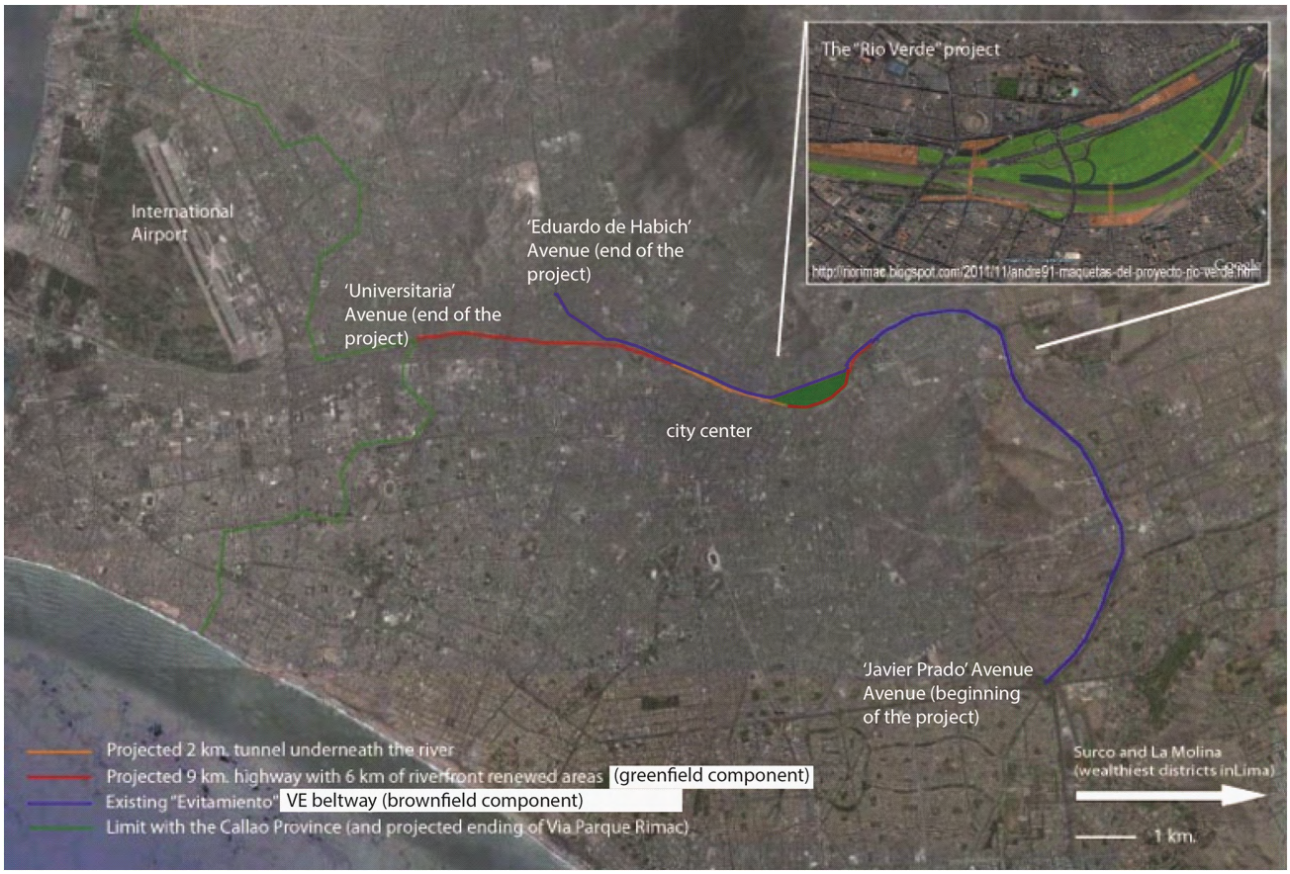
Transport network features

Two infrastructure components have been packaged and sold into the same LA-VPR concession: the refurbishment and management of an existing 16km highway called 'Via de Evitamiento' (blue line in figure 19) and the development of the 9km new highway (proper 'Via Parque Rimac' project – red line in figure 19). Nevertheless, they tend to perform as separate road systems: the first one, 'Via de Evitamiento' (VE) developed and managed by the MML for many years, has mostly attended the north-south demand by connecting its three most important regional connections ('Panamericana Norte', 'Panamericana Sur' and 'Central' highways); and the second one, LA-VPR, will connect the existing VE with Callao in the east-west direction. Indeed both infrastructures will pay 2 independent toll tickets, both of them collected by the concession (the first one since February 2013 and the second one after the VPR component is delivered).

99 Through the 'iniciativa privada' mechanism, private contractors can directly propose and develop projects of public interest.

100 The WP3 case study makes a detailed analysis of the MIRR area and a number of social aspects related to LA-VPR.

Figure 21: LA-VPR project layout



Source: Self developed.

