



## CITIES AND CLIMATE CHANGE

By David Satterwaite

*A provocative reassessment of cities' contribution to global greenhouse gases by David Satterwaite underscores the importance for local governments to foster environmental and social innovation.*

Cities are often blamed for contributing disproportionately to global climate change. For instance, many sources including United Nations agencies and the Clinton Climate Initiative, state that cities account for 75 to 80 per cent of all greenhouse gases from human activities. But the actual figure seems to be around 40 per cent. Of the 60 per cent of emissions generated outside of cities, a large part comes from agriculture and deforestation, with much of the rest coming from heavy industry, fossil-fuelled power stations and wealthy high-consumption people who live in rural areas or urban centres too small to be classified as cities.

In fact, many cities combine a good quality of life with relatively low levels of greenhouse gas emissions per person. There is no inherent conflict between an increasingly urbanised world and reduced global greenhouse gas emissions. Focusing on cities as 'the problem' often means that too much attention is paid to climate change mitigation (the reduction of greenhouse gas emissions), especially in low-income nations, and not enough on adaptation (minimising climate change's damaging impacts). Certainly, the planning, management and governance of cities should have a central role in reducing greenhouse gas emissions worldwide. But this should also have a central role in protecting populations from floods, storms, heat waves and other impacts that climate change will bring to many cities and this is an area that receives far too little attention.

The main source of greenhouse gas emissions in cities is energy use – in industrial production, transport and residential, commercial and government buildings (heating or cooling, lighting and appliances). Greenhouse gas emission inventories for cities show more than a

tenfold difference in average per capita emissions between cities, with São Paulo having 1.5 tonnes of CO<sub>2</sub> equivalent per person compared to 19.7 for Washington DC. The figure for Mexico City is 2.6 tonnes per person. If figures were available for more cities in low-income nations, the differences in per capita emissions between cities could well be more than hundred-fold. In most cities in low-income nations, greenhouse gas emissions per person cannot be high, simply because there is too little use of oil, coal and natural gas and little else to generate the other important greenhouse gases. There is little industry, very low levels of private car use, and limited ownership and use of electrical equipment in homes and businesses.

Transport is an important contributor to greenhouse gas emissions in almost all cities, although its relative contribution varies a lot – for instance from around 11 per cent in Shanghai and Beijing in 1998 (in these cities industry is the largest generator of greenhouse gas emissions) to around 20 per cent for London, New York and Washington DC to 30-35 per cent for Rio de Janeiro, Barcelona and Toronto.

Perhaps it is not cities in general that are the main source of greenhouse gas emissions, but only cities in high-income nations. However, an increasing number of studies of particular cities in Europe and North America show that they have much lower levels of greenhouse gas emissions compared to their national average – for instance New York and London have much lower emissions per person than the average for the USA or the UK. São Paulo and Rio de Janeiro also have much lower emissions per person than the average for Brazil.

Of course, it is not cities (or small urban centres or rural areas) that are responsible for greenhouse gas emissions, but particular activities. An inventory of these activities can allocate these between cities, other urban centres and rural areas but this is not a simple exercise. For instance, the places with large coal-fired power stations would be very high greenhouse gas emitters, although most of the electricity they generate may be used elsewhere. This is why greenhouse gas emission inventories generally assign cities the emissions generated in providing the electricity consumed within their boundaries. This explains why some cities have surprisingly low per capita emissions, because the electricity they import does not come from fossil-fuelled power stations. For South American cities supplied with electricity mostly through hydropower, this would reduce their greenhouse gas emissions per person.

There are other difficulties. For instance, do the emissions from the petrol used by car-driving commuters get attributed to the city where they work, or to the suburb or rural area where they live? Which locations get assigned the carbon emissions from air travel? Total carbon emissions from any city with an international airport are much influenced by whether or not the city is assigned the fuel loaded onto the aircraft – even if most of the fuel is used in the air, outside the city. Total carbon emissions for cities such as São Paulo, Rio de Janeiro or New York are much influenced by whether or not these cities are assigned the fuel loaded onto aircraft at their airports.

A more fundamental question is whether greenhouse gas emissions used in producing goods or services are allocated to production or consumption. If emissions are assigned to the final consumer's home, most emissions from agriculture, deforestation and industry could be assigned to cities where the industrial goods, wood products and food are consumed.

