

FORUM: DEVELOPMENT

ISSUE: URBANISATION AND POLLUTION IN MEGACITIES

ALEXANDRO C. NELSON

Introduction

“One hundred and fifty years ago, the monster began, this country had become a place of industry. Factories grew on the landscape like weeds. Trees fell, fields were up-ended, rivers blackened. The sky choked on smoke and ash, and the people did, too, spending their days coughing and itching, their eyes turned forever toward the ground. Villages grew into town, towns into cities. And people began to live on the earth rather than within it.”

– Patrick Ness, *A Monster Calls*



- Linfen, China¹

Megacities cover less than 2% of the Earth’s surface and consume more than 75% of its resources. This, along with the uncontrolled expansion, has brought along global challenges that can no longer be neglected. Pollution constitutes both an environmental and social threat for megacities, let alone life on Earth. Furthermore, because of increasing urbanization, this issue may be exacerbated in the future and thus undeniably must be swiftly dealt with.

¹ Picture Source: darkroom.baltimoresun.com

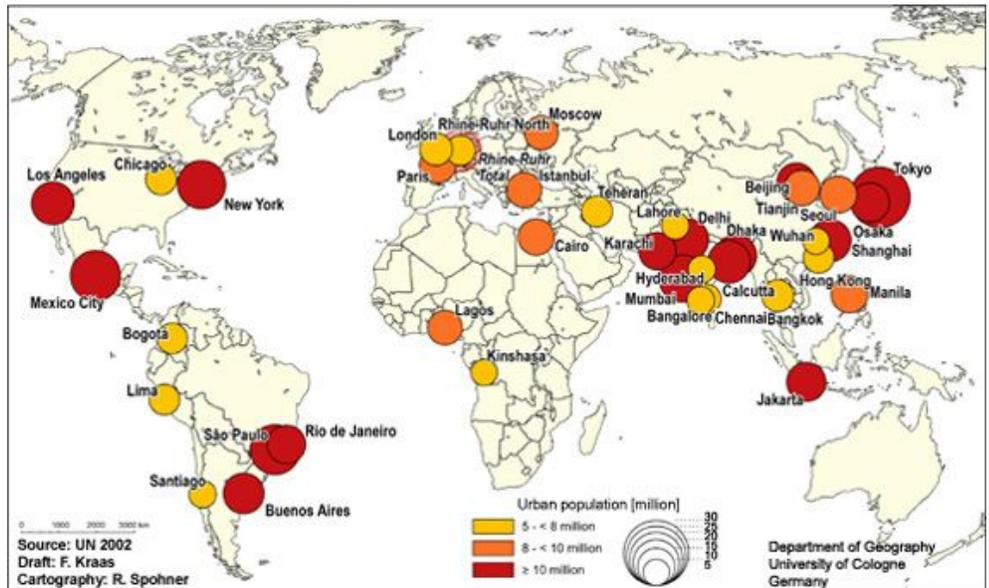


Definition Of Key Terms

- **Megacities**

A megacity is defined by the United Nations as a metropolitan agglomeration which concentrates more than 10 million inhabitants. However, this definition has been slightly

enlarged because the world's 40 most populated cities (see map below) are now considered megacities even if they do not necessarily have 10 million inhabitants. These 40 cities take part in the association called "C40" which aims to propose common projects and seek innovative alternatives for a sustainable development. These 40 megacities account for more than 18% of global GDP, generate over 10% of global carbon emissions and their total population is around 300 million residents.²



- **Pollution**

Pollution is the introduction of contaminants into an environment, such as water, air or ground that cause damage to human health and have a negative impact on ecosystems. Pollution is mostly caused by human activity: discharge of domestic, industrial and agricultural waste, gas emissions into the atmosphere, etc. However, some areas may also be prone to air pollution because of their particular topography or climate.

- **Water Pollution**

Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater). This form of environmental degradation occurs when pollutants are directly or indirectly discharged into water bodies without adequate treatment to remove harmful compounds. Water pollution affects the entire biosphere – plants and organisms living in these bodies of water. In almost all cases the effect is damaging not only to individual species and population, but also to the natural biological communities.

² Shows urban population (millions)

Picture source: IGU MegaCity - TaskForce



- **Air pollution episodes**

An Air pollution episode is a short-term increase in air pollution which is “greater than would be normally expected as part of day-to-day variation”, according to *Air Pollution and Health* by Stephen T. Holgate.

- **Particulate matter**

Also known as particle pollution or PM, particulate matter is composed of very small particles and liquid droplets.

The danger of these particles for human health lies in their size: particles that are 10 micrometers in diameter or smaller generally enter throats, noses and lungs, thus affecting the latter organs.