Financial aspects

The MML is giving up the 'Evitamiento' toll system, which is the most profitable in the country (70% of the total toll income from the MML). Calculations made by OAS indicate approximately 4170M USD after year 30 in gross revenue for the concession.[101] It is interesting to make an evaluation of the LA-VPR contract in comparison with another project called 'Vias Nuevas de Lima' (2013) for understanding the difference that contract terms and benefits can acquire. While 'Vias Nuevas de Lima' gives up 30% of the total toll income from the MML for a 590M USD (30 year concession), LA aimed to gave up 70% of the same income for a 571M USD concession (30 years as well).

Although 93% of the income from both highways will go to the same concessionaire, investments at 'Via de Evitamiento' represent less than 5% of the total. The concession is basically allocating 80% of the road infrastructure budget on `Via Parque Rimac' which concentrates only 6.2% of the expected demand for 2010 and 22.6% by 2040 (the other 93.8% of the expected demand in 2010 and 77.4% by 2040 comes from 'Via de Evitamiento' which has already been operative for many years and represents only about 5% of the 'Via Parque Rimac' investment amount).

Fiscal capacities of the Metropolitan Municipality (MML)

It has been stated that the financial-managerial scheme followed by the Via Parque Rimac project is a consequence of the lack of capacity from MML to self-finance projects of this scale; so performing a concession of that type was the only remaining option." It is the first time that a contract of that magnitude is signed, and the first time that the municipality does not put any money for developing such a project".[102] The budget for Metropolitan Lima is 460M

101 Indeed this calculation is rather conservative since it considers a 7.48% annual growth rate of toll income for the first year and a starting toll collection of less than 50M USD for 2013; while according to EMAPE, between 2011 and 2012 toll income for the referred VE toll point has grown 13.89%, making more than 60M USD in 2012.

102 Declaration from Luis Castañeda. In: http://www.larepublica.pe/node/232291/print

USD (one of the lowest considering other capital cities of the region, and any other region in Peru in per capita terms). In 2011 it has spent only 60.4M USD in transport infrastructure projects and budgeted 88.4M USD for 2012 (including debt servicing from previous and future projects). Considering that scenario it was very difficult for MML to sustain such a project with its own funds or to request a new credit line.

7.2. WP3. The Left Bank of the Rimac River (MIRR)

The MIRR is a low income residential area located nearby the city center (see figure 20), between the Rimac River and the Argentina Avenue, one of the most important industrial axis in LM. It was populated during the 1940s and 1950s and was characterized by the formation of settlements in unfavorable locations (prior to the occupation, the area was a landfill called 'El Montón').[103] The area was a former garbage dump and the first settlers were devoted to the breeding of pigs, it is currently the main center of recycling of paper and paperboard from Lima.

