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Do Inclusive Scenarios Contribute to Reduce Water Vulnerabilities Facing Climate Change in Metropolitan Cities? The Case of Lima, Peru

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This document includes opinions and contributions from the "Towards a Climate Change Adaptation Agenda for the city of Lima" Workshop. It was organized by the Metropolitan Municipality of Lima together with Cities for Life Foro as part of the Chance2Sustain project workshops as well as LiWa project. It also includes opinions from FCPV associates and from the Foro research team.[1]

Introduction

How do cities face uncertain water and hydro-energetic risks in front of Climate Change? This question requires a complex answer because it is necessary, first at all, to understand the links and interactions between territory, water and metropolitan city in terms of the relationship between water governance and territory (urban and rural). Secondly it is necessary to understand how citizen participation is added and how effective and articulated are multi-actors "concertation" processes, in and between each existent level of government (national, regional, provincial and district)?[2]; Does this institutional framework permit to articulate and integrate interventions in different territorial scales (basin, metropolitan city, neighborhood, and house)? Are these spaces sufficient and efficient for facilitating this interaction and integration in order to reduce water vulnerabilities facing Climate Change scenarios to 2050? All this questions are formulated in the context of weak institutionality and ungovernability regarding the management of a metropolitan city like Lima in Peru.

We will face this challenges within the research project "Urban Opportunities for Sustainability" Chance2Sustain financed by the European Union and lead by "Foro Ciudades para la Vida" in Peru from 2011 to 2014.[3] In a context where water governance/concertation experiences (urban or rural) are still in construction, it will not be possible to measure their success, but it will rather be possible to understand in which political/institutional conditions, the agendas of climate change adaptation are introduced (or not) into the strategies for metropolitan city and water management (from the river source itself to household connections).

1 Foro Ciudades para la Vida www.ciudad.org.pe
2 Coordination Councils, Environmental Commissions and their Climate Change Technical Groups, or other groups as established in the Organic Law of Regional Governments, Organic Law of Local Governments and the General Law of the National Environmental System.
3 Visit the project's web page: www.chance2sustain.eu

Water Governance and the Metropolitan City

Water for All, Water for None

As a first step it is important to know and conciliate the different approaches actors have on water governance and/or "concertation", as well as the city model(s) they (we) expect.

Water can be seen according to the values and perspectives from each actor; as an *economic good* or *merchandise*; as a *human right* or *social good*; as *socio-cultural* and *ecological good*, as a part of the "Pachamama"; as a sacred element according to traditions; or as a sector that provides a service.[4] These different and even contrary approaches are configuring nuances and emphases in the processes of "concertation" and multi-actor decision making. They are previewed by water institutionality on the city and territory, but represent a little integrated and articulated system that can be evidenced, for instance, from the moment water rights on each river are delivered by the National Water Authority[5] but the water and sanitation service is managed by SEDAPAL[6], a public company included in the Housing Ministry (Sanitation deputy ministry). SEDAPAL has resisted including representatives of the Metropolitan Municipality of Lima and Callao on its board of directors; and it has also resisted to be transferred to municipalities within the existing decentralization process, as it happens in the rest of cities of the country (only this water company does not belong to a Municipality).

Sector management still prevails. In Lima, there are different authorities with defined and overlapping competences and functions on water management, which results in an evident fragmentation and disarticulation of the performance of the state. Currently SEDAPAL depends on the national government; the energy provision depends on a private enterprise regulated by the national government (EDEGEL); water management as a hydryc resource depends on the National Water Authority through the –currently in formation– basin councils; land titling depends on a national government agency (COFOPRI[7]) and the allocation of urban land uses depends on 49 district municipalities while non-urban uses allocation depends on the different ministries. As a consequence, big investments or megaprojects related to water, sanitation and hydro-power are in hands of different entities of the national government and do not depend on city authorities, which are not even consulted nor informed of their decisions into the city. On the other hand and for the case of Lima, a management articulation of the three basins related to Lima is expected, considering the recent creation of the Council of the Rimac River Basin by the Municipality of Lima.

