

# THE CHALLENGE OF CLIMATE CHANGE IN LATIN AMERICA

In an overview of various mitigation and adaptation policies, **Patricia Romero Lankao** summarises why Latin American cities should care about climate change.

Just as Latin American urban centres have registered levels and paths of development different from those prevailing in high-income nations, so too do their trajectories of emissions differ. Carbon emissions per capita in urban areas such as Austin and the District of Columbia are 6 to 20 times higher than those in São Paulo, Rio de Janeiro and Mexico City. This might lead many to the conclusion that Latin American cities should not care about climate change, especially when they are faced with under-employment, housing backlogs and other more pressing development concerns; when considering the wealthiest nations emit most greenhouse gases it is the high-consumption lifestyles of the wealthy that drive climate change and must, hence, take urgent actions to curb their emissions and avoid catastrophic and irreversible damages. However, there are two sets of reasons here why urban centres in the region must pay attention to this burgeoning global phenomenon: first, our cities are especially vulnerable to the impacts of climate change, and are faced with the health impacts of atmospheric pollution; second, cities can also play a pivotal role in our efforts both to cope with or adapt to heat waves, floods and other climate hazards, and to reduce or mitigate the emissions of greenhouse gasses and other atmospheric pollutants.

The incidence of weather-related disasters in cities has increased more than twofold between 1970 and 2005. These included not only increasingly destructive hurricanes such as Mitch (1998) and Wilma (2005), and two intense episodes of El Niño, which, together with land use changes, resulted in floods, droughts, landslides and other disasters killing people and impacting the population, infrastructure and economic activities of many urban areas.

The disruption of our climate system will add to the risks and stresses that Latin American cities, where 77 per cent of the population is located, are already facing. For example, urban dwellers in Low Elevation Coastal Zones will be exposed to storm flooding and damage, coastal erosion, and increased salinity of aquifers. Urban centres in Northern Chile, the Brazilian North-East and Northern Mexico and other arid and semi-arid regions will face particular problems of water shortages. Many water basins

will get less precipitation, which will reduce the availability of fresh water. This will be especially hard for growing cities and large cities that already face serious problems in their fresh water supplies – e.g. urban centres along the US/Mexican border. As illustrated by the December 1999 flash floods and landslides in Caracas, which killed nearly 30,000, or the floods resulting from hurricane Stan in 2005 (more than 1,500 deaths), higher than average and more extreme rainfall events associated with climate change will be related to flood hazards, increased landslides and mudflows. A range of health-related risks is expected to arise from climate change. Extreme temperatures will coalesce with air pollution and the heat island effect to create heat and respiratory distress. Water- and vector-borne diseases will result from changes in temperature, precipitation, and/or humidity. Less direct risks are also expected, such as negatively affected livelihoods, food supplies or access to water and other natural resources.

Adaptive capacity, i.e. the ability of cities, their population and economic activities to reduce climate stresses or cope with their consequences, is as key a determinant of climate impacts as is exposure. Latin American cities have been struggling with – or even lacking – many of the determinants of adaptive capacity. During the 1990s, 48 per cent of urban workers were employed in the informal sector, thus lacking access to adequate and stable income sources. In the context of the state reform of the last 25 years, public provision of transport, healthcare, and water and sanitation services was practically abandoned by the state, or ‘decentralised’ to the private sector and local authorities. All this has negatively affected the key determinants of adaptive capacity such as stable and sufficient incomes, access to water, electricity, food, healthcare, education and other services and infrastructures.

Many cities have no all-weather roads. The proportion of urban dwellers without piped water supplies ranges between 1.2 per cent in Chile and 42 per cent in El Salvador, while the percentage without drains ranges between 13 per cent in Chile and 77 per cent in Paraguay. About 37 per cent of the housing stock in the region is inappropriate to offer protection against disaster and diseases. Many homes are situated on illegally occupied or subdivided land, which

inhibits any investment in more resilient buildings. Large sections of the low-income population live on risk-prone areas and dangerous sites – e.g. floodplains – because these are the only sites for them to occupy that are within reach of income-earning opportunities. Thus, it is difficult to talk about adapting infrastructure and buildings that are not there. It is more adequate to refer to adaptation deficits and even to the lack of adaptive capacity.

Latin America has a long history of adapting to the impacts of stresses related to climate variability, including extreme weather events. Some are autonomous adaptations that occur without any specific planning. In Costa Rica and Ecuador for instance, communities have improved their housing design with elevated or reinforced concrete strips as foundations, and bamboo walls that are not touching the ground to better cope with floods and droughts. Low-income households in for instance El Salvador invest an average nine per cent of their incomes in risk-reduction actions – e.g. diversifying their livelihoods, getting assets that could easily be sold if a disaster occurred. The individualistic nature of households’ investments, the lack of representative community organisations through which to design and implement settlement-wide measures, and the lack of support from government agencies limits their effect.