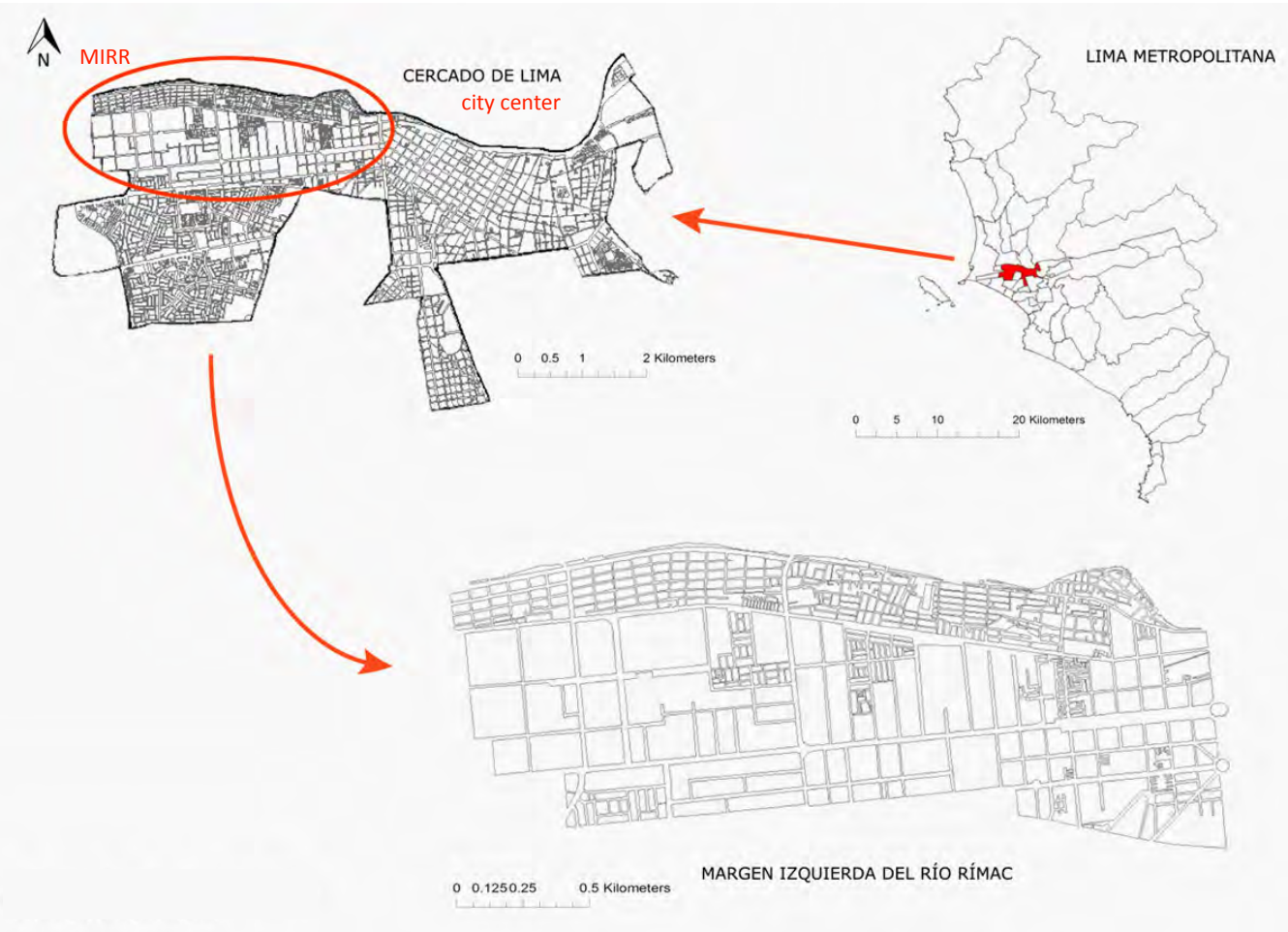
There are processes that have been important for generating social mobilizations in LM and have influenced the urban territorial consolidation of the MIRR:

a. At the beginning of the 1970s, a group of people took the land of an abandoned brick factory at the industrial area next to the MIRR settlement. These people understood that it did not constitute an invasion of private property but the rescue of land that belonged to all Peruvians. Therefore, the occupation was popularly named as 'The Rescue', being a milestone in the history of Peruvian social

103 Until the early 1960s, irregular settlements tended to occupy more central –but more difficult to develop– areas.

Figure 22: Location of the MIRR

Source: Self developed.



Map Source: Census Blocks from INEI, 2007
Adjusted by: Lisa Strauch, UvA

movements. Settlers from the Rescue made an alliance with other settlements of the MIRR, forming the "Front of the Rescuers' and establishing an alliance with the very active trade union movement at that time.

b. A few years ago, the MML managed to reallocate street vendors from the outskirts of the historical center to the first blocks of the Argentina Avenue, creating the Las Malvinas fair that energized the economy of the MIRR.

c. Today the MML is implementing the LA-VPR mega project that involved the relocation of families and provoked the people's reaction in defense of their property.

Reactions to 'Via Parque Rimac'

In close relation to the LA-VPR, WP2 case study the 'Primero de Mayo' neighborhood has been selected as a case-study according to the degree of impact and reaction to the project. The 'Barrio Obrero Primero de Mayo' is the first settlement emerged at the MIR.

Following the national trend most organizations at the MIRR are currently formed around pragmatic interests and are not inspired by political-ideological objectives and organizations often lose their purpose once the consolidation of the neighborhood occurs. However, as the population is facing a possible reallocation in unfavorable conditions due to LA-VPR, the neighborhood council has reactivated and several organizations have taken actions for defending the rights of the local population. On March 18th 2010 hundreds of people made a demonstration to the city center against the project and on May 28th they went to the National Congress, protesting against a possible eviction. This action indeed stopped the process for almost two years and effectively changed the project compensation scheme. The case of the MIRR although it is an example of loss of political vision of the social movement but it showed the intrinsic value a base firmly united around a proposal for compensation.

It is worth mentioning that the mobilization of The Rescue had a strong ideological base and occurred in a booming moment of the neighborhood movement in Lima, while the demonstrations after the LA-VPR have occurred in a period of decay of social movements. Nonetheless, their claims didn't lose effectiveness in the defense of specific interests managing to stop the execution of the project for a period and forcing a renegotiation.[104]

104 More related to economic compensations,

Overall people lament the lack of information, the complete state of uncertainty and the provision of contradictory information from authorities or officials which tends to aggravate the situation. The project is perceived to be implemented in a top-down manner without consultation mechanisms. It has already caused and will continue generating social conflicts with the population. Most residents relate the megaproject with the disappearance of the settlement and reject it as a threat to their lifelong efforts considering that their main concern was the consolidation of their houses, the regularization/formalization of their property, and the improvement of their neighborhood. Since the announcement of the project, residents live with the uncertainty that they might be evicted. Hence, they cannot take individual and collective actions to improve the settlement, reaching a standstill.