A City with no Authority, Identity nor Plan

In relation to the cities we have identified, different focuses and models that can define it as compact, as in process of densification and/or agglomeration, as a networked city, or as mono centric or polycentric city. For Lima, there are proposed visions based on the merging of some of these urban forms with their population growth correlation and interaction but so far there are no consensuses. Which is the city that we want? How do we imagine it? For who is it thought? This means that it is necessary to analyze it from multiple layers of government –local, regional and national– since Metropolitan Lima is governed by at least two regional governments (a third region commonly named as "Lima

4 Miranda, et al (2011), "Water Governance key approaches: An analytical framework" Literature Review 4, 23 pp, Chance2sustain.

5 The General Water Law is still to be implemented by Local Water Authorities in the river basins of Metropolitan Lima: Chillón, Rímac, Lurín y alto Mantaro.

6 Potable Water and Sewer Service of Lima. www.sedapal.com.pe

7 Agency for Formalization of Informal Property. www.cofopri.gob.pe

Provincias" has also considerable power), at least three provincial municipalities and more than 50 district municipalities. This means that *Metropolitan Lima does not have a single and clear authority*. How to govern it in such a way?

One of the decisions of the current metropolitan government is to reestablish the Lima Metropolitan Assembly. It is an institutionalized space that will definitely contribute with a better management and recover authority on the city through citizen consensus. Another decision is to "concertate" around an urban vision of the city to 2035 and 2050 through a Plan for Lima that will be elaborated by the Metropolitan Planning Institute (IMP) of the Metropolitan Municipality. These are remarkable efforts for the recovery of authority and leadership, and an opportunity to build a consensual and concerted city vision: a city project for a mixed Lima, of multiple identities that are concentrated on a proud citizen project and related with the idea of belonging Lima; a vision that defines which is the Lima that we want and how to build this joint and positive vision of the future of the metropolitan city.

Currently, in the framework of the LiWa[8] project as a part of a process of scenario construction and dialogue and debate workshops about the urban form descriptor for Lima[9] in which FCPV and local experts participate; the following sub-scenarios of urban form driving force descriptor have been consensually defined for Lima:[10]

Urban form descriptor in an adaptation scenario

- Network expansion of the city with territorial arrangement that protects its valleys. The city is multicentric, with fast, massive, multimodal and interconnected transport. It is compact in the central area with a decreasing overcrowding level in low and middle income areas. It has increasing equipment and public spaces, including water provision, with protection and forestation of slopes. It has increasing resilience against disasters and 10 m2 of green areas per inhabitant, with treatment of waste waters and high level of reuse on greening the city.

Urban form descriptor in a "business as usual" scenario

- Uncontrollably sprawled city with no valleys, with incipient centers on its outskirts and with a chaotic transport system that prioritizes cars. It is compact with green areas but fragmented and segregated on its central area; with a high overcrowding level in middle and low income areas and with insufficient equipment and public spaces. It has high risk of landslides on its slopes, and high risk of flooding by overflowing and sea level rise. It has insufficient green areas per inhabitant and high irrigation costs due to the insufficient water provisions, low level of water treatment and reuse.

The 2050 Scenario construction will permit us to know scenarios and positive or negative future trends regarding each aspect relevant to the city development (driving force descriptor). It will be useful as an analysis basis in order to link this scenario to the future vision expected for the city.

Territory and City of Fragmentation

It is important to precise how development paradigms are present in the understanding of the city and territory. Not many are able to understand the city through an integrated and non-fragmented focus, which means as a part of a territory (urban and rural) which

8 Peruvian German research project.: www.lima-water.de

9 Positive and negative characteristic that a component or aspect of analysis will have in the future.

10 Workshop "Urban Form Descriptor" with the participation of guest experts in the framework of the LiWa project.

implies perceiving it in its entire dimension.[11] This dimension includes soil, subsoil, water, maritime domain and air; considering and including all physical, technical biotic and non biotic components as an intrinsic part of a more holistic and eco-systemic vision of territorial development and the city.

Currently, the most relevant studies and proposals about Lima are concentrated on infrastructure, equipment and services that make its correct functioning feasible. Other components are considered as external to the city until some event highlights its high level of dependence on the environmental conditions of the territory, its ecological structure, its biodiversity, and the environmental services that natural resources such as water provide to the city. At the same time, vulnerability to climate change effects, albeit uncertain, appear to be increasing risks constantly.

