



## Proceedings of the Resilient Cities 2014 congress

### Session: B1 – Making climate compatible development pay for local communities

#### Carbon and Water Footprinting in three Andean cities

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#### Abstract:

Latin America is the world's region with the highest urbanization rate, and the Andean cities of La Paz-Bolivia, Quito-Ecuador and Lima-Peru, are considered to be vulnerable to climate change, partly as provision of water for different uses is dependent upon services provided by tropical glaciers. Although not key players in the global greenhouse gas emissions scenario, these three cities also have opportunities to promote low-carbon development and have shown clear leadership and commitment towards this goal. In response to requests from the three Mayors, the Carbon and Water Footprints of both the municipal governments (as organizations) and the cities (as territories) have been assessed under the CDKN-sponsored project "Carbon and Water Footprinting in three Andean Cities: La Paz, Quito, Lima". Based on the results of the footprint assessment, the critical contributors to the footprints have been identified and actions already planned and undertaken to reduce their negative impact. Also, a city Action Plan for reducing both footprints has been produced in collaboration with the municipal governments, which includes a project portfolio, city footprint reduction targets, sources of financing, technology suppliers and a cost-effectiveness analysis for the proposed measures, as well as recommendations about institutional design. Ultimately, the project has generated positive impacts, such as increased awareness of the need for climate compatible development in urban areas, changes in the discourse of the Mayors and high-level city officials, and inclusion of footprint reduction measures in the cities' agendas and budgets.

#### Keywords:

Carbon, Water, Footprints, cities

Under the Cities Footprint project, co-sponsored by CDKN<sup>1</sup> and CAF<sup>2</sup>, facilitated by Fundación Futuro Latinoamericano<sup>3</sup>, and implemented by Servicios Ambientales S.A.<sup>4</sup>, the Carbon and Water Footprints of the cities of La Paz, Quito and Lima were assessed using internationally-recognized methodologies (GPC<sup>5</sup> and the Water Footprint Assessment Manual<sup>6</sup>), with the technical support of Carbonfeel<sup>7</sup> and the Water Footprint Network<sup>8</sup>. Regarding the Water Footprint, this was the first effort globally for measuring the Water Footprint of a city (products, countries and even continents' footprints have been assessed previously). It also was the first time that a GHG inventory study was conducted for La Paz and Lima, and the first with this methodology for Quito, allowing for comparisons with the previous methodology.



For the Carbon Footprint, the transport sector is the main contributor across the 3 cities, representing 49% of the total in La Paz, 56% in Quito and 36% in Lima, and among the main sources of emissions are gasoline and diesel. These results emphasize the need for a low-carbon transport sector. Regarding the Water Footprint, the main contributor in all cities is the residential sector - 85% in La Paz and Quito, and

<sup>1</sup> Climate and Development Knowledge Network: [www.cdkn.org](http://www.cdkn.org)

<sup>2</sup> Latin American Development Bank: [www.caf.com](http://www.caf.com)

<sup>3</sup> [www.ffla.org](http://www.ffla.org)

<sup>4</sup> [www.sasa-bolivia.com](http://www.sasa-bolivia.com)

<sup>5</sup> ICLEI's Global Protocol for community-scale greenhouse gas emissions.

<sup>6</sup> By the Water Footprint Network.

<sup>7</sup> Spanish network of organizations related with Carbon Footprint assessments