In relation to the compensation program, it is perceived that the company and the MML pursue an inadequate housing programme which does not respond to the needs of the affected population. The minimum compensation scheme that has increased from a 5000 USD to a 30000 USD, is still considered as not fair. Although the settlements are characterized by a high residential density (several families may live in each house) the program foresees to compensate only the owner of the house. Some owners rent parts of their houses and relocation would deprive them of this source of income. Since the settlements are spaces for living but also for working in forms of small shops and workshops inside the houses, people who use their houses for economic activities are worried that relocation might affect their professional activity and income generation.

7.3. WP4. Three Scenarios for Metropolitan Lima for Year 2025

During recent years two processes have run in parallel to analyze the consequences of plausible climate change scenarios in LMs water governance where Cities for Life Forum has been actively engaged. The first process was led by a German-financed research programme whose objective was the development of climate change scenarios and water simulation models. The second process has been initiated by the MML in order to construct city development strategies and a climate change adaptation strategy (sponsored by AVINA). The Chance2Sustain programme has also opened up a discussion on a more spatial perspective in city development and water governance, by framing and spatializing scenarios with mapping methods, which can help visualizing inequities and indicate areas of water related vulnerabilities.

After three years of consultations, interviews, workshops, focus groups, seminars and round tables; a level of consensus has been reached and the bases for taking measures and actions for the adaptation facing serious droughts and intensive rainfalls in critical periods as 'El Niño', 'La Niña' or 'el DANA' have been set.

The two main scenarios that the diagnosis of the 'Estrategia de Adaptación al Cambio Climático de Lima' (MML) has elaborated are –on one hand– drought and –on the other hand– intensive rainfall. In both cases, the rise of temperature would be almost 2 degrees[105] and in consequence, sea level would rise at least 1 centimeter per year. Additionally, there is a third plausible scenario that combines the first two: permanent drought with heavy rainfalls occurring more often. According to key actors, that is the most probable scenario.

As shown in table 4, according to the first scenario, the expected impacts of heavy rainfalls are the increase of overflows, landslides, mudslides and floods (with 6% increase of rainfall per year and higher river flows)20 aggravated with the extreme meteorological conditions of recurring events (El Niño, Dana) and the melting of glaciers. However, there is an opportunity of changing daily life patterns from an arid city to those ones from a green city (with a potential increase of agriculture areas and coastal hills inside and outside the city area) with a warmer weather (opening new opportunities for summer tourism).

The second scenario (also shown in the table 4) may be the worst, by combining the first two scenarios: permanent drought with eventual extreme events related to radical temperature changes and intense rainfall increase.

The third scenario entails that considering the presence of more extreme and permanent drought (a 10% annual rainfall decrease)[106] water scarcity would increase, creating conflicts related to the access to hydric resources and hidroenergy (68% of the country energy is generated by water sources). Considering current population growth trends, if per-capita water consumption is not reduced and a more aggressive policy for recycling and reuse is established; water demand would increase to a critical situation, related once again, with D and E socioeconomic sectors, which are the most vulnerable.

These three scenarios imply that insufficient sanitation and drainage infrastructure, as a result of a lack of investment in prevention, can cause an increase of water transmitted diseases. Also, rising temperature can boost tropical diseases like dengue and malaria (for instance in April 2013, 66 dengue cases where detected in Tablada de Lurin in Villa María del Triunfo, a low-income district in southern LM).[107]

Figure 21 points out the relationship between population and density increases and water availability. Once again, the most affected populations would be those ones from the north, east and south peripheries. The turn from blue to light blue colors represents a decrease from 50-150 liters of daily water consumption to less than 50 liters.

Peru is one of the ten most vulnerable countries in relation to climate change.[108] LM will experience many of the consequences, making water scarcity and heavy rains issues of great concern. Considering the residential occupation of floodable land and very inclined hillsides and gaps, with low quality buildings and road infrastructure and bridges exposed to landslides and floods; structural vulnerability of Lima would increase particularly on hillsides with more than 20 degree gradients (where the MML is implementing the 'Barrio Mio' upgrading program), zones next to rivers and dry ravines as well as urban roads and basements not prepared for intense rainfall (due to a lack of drainage). Some of the plausible impacts are:

- A reduction in availability of and access to water, and an increase in dependency on rain and groundwater (causing rationing during drought);
- increased levels of water pollution;
- reduced hydropower generation;
- increasing unsatisfied demands for water and energy, leading to greater conflicts on water and land use;
- reallocation of large numbers of people due to climatic displacements such as tidal waves and sea level rises.
- an increase in the incidence of water borne diseases as a result of the use of polluted water, lower hygiene levels as a result of water shortages, and increased ENSO related flooding.