Lima seems to be on its way of becoming a mega city that is developing beyond its political/administrative limits and occupying other regions such as Callao and "Lima Provincias". In respect to water, Lima depends on the basins from the high Andean zone (High Mantaro and more recently from the high basin of Chancay Huaral) in order to guarantee water sources. This has generated negative environmental impacts in the territory and water of the population on higher basins and in the proper metropolitan territory; implies for the authorities to rethink on the role that until now the metropolitan area has had in relation to the basins and the occupied (and expansion) territory. Fragmentation in the treatment of urban and rural territories; of high, medium and low basins and the treatment of density (being construction and population density) of the occupied (and future) urban territory; evidences a demand for a more integrative territorial planning process more related with the multiple scales, levels and great physical, environmental and social diversity of the metropolitan city. A territorial planning process more related to the complexity that the metropolitan city has and will have is needed, albeit it is jeopardized by the 2050 climate change scenarios.

Regional Community... An Option?

Urban development visions promoted by private real estate agents imply the expansion to other regions on the South of Lima to the point of reaching the Ica neighboring region. In respect to hydryc resources, future water feasibility for Lima involves the Junín and Pasco regions to the east. In order to reach this, it is very important to analyze experiences on the formation of regional communities for solving common problems and canalizing large infrastructure investments. For this case, the formation of city networks articulated to basins with a territorial and urban development model, integrative and eco-systemic; can be an alternative that permits governability and sustainability in the territory within the city, but also in the surrounding nature and landscape.

The present study on Metropolitan Lima, 8 months after the new Metropolitan Lima administration took power, raises a current public management dilemma in which important things are contra posed to urgent things. It means that the necessity to build planning instruments might be displaced in front of demands for politically visible and concrete results. That is why the new administration has opened participation to actors involved in development and planning, which reveals willingness to "concertate" with other levels of government related to water management, among others. This represents a favorable context for the development of the research process of our project. This process is promoted by the municipality from IMP; and the Environmental office of the Regional Government of Lima (also part of the Metropolitan City Government) has shown special interest on the development of a Climate Change Adaptation Strategy with the intention to integrate it into participation and concertation processes for metropolitan

11 For the Peruvian case, this has been considered in the 54th article of the Peruvian Constitution.

development planning to 2035 and 2050. The FCPV is related to this process in the context of the research projects LiWa and Chance2Sustain.

All these tasks demand shared and concertative leadership from the political, social, economic and scientific point of view; that permits the integration of policies and strategies for harmonizing territorial management (including urban and rural land as well as the landscape) with water vulnerabilities of cities facing 2050 climate change scenarios.

As a first exercise for the debate, the following two descriptions of the possible scenarios of water governance for Lima in the framework of the LiWa project have been elaborated during expert's workshops:

Adaptation Scenario

- Water management in the territory of the Lima Metropolitan Region, Callao and its valleys involves the basins of Huacho, Chillón, Rímac, Lurín, Chilca, Mala, Cañete and Mantaro. It is lead by three regional governments: "Lima Provincias", Lima and Callao[12] in association with SEDAPAL, EMAPA HUACHO S.A.[13] and EMAPA CAÑETE S.A.[14] , all of them municipal enterprises. They constitute a regional community that counts with technical and policy support from the Sanitation Deputy Ministry (as a part of the Ministry of Territorial Arrangement, Cities, Construction and Sanitation) that leads the Water Multisectoral Technical Group for Lima and Callao. This group is also integrated by MINAM[15] (that includes ANA[16], DIGESA[17] and requires for approbation of sectoral EIAs[18]), MINEM[19], MEF[20] and SUNASS[21].
- The Regional Water Community for Lima, Callao and their Valleys is democratic, concertative and binding. It admits participation from civil society, experts, private sector as well as the academic and scientific community; and maintains permanent contact with the involved communities at the low, medium and high basins, through Water Local Authorities.