<sup>8</sup> Creators of the concept of the Water Footprint

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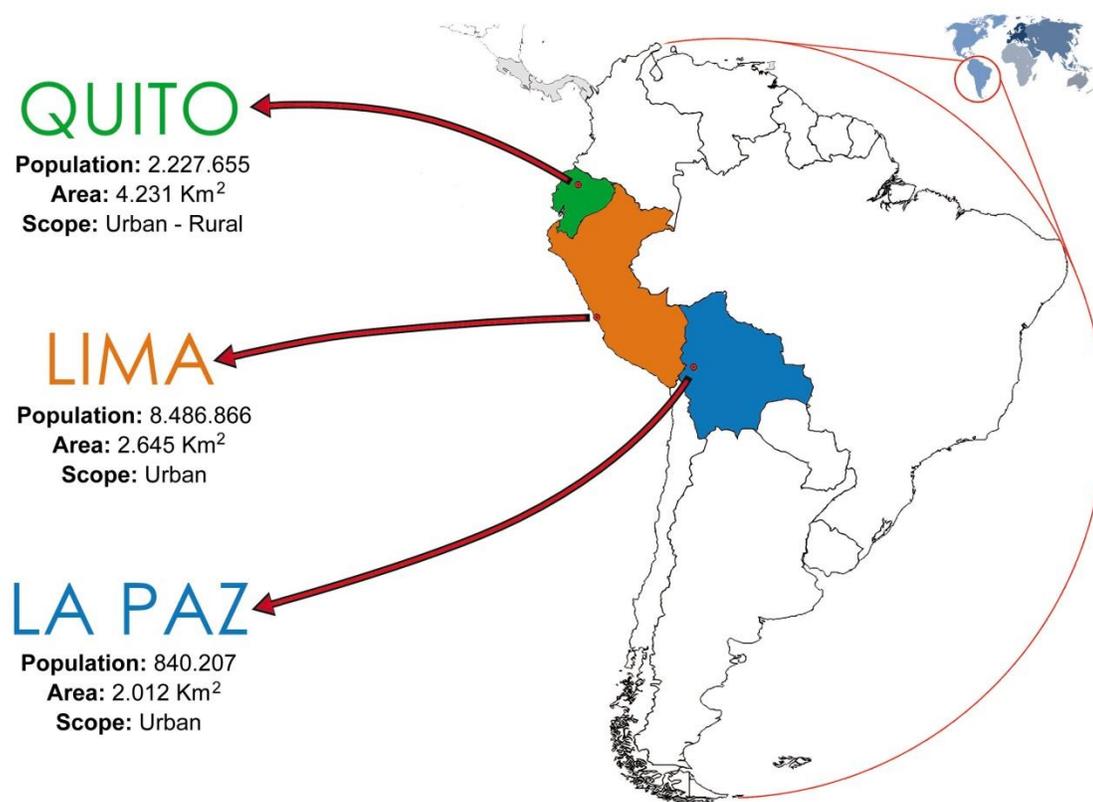
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95% in Lima. The gray water footprint of the residential sector represents by itself about 80-90% of the total Water Footprint. Thus, measures to reduce water pollution from the residential sector should be prioritized.

The assessment of the Carbon Footprint allows the cities to comply with international commitments, such as reporting its GHG inventory to the carbonn Cities Climate Registry, under the Mexico City Pact. It has also catalyzed the participation of La Paz and Lima in a group of 35 cities from around the world, in a pilot project to test the GPC v1.0, led by ICLEI – Local Governments for Sustainability, World Resources Institute and C40 – Climate Leadership Group. This translates into an increased international visibility and recognition about a proactive attitude towards climate change issues.



The Carbon and Water Footprints of the municipal governments were also assessed using internationally-recognized methodologies<sup>9</sup>.

<sup>9</sup> For Carbon Footprint: ISO 14064:2006 “Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals” and Compound Method based on financial accounts by Carbonfeel. For Water Footprint: Water Footprint Assessment Manual

The effect of the Carbon and Water Footprint assessment process was the identification of critical points within the municipal governments, linked to the definition of preliminary footprint reduction measures. For instance, in terms of the Carbon Footprint, in La Paz two municipal buildings were identified as the main consumers of gasoline and electricity. The correspondent measures proposed were converting vehicles that run on gasoline to vehicular natural gas<sup>10</sup>, efficient lighting, and maintaining a registry for electricity consumption. In terms of the Water Footprint, the municipal slaughterhouse was identified as the main contributor, with 80% of the total, which led to increased awareness of the problem and subsequently, provisioning the design of a wastewater treatment plant in the 2014 municipal budget.

In terms of sustainability of the results, the municipal government staff was actively engaged during the footprints assessment process, which was part of a learning process. The tools developed for the assessment of the footprints in each city have been transferred to the correspondent municipal government staff, via a capacity building event with the attendance of 20-30 staff members from relevant units (environment, statistics, and administration, among others). The official designation of a person as responsible for the assessment of the footprints is a clear sign of the importance that was given to the continuity of the assessment in future years.

## **Challenges to project implementation – and enabling factors**

Three main challenges were identified during the implementation of the project in the three cities.

**Data availability.** The footprints assessment process is very data-intensive, which requires the assignment of sufficient time and resources. Data is often difficult to access, incomplete or simply inexistent. It is necessary to schedule multiple visits to relevant stakeholders, such as basic services and regulation entities, municipal units, industry and commerce chambers, the National Statistics Institute, to name some. In order to cover the resource needs to complete the data collection task, it is advisable to have a local focal point who can present the project to stakeholders in order to generate their buy-in, clearly exposing how participating in such a process can be beneficial for them (e.g. Social Responsibility may be appealing for private entities), follow-up, and thus increase chances to obtain required data.