105 IPCC, Panel Intergubernamental de Cambio Climático

106 IWS, LiWa 2012. The information has been based on hydrologic modeling works made by Dr. Andra Bardossy and Alejandro Chamorro from IWS, Stuttgart University.

107 In: http://peru21.pe/actualidad/suben-66-casos-dengue-villa-maria-triunfo-2125876

108 Tyndall Centre for Climate Change Research (2004). W Neil Adger, Nick Brooks, Graham Bentham, Maureen Agnew and Siri Eriksen, New Indicators of Vulnerability and Adaptive Capacity. Tyndall Project IT1.11. Technical Report 7. UK: Tyndal Centre.

Conclusions

The main conclusion that comes out of both projects is that the main scenario is **uncertainty**: no scientific truth exists about the climate change scenario for Lima in 2025 or 2040.

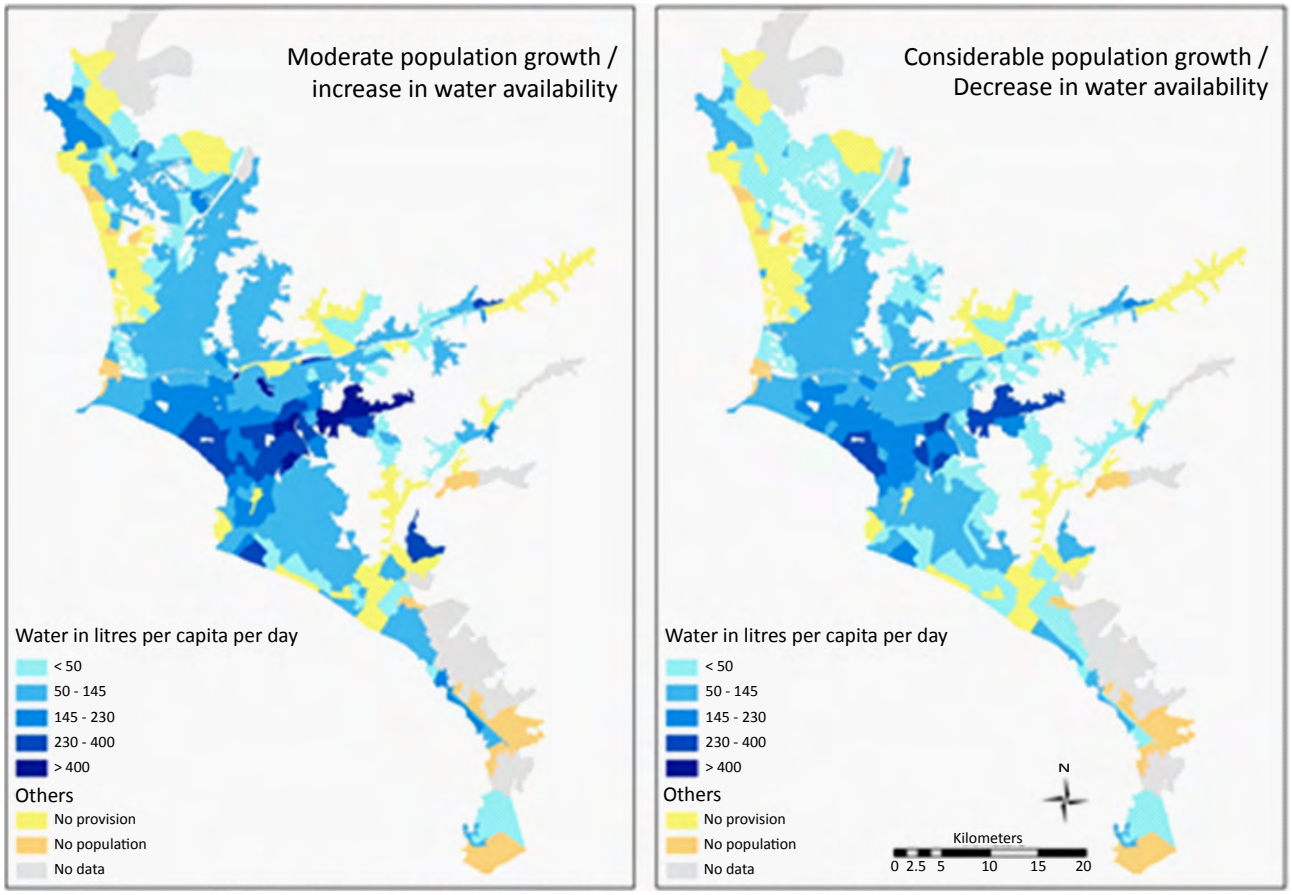
Even though these processes used *concertacion* and social construction of knowledge, the actors could identify a neglecting attitude regarding risk in general and climatic risk in particular. There are different risk perceptions than in general are not very accepted. The kinds of included and exchanged knowledge differed considerably but representing interesting points for comparing ideas on adaptive management and the role of knowledge building.