"Business as usual" Scenario

- Water management in the territory of the Lima and Callao Metropolitan region (already expanded and conurbated by 2035) that involves the rivers Huacho, Chillón, Rímac, Lurín, Chilca, Mala and Cañete lacks of clear leaderships. It still maintains overlapping competences and legal mandates from the national government. Water companies as SEDAPAL and EMAPA CAÑETE S.A. have developed private concessions for attending expansion areas and have been partially sold. The Sanitation Deputy Ministry coordinates basin by basin activities with MINAG[22]/ANA, MINAM, MINSA/DIGESA, MINEM and MEF through Local Water Authorities.
- Although this basin authority has developed a basin management focus, it maintains a sectoral vision which is little concertative and does not permanently admit participation from the civil society, experts or the scientific and academic

12 The Junín regional government can be also considered.
13 Municipal Company of Potable Water and Sewer of Cañete www.emapac.com
14 Municipal Company of Potable Water and Sewer of Huacho www.emapahuacho.com
15 Ministry of Environment of Peru www.minam.gob.pe
16 National Water Authority of Peru www.ana.gob.pe
17 General Direction of Environmental Health of the Health Ministry of Peru www.digesa.minsa.gob.pe
18 Environmental Impact Evaluation
19 Ministry of Energy and Mines of Peru www.minem.gob.pe
20 Ministry of Economy and Finance of Peru www.mef.gob.pe
21 National Superintendence of Water and Sanitation Services of Peru www.sunass.gob.pe
22 Ministry of Agriculture of Peru. www.minag.gob.pe

community. The lack of transparency and relationship with the involved communities at the low, medium and high basin constantly generates conflicts with irrigating farmers and other economic activities around water and the city.

Scenarios Related to Climate Change in Lima

Vulnerability of cities in front of Climate Change and especially of coastal cities is related to water availability. For the case of Metropolitan Lima it is also necessary to consider hydro-energetic dependence, the high level of urban poverty, the high vulnerability in front of natural risks and the serious difficulties for the provision of water suitable for human consumption to constantly growing population. The importance of water governance in the city becomes very relevant considering the uncertainty of climate change effects that makes the authorities to interest on the possible effects that the city will face.

According to Eduardo Calvo, the only Peruvian member of the IPCC[23], there have been identified two extreme, but possible, scenarios of extreme climate variation related to water in the city of Lima: tropicalization and drought. This is corroborated by the studies made by IWS[24]. The results of four of five hydrologic models indicate a reduction –of approximately 10%– of water sources, while the fifth model evidences an increase on a similar level. According to the first scenario Lima would face drought to extreme drought, where the current problem of water scarcity would be aggravated. This, together with the current deficit of the provision of water and sanitation services, would aggravate the sanitation vulnerability situation. According to the second scenario we would face a significant rain increase in a city like Lima that does not count with a rain drainage system, with flat rooftops and deficient housing infrastructure located on alluvial hills or very close to the sea level. Within this uncertain situation it is important to identify key issues of water vulnerability in Lima in order to know the measures for diminishing risk.

Towards Metropolitan Lima's Water, Territory and Landscape Governability

How to speak about city governance without incorporating actors, institutions and persons related to the management of water, hydro-energy, landscape, territory and vulnerability of the city? Limited information –which whether does not exist or it is not accessible because of its complexity– requires to think about methodologies that permit to capture focuses from all involved disciplines and above all, inclusive spatial knowledge construction; in other words, social construction of knowledge, not only based on experts participation. That is why we consider for this research that one of the most important aspects in the process of plausible/possible scenario construction is the participation of key actors: a) those ones that suffer –or will suffer the most and are conscious of that problem b) those ones who have economic means and political decision to solve them, c) those ones that cause them –or will cause them and are currently conscious of that– and d) those ones that count with information and knowledge to solve them. All of them related with city, water and the involved territory.

These are the considerations taking into account for the elaboration of the inclusive scenario methodology presented by the "Foro Ciudades para la Vida" crew. It additionally considers the participatory use of GIS tools, applying specialized programs of scenario visualization for the city through maps and 3D simulations. All of this aims to collaborate to the process of planning city development to 2035 and 2050, initiated by IMP, SERPAR[25] and the Metropolitan Municipality of Lima.