Although where to assign greenhouse gas emissions might seem pedantic, it actually has enormous significance for how responsibilities for reducing greenhouse gas emissions are assigned between nations and within nations between cities and other settlements. If China's manufacturing cities are assigned all the greenhouse gas emissions that go into the goods exported

(including the electricity that helped produce these goods), this would imply a much larger responsibility for these Chinese cities in moderating and eventually reversing such emissions than if these emissions were allocated to the nations or cities where Chinese exports are consumed. As Walker and King note: 'Many of the countries in the western world have dodged their own carbon dioxide emissions by exporting their manufacturing to China. Next time you buy something with "Made in China" stamped on it, ask yourself who was responsible for the emissions that created it.'

Seeing cities as 'the problem' draws attention away from the fact that the driver of most greenhouse gas emissions is the consumption patterns of middle- and upper-income groups in wealthier nations. Using average figures for greenhouse gas emissions per person for cities hide the very large differences in emissions per person between high-income groups and low-income groups. High-income groups in the wealthiest Latin American cities are likely to have greenhouse gas emissions per person far higher than low-income groups. Focusing on cities only as large greenhouse gas emitters ascribes too much importance to energy efficiency within climate change mitigation and adaptation strategies for low-income nations, most of whose cities have very low fossil-fuel use (and thus far less scope for reducing it).

Seeing cities as 'the problem' also misses the extent to which well-planned and governed cities are central to de-linking high living standards from high greenhouse gas emissions. This can be seen in part in the very large differentials between wealthy cities in petrol use per person; most US cities have three to five times the petrol use per person of most European cities, yet, they do not have a better quality of life.

Cities with good public transport systems that have avoided low-density sprawl will generally have much lower levels of greenhouse gas emissions per person than cities that have not. Singapore has one-fifth of the car ownership per person compared to most cities in other high-income nations, yet also a higher income per person. Many of the most desirable (and expensive) residential areas in the world's wealthiest cities have high densities and building forms that can minimise the need for space heating and cooling – much more so than

housing in suburban or rural areas. Most European cities have high-density centres where walking and cycling are preferred by much of the population – especially where good provisions are made for pedestrians and cyclists. High quality public transport can keep down private car ownership and use.

Cities also concentrate so much of what contributes to a very high quality of life but which do not imply high material consumption levels (and thus high greenhouse gas emissions) – theatre, music, the visual arts, dance and the enjoyment of historic buildings and districts.

Cities have also long been places of social, economic and political innovation. This is already evident in relation to global warming; in many high-income nations, city politicians have demonstrated a greater commitment to greenhouse gas emissions reduction than national politicians. This is evident in Latin America too, where much of the environmental and social innovation over the last 20 to 25 years has been driven by mayors. Many cities in Latin America, Africa and Asia have low greenhouse gas emissions per person. Yet they house hundreds of millions of people who are at risk from the increased frequency and/or intensity of floods, storms and heat waves and water supply constraints that climate change is likely to bring. It is generally low-income groups that are most at risk – as they live in informal settlements, often on sites prone to flooding or landslides, lacking the drains and other needed protective infrastructure. Discussions of climate change priorities so often forget this. And these are risks that are not easily addressed, especially by international aid agencies that

show little interest in urban areas and have little capacity to support the kinds of locally-driven pro-poor approaches that are needed.

This text is drawn from David Satterthwaite, 'Cities' contribution to global warming: notes on the allocation of greenhouse gas emissions', in *Environment and Urbanization*, Vol. 20, No. 2, pp 539-549. The main sources for the statistics are: David Dodman, 'Blaming cities for climate change? An analysis of urban greenhouse gas emissions inventories', in *Environment and Urbanization*, Vol. 21, No. 1, forthcoming 2009; Patricia Romero Lankao, 'Are we missing the point? Particularities of urbanization, sustainability and carbon emissions in Latin American cities', in *Environment and Urbanization*, Vol. 19, No. 1, 2007, pp. 157-175; Shobhakar Dhakal, *Urban Energy Use and Greenhouse Gas Emissions in Asian Cities: Policies for a Sustainable Future*, Kitakyushu: Institute for Global Environmental Strategies (IGES), 2004; Peter Newman, 'The environmental impact of cities', *Environment and Urbanization*. Vol. 18, No. 2, pp. 275–296. The quote from Walker and King comes from G. Walker G and D King (2008) *G. Walker G and D. King, The Hot Topic: how to tackle global warming and still keep the lights on*, London: Bloomsbury Publishers, pp. 199-200. For a full list of sources, refer to the longer paper from which this is drawn.

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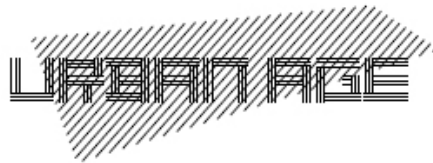
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