There are spaces of coordination and participation but they are still incipient and require to be institutionalized. Under those spaces, mandated by law, a process of social construction of knowledge contributed to design metropolitan water governance and climate change adaptation strategies. Our analysis focused specifically on the extent to which *concertacion* processes allow the inclusion of a wider range of actors, discourses and knowledge in metropolitan governance and adaptation strategies, and later on, how they influence priorities in decision-making processes. *Concertacion* processes offer possibilities of mutual understanding and building consensus through the inclusion of a wider range of actors and various types of knowledge into the discussions and dialogues.

Key discourses in water governance were identified among actors from the Lima water governance network, on the basis of workshop discussions and individual interviews (see Miranda Sara et al. 2011).[109] The main discourses include a view on **water** as an "economic good", a "human right", a "right of nature for all beings (human/ecosystem)" and/or "(drinking water) sector". Actors in the *concertacion* processes also identified development as "pro-growth", "pro-poor", "pro-life/green" and "sectoral (mainly pro-large scale water infrastructure investments)" discourses; associated to the so called public-private-partnerships.

109 The characterization refers to the model built up in Miranda Sara, Hordijk et al. 2011, *Water Governance Key Approaches: an analytical framework*, Chance2Sustain, EADI.

Figure 23: Density scenarios and unequal water distribution in Lima



Source: Population census 2007 (INEI). Water consumption data 2007 (Sedepal); Population / water growth rates - Lima project

Double discourses where also identified, between what participants stated into the workshops and what their institutions later did.

In the case of LM, government actors, particularly from the central government, often apply a dominant "**pro-growth**" combined with a "**pro-sector**" discourse; and decision-making processes are considered as not transparent or *concerted*. However, metropolitan government and its related institutions, as well as civil society organizations, are gradually taking a "**pro-poor**" and "**pro-life/green**" focus with a tendency to open transparent spaces for *concertation*. The water company takes a combined "**pro-sector**" and technocratic approach by following the hierarchical centralized decisions from national government. It can be stated that the main vulnerability of LM is an **institutional** vulnerability since territorial management in the city is highly centralized and not articulated from water and (climatic) risk management:

The discussion of these analysis and the *concertacion* processes for the construction, validation and transfer of inclusive climate scenarios (combining various types of knowledge) has contributed to expand the actors' opportunities of acceptation and mutual understanding, building up consensus, developing measures and agreements for collaborative action over time and bringing in knowledge from different territorial and spatial scale levels with diverse water and development discourses and different territorial and city visions. In fact, a new question related to the future of the metropolitan city and the macro region can be raised: how to integrate and harmonize urban growth, risk management, nature conservation and hydro energy generation with an equitable, ecoefficient, safe and integrated water management (from the upper basin to the ocean, passing through the Metropolitan City)?

7.4. WP5. 'Institutional Knowledge and Technology Management in Callao.[110]

Since 2009, the Regional Government of Callao, through the Spatial Conditioning Office as part of the Regional Office of Budget, Planning and Spatial Conditioning, takes up the challenge to develop a number of documents in consultation with the Provincial Municipality of Callao and several district municipalities. They furthermore consult with public institutions such as the Peruvian Marine institute IMARPE, the Directorate of Hydrography and Navigation HIDRONAV, the national port authority APN, private companies, and civil society.

The main knowledge products are divided into three important processes (executed by i.e. the Spatial Conditioning Office)

- Process of spatial planning
- Process of delineating boundaries
- Process of information gathering for the spatial database – GIS

In order to centralize and share all spatial products, a TIC-GIS product has been developed for integrating computing tools, internet and communications. This product is built on a GIS platform server and is called: Regional Spatial Information System (SITR). The main objectives of the SITR are to systematize the products developed; to have a GIS map server and a metadata server; to manage the spatial databases for decision-making processes; to publish the products for the benefit of the institutional structures, local governments and public and private institutions; to provide information that guides spatial planning and urban development; to pass on the actions of demarcation and spatial organization; to contribute to disaster risk management; to provide feedback and comply with Peruvian regulations on spatial data. The SITR contains diverse knowledge generated by the Spatial Conditioning Office, such as accurate information, maps, database and metadata of Ecological Economic Zoning and boundaries; accurate information and maps for the spatial organization of the Ventanilla district; databases, maps and spatial catalogues for Porcino Park, Mi Perú, hazards in human settlements and historical monuments and ruinous properties.