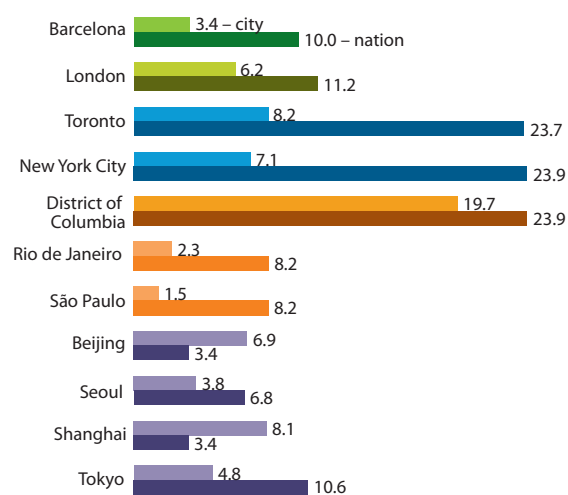
There are good examples of city governments, such as in Manizales in Colombia and Ilo in Peru, that are taking steps together with NGOs, communities and other local actors to promote development, and, in doing so they reduce vulnerability. Governments and involved stakeholders implemented actions to avoid rapidly-growing low-income populations settling on dangerous sites, but also to improve the living standards of the poor and to protect and regenerate fragile ecological areas. They illustrate how pro-development and pro-poor policies can enhance adaptive capacity.

The problem is that most of the policy-driven adaptation practices are disaster responses rather than policies that actively reduce risks and address the factors that make poorer groups vulnerable. The poor quality of infrastructure and the lack of maintenance are key determinants of dams failing, public hospitals and schools and bridges and motorways collapsing as a result of weather-related disasters. Only 150,000 houses out of 16 million (i.e. less than 1 per cent) had disaster insurance coverage in Mexico in 1998. The rate of insurance coverage for the Venezuela floods of 1999 only accounted for 1.4 per cent of total losses. As highlighted by events such as Hurricane Stan that hit Mexico and Guatemala in 2005, individuals bear most of the cost and manage it through the solidarity of family and other networks, if at all. The lack of transparency in public works procurement frequently leads to corruption and



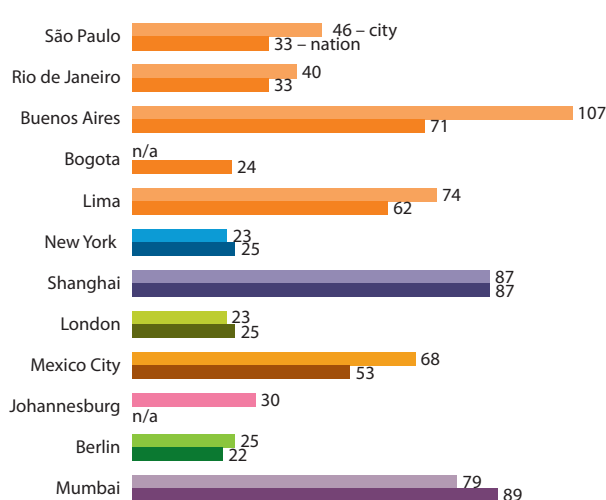
Air pollution levels in São Paulo are twice as high as those of New York City and London even though Paulistanos have relatively low carbon emissions per capita compared globally.

## CARBON EMISSIONS PER CAPITA



David Dodman, *Environment and Urbanization*, Vol. 21, No 1, forthcoming.

## AIR POLLUTION (PM10)



poor quality infrastructure and buildings. Many urban governments also have antagonistic relationships with low-income groups. Decentralisation should have helped address these issues. However, in many cases decentralisation of responsibilities to urban authorities has not been accompanied by increased revenues or revenue-raising capacity. In most cases, the reform of the state during the 1990s weakened many of the mechanisms that support adaptive capacity as the state withdrew itself from public transport, health care and public works.

Although Latin American cities are not big emitters, they need to pay attention to actions aimed at reducing their emissions. First, wealthy cities such as Tokyo and Barcelona have pretty low levels of emissions per capita. Latin American cities need to address some of the factors that are jeopardising cities' capacity to promote sustainable patterns of urbanisation, namely: urban sprawl, associated increased commuting distance and increasing use of low-capacity modes of transport.

Buenos Aires, Santiago and Mexico City for instance, experienced during the last two decades a region-based or polycentric urban expansion of first and second-order urban localities sprawling along major motorways and functionally linked to the main city. This pathway of urbanisation is associated to relevant consequences for both GHG and other atmospheric emissions. As illustrated by Mexico City, passengers' commuting distance and travel times increased from 3.5 km/h and 16.8 km/h by bus in 1987 to 5.6 km and 16.7 km/h in 2000. The same may be the case with freight transport. More sprawled patterns of urban growth are related to variations in car use, petrol consumption, and by this, to more emissions.

Second, there are very large differentials within urban centres. Equity and affluence in other words are other key dimensions of the carbon footprints by Latin American cities. The transport sector of Mexico City, which accounts for the highest share (34.7 per cent) of CO<sub>2</sub> equivalent emissions, can also illustrate the weight of equity. Private

## FROM WASTE TO PUBLIC SPACE

**Stela Goldenstein** describes how solid waste management in São Paulo is reducing the city's carbon emissions and allowing for investments in public space.