**Prioritization of project by key stakeholders.** Some of the identified stakeholders may be reluctant to share information that might be sensitive (e.g. losses in distribution for the water services company), or may simply not be compelled to be actively engaged. The selection of project partners is a critical task during the project implementation phase, since, usually, their institutional relations may help establish a

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<sup>10</sup> The conversion is free as it is subsidized by the national government of Bolivia.

working relationship of other key players with the project. The main project partner and champion was the municipal government, which played an articulation role with relevant stakeholders, either for data collection or for convening meetings for participatory prioritization of footprint reduction measures.

**Political environment.** In the case of the 3 cities, 2014 is an election year, which leads to a highly politicized environment. This may result in a risk of not having the total buy-in of the municipal government as a project partner, since the political agenda can be prioritized over the environmental agenda. However, this situation can also be understood as an opportunity: the Mayor is looking to be re-elected, and visible results need to be delivered. As another objective of the Cities Footprint project is related to implementing footprint-reduction pilot projects, there is a coincidence in interests that helps propel these projects. In this framework, as examples from La Paz, two pilot projects have been prioritized and are underway:

- Integrated energy production and wastewater reuse system in the municipal zoo. With about 5,000 visitors per week, a large portion being school students and teachers, and a relatively large contribution to the municipal government's footprints, the municipal zoo was the ideal site to install a system that uses animal dung and wastewater to produce thermal energy and liquid fertilizer. The latter is used for organic production of vegetables for animal feed, which are actually cooked with the thermal energy produced, forming a closed loop that reduces the footprints and hopefully conveys a message about CCD to visitors.
- Solid waste management and family agriculture in periurban neighbourhoods project. In collaboration with the flagship "Real Neighbourhoods" municipal programme and the neighbours of Kenanipata, a 100-family neighbourhood, a greenhouse is being built for local production of vegetables. A group of women will be in charge of organizing a solid waste management system, collecting organic waste for composting and posterior use for food production in the greenhouse. Training events will be held by other municipal units – thus generating internal synergies. The Carbon Footprint is reduced, food security enhanced, diminishing the potential fluctuations of food prices due to extreme climate events, that usually affect transport of food to the city. The replication potential is large, as there exist 100 more similar neighbourhoods within the programme.

## **Implications of experience for decision-makers and practitioners elsewhere**

The project needs to arise from a local demand and to be framed within institutional strategies (development and environmental policies, plans, programmes and projects), as this is a guarantee of commitment of time and resources. The leadership of the municipal government is instrumental during all

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stages of the project. It is also important to frame the project within international commitments, city networks and initiatives. A benefit of the assessment of the first GHG inventory in La Paz and Lima is that they are now able to report it under the Mexico City Pact, while having participated in a GHG Protocol global pilot project of city Carbon Footprints. It also brings them closer to other global initiatives.

The buy-in of local stakeholders is crucial during all stages of the project, especially implementation. Local municipal government officials, from high-level decision makers to technicians and administrative staff, need to be convinced that the project supports the achievement of municipal goals, helping operationalize current policies and plans, not only regarding climate change but development overall. The same applies for sectorial stakeholders, who need to understand the benefits of becoming engaged. Only this way can a real governance framework for city-wide footprint reduction efforts be achieved.

A critical factor for sustainability of results is capacity building of municipal government staff and institutionalization of the process. Middle-management and technical-level staff must be involved during the footprint assessment process, promoting learning-by-doing. In order to reinforce learning, footprint assessment workshops have proven to be useful. To avoid the risk of discontinuity due to high personnel rotation in the institution, the footprint assessment process needs to be institutionalized, mainly by including it in the operations and functions manuals and procedures of local governments. A local focal point that works with the municipality and reports to the project plays a key pivotal role.

The identification of “critical points” as a result of the footprint assessment process allows for local policy makers to take informed decisions in order to reduce the CF and WF of both the municipal government and the city. As a result of increased awareness of the problem, the municipal government included wastewater treatment items in its 2014 budget. A positive change in discourse could also be evidenced when the Mayor of La Paz presented the “10 commitments of the municipal government to reduce its Carbon and Water Footprints” in a [public event held at the municipal palace in August, 2013](#).

## **Acknowledgements:**

The Cities Footprint projects wishes to acknowledge the kind collaboration of CDKN and CAF in sponsoring the Cities Footprint Project, as well as that from CDKN-ICLEI Subnational Learning Programme, both of which allowed the presentation of some project results during the Resilient Cities conference 2014.

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