Although legislation on spatial planning is not clear and explicit (often using confusing terms as spatial conditioning, spatial organization, environmental and land management, etc.) it was possible to conduct studies and generate important information in Callao. This information is not only useful for the Regional Government of Callao, but also for the municipalities, public institutions, the private sector, and civil society. The knowledge products become management and guiding instruments for the development and implementation of urban spatial planning, environmental risks management or actions of demarcation. For instance, the MZEE of Callao was incorporated in the study on the Chillon watershed proposed by the multi-sectorial commission for spatial planning of the Chillón river basin. Also, the Spatial Conditioning office has been coordinating with the IMP its participation on the spatial planning of Chillón, where the MZEE product has being incorporated.

110 Based on the WP5 report on Callao by Consuelo Mugurazu.

Counter-mapping in Callao

The most active form of participatory knowledge generation is counter-mapping, that is, "mapping against dominant power structures, to further seemingly progressive goals" (Hodgson and Schroeder, 2002). Counter-mapping produces knowledge that has to be used to resist and develop counter arguments. This multidisciplinary generated information has been developed in a participatory manner with input from local governments, public and private institutions and civil society organizations, while subsequently validated by the respective actors for each process.

Table 8: Main knowledge products developed in Callao

Processes of spatial planning
• "Ecological Economic Micro-Zoning (MZEE) of the Constitutional Province of Callao – updated version 2011". A dynamic and flexible process that aims to identify various options for sustainable use of a certain area. It is based on the evaluation of land use potentials and restraints; by using physical, biological, social, economic and cultural criteria.
• "Spatial Management Plan of the Constitutional Province of Callao 2020 – proposal" The Spatial Management Plan of the Constitutional Province of Callao 2020 is an interdisciplinary attempt to intergrade the different social, economic and cultural processes and systems into a proposal for integrated and efficient land use management.
Processes of delineating boundaries and formalization
• "Diagnosis for delineating and determination of territorial boundaries in the Constitutional Province of Callao" The technical document is base for the delineating of boundaries of existing constituencies in the province.
• Proceedings of delineating territorial boundaries between the Ventanilla district and the LM districts (Ancón, Sta. Rosa, Puente Piedra and San Martín de Porres).
• "Zoning for Spatial Demarcation and Organization of the district of Ventanilla – Constitutional Province of Callao". The supreme decree No. 074-2010-PCM has declared the district of Ventanilla as a national interest zone.
Processes of information gathering for the spatial database - GIS
• "Development of the catalogue about the hazard in human settlement, disaster risk management and spatial planning". It contains information about the identification of hazards, vulnerabilities and risk levels for the human settlements located in the districts of Callao (downtown) and Ventanilla.
• "Development of the Regional Spatial Catalogue No. 1. "Human settlement Nuestra Señora de las Mercedes Mi Perú". It contains information about infrastructure services, economic activities, the legal physical state of the urban centers and their margins, etc.
• Regional catalogue No. 2 "The Porcino Park Project – Ventanilla - Callao". It contains cartographic information on demographic issues, facilities, socio-economic activities, access to basic services and infrastructure of each sector, zone, association or cooperative project.
• "Human settlements in the Constitutional Province of Callao". It is a record of all human settlements in the Constitutional Province of Callao (urbanizations, cooperatives, neighborhoods, etc.) in order to cover the lack of information regarding name, location and the jurisdiction to which it belongs.
• "Development of a Spatial Information Database" – Landmarks. This catalogue aims to show the status of the nation's cultural heritage, as well as ruinous properties.

8 Conclusions

Cities are the territorial expression of a model of economic development that includes space in a fixed form. The classic phrase from Margaret Thatcher, "There is no such thing as society. There are individual men and women and there are families"[111] explains the social and economic model that has constructed the modern urban paradigm applied in LM since the 1990s. It has prioritized the competition between individuals, enterprises and territories over solidarity, collaboration and shared responsibility.

The dominant visions that governmental actors keep applying on LM's development that can be mostly typified as "pro-growth" and/or "pro-sector" since economic growth strategies are mostly channeled through sector/centralist-based policy actions with rather fragmented territorial approaches with no integral vision of the city as a whole. There is a diversity of authorities with overlapping functions that generates fragmentation, disarticulation and weakening of the role of the state in the city at different scales of government. Probably, the most eloquent case is the relation between Lima and Callao. Although both are conurbated and form the same metropolitan region there exists a very limited planning and administrative relationship regarding national-sectorial, regional or local spheres, which generates constant overlapping and even conflict/competition situations.