City governments are institutions with great potential for reducing carbon emissions, and recent innovations in treating solid waste in São Paulo provides an instructive example. The city has reduced methane emissions through intervention in the disposal of urban solid waste, mainly domestic rubbish. Unlike the irregular and extremely large outdoor *lixões*, domestic waste in São Paulo is collected in landfills in environmentally protected areas which avoid human contamination or damage to the soil and ground water tables. The city operates two such solid waste landfills: Bandeirantes in the north-western part of the city, and São João in the South-East. Each receives around 7,000 tons of domestic solid waste daily, in addition to the sludge generated through sewage from the state water company.

Slow decomposition of organic matter present in the solid waste produces a biogas, rich in methane, which permeates the layers of material covering the landfills and is released into the atmosphere, thus contributing to the greenhouse effect. Here, a system for collecting, filtering, pressuring, and burning the gas in thermal electric plants prevents it from being released into the atmosphere. In addition, 80 per cent of the collected biogas is used to generate electrical power at electric plants located on site. By the end of 2008, seven per cent of households in São Paulo will be supplied by energy thus generated. The result is a twofold environmental gain: in addition to reducing the amount of methane released into the atmosphere, the need for new sources of energy is reduced.

The Kyoto Protocol, which requires industrialised countries to meet targets for reduced emissions of greenhouse gases either within their own territory or through investment in developing countries, made this project possible. The United Nations Clean Development Mechanism, which granted São Paulo the carbon credits to sell to companies and institutions in countries seeking emission control targets, has in effect helped to fund

environmental controls already in place in São Paulo.

Today, the project's biogas control certification is equivalent to controls of 3,106,211 tons of carbon, a sum close to the total carbon credits generated by all the other certified projects in Brazil combined. With the highest landfill control certification in the world (1,150,144 tons), the Bandeirantes landfill generates the highest benefit percentage for the State of São Paulo: half the credits are sold at public international auctions to ensure transparency and the highest price for the city. Recently, purchase of São Paulo's Certificates of Emission Reduction (CER) generated almost € 28 million for the city.

These proceeds are then invested in urban and environmental improvements to the areas surrounding the landfills – areas where their impact is directly experienced. The neighbourhoods of Perus and Pirituba in the North-West, and São Mateus and Sapopemba in the South-East, are receiving parks, public squares and other measures to control erosion and to improve access to quality space for the low-rent population living there. Public hearings organised by the municipal government allow for the direct participation of residents in the vetting of how and where to invest financial resources obtained from the sale of the CER.

Additional credits and future auctions are expected to produce further social and physical improvements to the urban landscape, proving that the landfills are assets to be maintained, valued and utilised throughout their life span. This project is thus proving to be a safer and more economical solution than incineration plants. Even so, São Paulo will need to work with other *prefeituras* in the metropolitan area to implement and share new landfills at even more distant sites.

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cars only contribute 16 per cent of the city's daily journeys segments. Still, they account for 40.8 per cent of CO<sub>2</sub> equivalent emissions, while public transport accounts for 82 per cent of those journey segments, yet emits 25.9 per cent of CO<sub>2</sub> equivalent emissions. Therefore, a key determinant of greenhouse gas and other atmospheric emissions is the consumption patterns of middle- and high-income sectors together with the production systems that benefit from that consumption.

Third, policy making in Mexico City and other Latin American cities involved in the International Council for Local Environmental Initiatives (ICLEI) campaign and other climate initiatives illustrates the role that urban authorities can play in reducing emissions. They show that policies addressing other problems, such as air pollution and energy, can often be adapted at low or no cost to reduce greenhouse gas emissions and simultaneously improve the health of the population. The burning of fossil fuels is linked to climate change, energy security and air pollution. Thus reductions in the amount of fuel combusted will result in lower greenhouse gas emissions, lower energy costs and lower health and environmental impacts from reduced emissions of air pollutants and their precursors. However, attention needs to be given not only to the synergies, but also to the conflicts between these three policy domains. For instance, standards to improve the fuel efficiency of

vehicles can reduce both local pollution and CO<sub>2</sub> emissions per vehicle-km. Yet, they can result in increased emissions if vehicles' travel distances increase, or drivers switch to vehicles with larger engines.

To summarise, there are many reasons why Latin American cities need to address their many linkages with climate change: they concentrate industries, transport, households and many of the emitters of greenhouse gases and other atmospheric pollutants. They are affected by hurricanes, storms, water shortages and other hazards that climate change is expected to aggravate. Furthermore, without climate change they already face adaptation deficits. Therefore, actions need to be taken to address those and, by doing so, to enhance the adaptive capacity of urban populations, economic activities and infrastructures. Latin American cities are sources of initiatives, policies and actions aimed at reducing or mitigating emissions and coping with or adapting to climate change. However, those measures are still tiny, ineffective and not targeting climate change.

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