- **Urbanization**

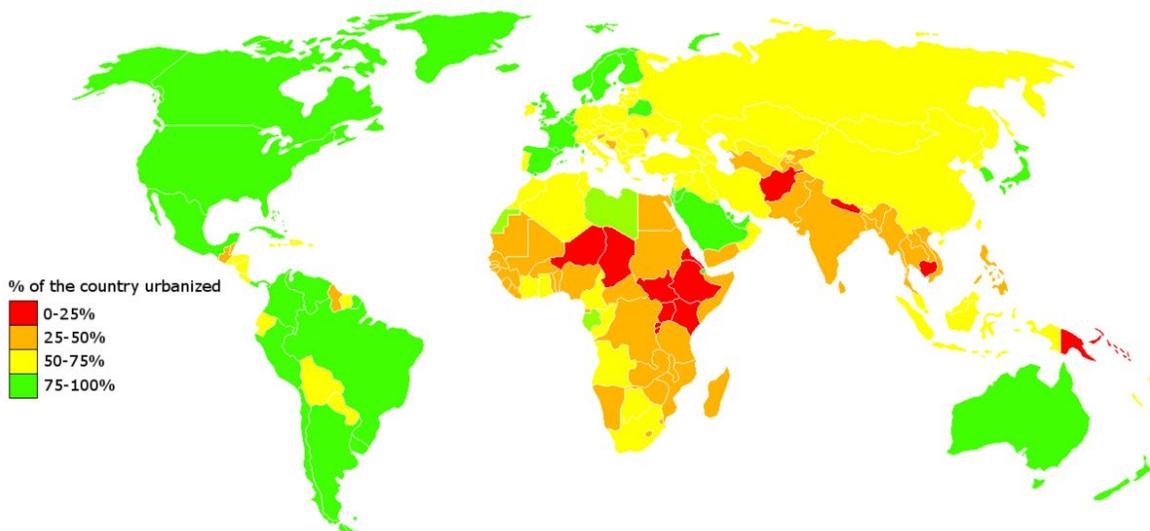
The gradual increase in the proportion of people living in urban areas, and the ways in which each society adapts to the change (population growth). It is predominantly the process by which towns and cities are formed and become larger as more people begin living and working in central areas.

Background Information

According to a UN report from 2010, the world’s population is expected to rise by 2.3 billion people, between 2009 and 2050. In Addition, while only 10% of the population lived in the cities before the Industrial Revolution, today urban dwellers represent 50.5% of the global population.

The United Nations projected that half of the world's population would live in urban areas at the end of 2008. It is predicted that by 2050 about 64% of the developing world and 86% of the developed world will be urbanized. That is equivalent to approximately 3 billion urbanites by 2050, much of which will occur in Africa and Asia. Notably, the United Nations has also recently projected that nearly all global population growth from 2015 to 2030 will be absorbed by cities.





-Percentage of urbanization per country (2012)³

Megacities are thus constantly growing and as a result are also increasingly polluted: the United Nations Environment Programme (UNEP) notably reported that “*rapid industrialization and burgeoning cities have caused increasing production of harmful pollutants in most urban cities*”.

Air pollution is the most direct issue resulting from the urbanization of these megacities. The concentration of human activities, such as transport and industry, in a relatively small area puts an enormous pressure on the environment and inevitably leads to problems caused by the pollutants. A country’s dependency on fossil fuels; motor traffic, industry, agriculture, trade and domestic activities constitute the main sources of pollution today and result in the deterioration of the quality of air. An investigation published by Mage (1996) notably reported that motor traffic is the most damaging source of air pollution in megacities. Along with the growing population comes an increasing number of cars. Their global number has increased by a factor of 10 since 1950 throughout the world, most of which circulate in major cities.

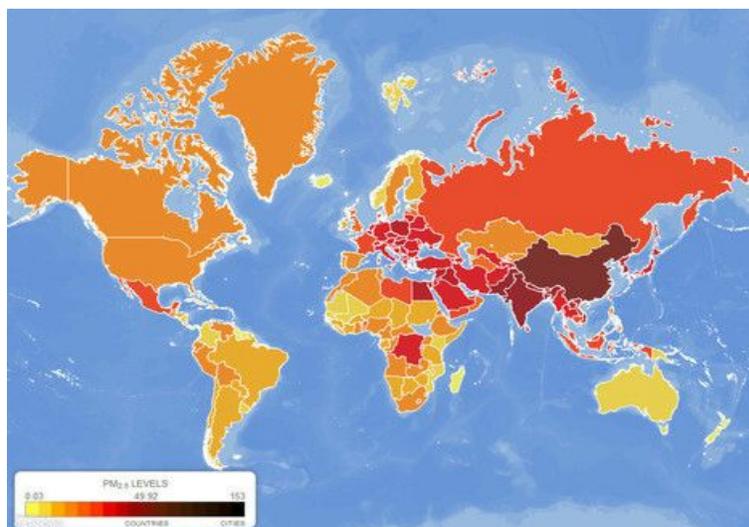
In relation with increased emissions are increased **air pollution episodes**. These peaks of pollution normally come from forest fires or volcanic eruptions but the heightened emissions from human activities has enhanced the outcomes of these episodes. The South-East Asian haze is an example of air pollution episodes: in June 2013 Singapore, Malaysia and Indonesia were suffocating in a cloud of historically- high pollution. However, air pollution episodes are also very often the direct or indirect consequence of a drastic increase in burning fuel for transport, industry or domestic use. An important air pollution episode notably occurred in Beijing no later than 2013. This led to several measures taken by the government that greatly affected the life of the population, such as the necessity for heavy polluting enterprises to

³ Picture source: wikipedia.org



reduce emission by 30% and the establishment of a ban on outdoor sports activities for primary and middle schools.⁴

The most dangerous culprit to human health within the broad spectrum of air pollution are the small **particulate matter** that is present in all sorts of emissions. These particulates are most common in Asian megacities. Cardiopulmonary and lung cancer mortalities are particularly more common in areas is high particulate matter. This results in a lower life expectancy for that area.