There is also a strong bias towards putting national visions ahead of metropolitan or local scale ones, especially in LM as Peru's capital city that represents a strategic political arena for national government actors since one third of the whole voting population live there (often through the direct intervention of ministries or the president himself).[112] Those political pressures have been effective in undermining the ongoing decentralization processes that does not imply a genuine power transference to sub-national levels in LM. This reflects, for instance, in the conflictive relationship of the MML with SEDAPAL and the incapacity of the metropolitan government to take decisions on water infrastructure. Despite the relatively well established government subdivision, it is important to state that consolidating a public management with a territorialized focus is still a difficult task since sector based approaches biased by strong centralist impetuses have tended to historically overpower more territorially integrated or autonomous governance schemes.

At both national and local levels, the current public policy package relies on the promotion of private investments in order to reach a 'modernity' and competitiveness level that would eventually sustain more socially oriented or pro-poor approaches. The dominant rationale has not given any priority to long term planning, but has consolidated market orientations through several deregulation policies (in the form of administrative simplification instruments), the weakening of regional and local institutionality and the reliance on megaprojects as city development engines; which has exacerbated conflicts and generated corruption problems in a context of non-sufficient instruments of urban and territorial management. In LM these actions occur in a context where pure profit oriented actions perform with no counterpart from strong planning approaches or socially oriented policies, which exacerbates socio-spatial segregation.

Nevertheless, "pro-poor" and "pro-life" focuses have recently started to become more relevant within the new metropolitan administration. These approaches are materializing in ongoing large-scale programs such as 'Barrio Mio' that aims to build urban infrastructure in marginal areas. But they are still very focused on smaller neighborhood scales and run in parallel with more integrated metropolitan visions that are still driven by real estate corporative powers. Similarly, it should be noted that recently opened participatory spaces such as participatory budgeting, do not have a significant impact on core decision-making processes at the local and metropolitan levels. They are more related to decisions on small investment project, not applying to larger projects in which (affected) populations commonly remain marginalized. Differently from the past, when effective connection channels between the state and organizations , participatory budgeting and concerted development planning have become almost the only official instrument. Its design limitations have caused organizations' voices to lose legitimacy in relation to issues such as decisions on large-scale infrastructure provision, feeling that the only remaining interlocution channel is social unrest.

111 Margaret Thatcher, Interview for Woman's Own magazine. October 31, 1987.

112 The most important decisions and about 70% of the national budget are concentrated at the national level of government.

Additionally, the arrival of the *global city* dominant discourse to LM is specializing land uses in favor of efficiency. It is operationalized by strong public private investments in an unregulated environment which have strong impacts on the urban and social fabric, enabling speculative behavior from real estate operators in already consolidated middle and high-income central areas and developing profit oriented low-income "micro housing" initiatives that misunderstand the complexities of the demand. In parallel, CBOs densify their original neighborhoods (overcrowding them) through informal channels. In these neighborhoods land trafficking is on the rise at a moment when social organization structures have decayed and lost their direct link with the state apparatus. CBOs mobilize in instrumental ways more related to their own specific agendas and organization structures have been atomized to the point that demands are covered even at household levels.

Although increasing socio-economic inequalities have great impacts in relation to housing, basic services and spatial segregation, LM does not count with socio-spatial segregation related policies for permitting greater social and spatial integration, promoting mixed land uses and generating meeting spaces between different social strata. As this report shows, the territorial distribution of income remains certainly correlated with density and particularly vulnerability issues. Unfortunately, issues such as climate change vulnerabilities have not been well acknowledged in a moment while new kinds of informal urbanization tend to occupy even more inadequate areas and new situations of great risk for the city's lowest income families are under configuration.

The city report has told us a tale of two different cities. One is desperately trying to insert into a (second or third order?) global network of cities by receiving the bulk of investments and development efforts; and the other one has been not only left aside by policy makers but is performing as the main absorber of the negative externalities of the first. Instead of getting closer to a convergence point, the implementation of neoliberal policies has contributed to polarizate them. As it has been said during the report, the current main vulnerability of LM is institutional in a moment when planning schemes have been almost completely dismissed and an important part of the city administration (and decisions) have been put in the hands of profit oriented sectors, the future scenario is not very optimistic.

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Chance2Sustain examines how governments and citizens in cities with differing patterns of urban economic growth make use of participatory (or integrated) spatial knowledge management to direct urban governance towards more sustainable development. **Consortium partners:** European Association of Development Research and Training Institutes (EADI, Germany), Governance for Inclusive Development (GID) at the Amsterdam Institute for Social Science Research (AISSR-UvA, Netherlands), French National Center for Scientific Research (CNRS, France), School of Planning and Architecture (SPA, India), Cities for Life Forum (FORO, Peru), Centro Brasileiro de Análise e Planejamento (CEBRAP, Brazil), Norwegian Institute for Urban and Regional Research (NIBR, Norway), University of KwaZulu-Natal (UKZN, South Africa)

SEVENTH FRAMEWORK PROGRAMME