23 Intergovernmental Panel on Climate Change www.ipccc.ch

24 Water Institute of the Stuttgart University. Msc. Ing. Alejandro Chamorro, lecturer on the workshop "Towards a climate change adaptation strategy for Lima", March 2011.

25 Lima Municipal Parks Services www.serpar.munlima.gob.pe

We consider that one way of contributing from academic research to city governance, is through promoting the generation of platforms for concertation of the diverse focuses of political, social, economic and environmental actors; and providing instruments and specialized information about water vulnerability scenarios facing climate change. As it has been told the new Metropolitan Lima Administration has previewed the elaboration of a Management Plan for the development of the city, an Environmental Plan and the Climate Change Strategy. Also a Municipal Environmental Commission and a Technical Group on Climate Change have been installed. The FCPV is part of these spaces.

In this context, the following policy recommendations have been preliminarily formulated and they are open for the ongoing debate:

Instruments

- The analysis and intervention ambit must reach all the Metropolitan Lima territory, the basins that contain it and its respective influence area. This can be articulated on a Regional Community that requires a territorial planning of Lima, articulating the different aspects in order to reach harmonic development of the city and its territory.
- To define and approve the assignation of surplus value duties for land use changes, public infrastructure investment and valorization of the urban territory (through an Ordinance and a proposal for the modification of the national legislation).
- To incorporate among the measures and recommendations for climate change adaptation:
  - Mechanisms and practices oriented to reduce water consumption, recycling and reusing it in green areas among others (incorporated as part of a process of urbanization and construction).
  - Norms for technical design of public and private infrastructure must incorporate criteria for the adequate disposition of water in front of rain increase and water saving and storage in front of drought.
  - Compulsory norms of natural climate conditioning for buildings in front of temperature, humidity and solar radiation variations, among others.
  - The prohibition of sanitary devices that use more than 6 liters of water.
  - The use of saving mechanisms in public institutions and massive use facilities.
  - Urban development must occur as a function of water capacities of the territory.
  - The revalorization of ancestral costumes for the care, improvement and maintenance of water and water harvesting.

Focuses

- To define a land policy that understands land as a non-renewable social, economic and environmental good. The right to use and occupying land should be exercise by prioritizing the commonweal in against particular interests.
- Land and water management must be closely related in order to determine the limits of urban development; based on the availability and feasibility of hydryc resources, controlling urban speculation and protecting valleys and water sources.
- To condition the use of the territory according to territorial risk issues.
- To keep superficial and subterranean water sources in order to guarantee the hydryc balance of the basins
  - Compulsory reuse of water for industrial activities
  - Compulsory use of trickle irrigation for agriculture and green areas.

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Chance2Sustain examines how governments and citizens in cities with differing patterns of economic growth and socio-spatial inequality 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), Centre National de la Recherche Scientifique (CNRS, France), Centro Brasileiro de Análise e Planejamento (CEBRAP, Brazil), Cities for Life Forum (FORO, Peru), Norwegian Institute for Urban and Regional Research (NIBR, Norway), School of Planning and Architecture (SPA, India), University of KwaZulu-Natal (UKZN, South Africa)

SEVENTH FRAMEWORK PROGRAMME
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- Use of systems for alternative capitation and efficient use of rain and fog water.

- Forestation of risk areas and water capturing by using native and low water consumption species (prohibiting eucalyptus because of its high water consumption).
- Conservation of natural areas in the city: "The Costa Verde", valleys, wetlands, "lomas", among others.

Institutionality

- Progressive transference of the property of SEDAPAL to the regional community in the context of a concertation platform for water governance in Metropolitan Lima. Ministries of Housing and Environment, the ANA and DIGESA should participate. "Produce" and MINEM should also participate as minor shareholders.
- To recover and institutionalize a single authority for urban and environmental management of the city, concentrating main functions and competences at the metropolitan government level municipal community. It should integrate land management (titling, use and parameters), water management (use, treatment and reuse), risk management (hydro-meteorological), green urban areas as well as landscape and public space management.
  - The agency for the formalization of informal land property, COFOPRI, must be deconcentrated to the municipal level.
- Assignation of land use will go along with interventions oriented to prevent risk. Land use must be directly conditioned by risk maps.