Water pollution constitutes another major challenge for megacities. Waste generated by the city dwellers becomes difficult to manage and most of it is dumped into rivers. Subsequently, water is made unclean and shortages are becoming more and more frequent in certain countries. Everyday, 2 million tons of human waste are disposed in water courses.

For the majority of the global southern countries, industrial pollution is the price to pay for development. For example, the Nile river in Cairo (Egypt) is pressured by a growing population, **urbanization**, and the political and economic demands of modern times.⁵ The pollution of rivers is made worse by the increasing number of slum dwellers due to the a massive rural exodus and can no longer cope with the large influx of migrants notably in terms of housing and waste management.



Waste can also have disastrous effects on the quality of underground soil in cities. It is likely to be polluted due to dangerous chemicals often originating from industrial waste. On top of the shortages of clean water for domestic use, the deterioration of water quality also results in huge problems notably concerning the fishing and agricultural markets. In China, for instance, the Institute of Geographic Sciences and Natural Resources Research reports that heavy metal pollution in underground soil has so far affected more than 10 percent of the country's farmland and caused the loss of 12 million tons of grain every year.

⁴ Image shows severity levels of global air pollution in 2014.

Picture Source: epi.yale.edu

⁵ Picture source: the40yearplan.com



Several studies report that ambient air pollution threatens the health of a large fraction of the world's population. In the short-term, high levels of air pollution can lead to acute respiratory problems. In addition, blockage of sunlight may promote the spread of harmful bacteria and viruses that would normally be killed by ultraviolets. The United Nations Environment Programme (UNEP) unit reported that air pollution resulted in the death of over 1 million people in 2012. As an example, 12.6% of deaths in Jakarta are linked to the polluted ambient air.

Furthermore, the possible long-term health effects of exposure to air pollution are still vague but can be predicted as to what could develop. Components of smoke haze are presumably carcinogenic but their effects may not be apparent for years.

Deteriorating urban air, ground and water quality also deeply affects the viability of important natural and agricultural ecosystems both in megacities and in regions surrounding highly **urbanized** areas. Accelerated urban growth presents an enormous challenge for the preservation of biodiversity in Indian megacities: a transformation of ecosystems from woodlands or grasslands into urban concrete jungles often leads to further degradation. A great decrease in native bird species, for instance, has been observed in Delhi and more than 69 species of birds are currently considered as threatened, according to the Indian Institute of Science.

Major Countries And Organisations Involved

Results of the World Health Organisation (WHO) and the UNEP study of megacities show that the “*most severe air pollution is monitored in cities in developing countries*”.

Developing countries, experiencing a rapid and massive urbanisation due to the apparent opportunity for a better quality of life in cities, are indeed plagued by the issue of pollution. This challenge is particularly present, for instance, in **China** where the deterioration of air quality is becoming a major issue. In a 2006 Chinese Green Gross Domestic Product estimate that reported pollution in 2004 caused a GDP loss of 3%. Other emerging countries, such as **India** or **Mexico**, are currently experiencing the same issue. These high levels of pollution are due to a wide range of factors but those that are more obvious include: the uncontrolled urbanization of megacities, the use of polluting sources of energy and the broad-minded policy towards polluting companies.



However, whilst several studies suggest there is a decrease in pollution in the developed world, the deterioration of the environment in megacities located in post-



industrialised countries is still a major concern. The most polluted megacity in Europe remains **London** but recent peaks of pollution in **Paris**.⁶

Despite the relatively low number of megacities in Africa, **Cairo** and **Lagos** are today considered as two of the most polluting cities in the world. Lagos, the economic capital of **Nigeria** concentrating over 70% of the country's industries, may indeed be one of the three megacities in the world with a population exceeding 20 million by 2025. Its rapid growth and urbanization have resulted in an increase in waste generation and environmental pollution.

Previous Attempts

Although the central focus of the **United Nations Environment Programme (UNEP)** is not megacities, they are largely taken into account in the fight against climate change. UNEP notably created an air quality guideline for a wide range of pollutants which serves as a reference measurement.

The **World Health Organisation (WHO)**, the first institution that established the link between health problems and pollution. It is also particularly concerned about the consequences of pollution for human health. *"The evidence signals the need for concerted action to clean up the air we all breathe"* Dr. Maria Neiro (WHO)

A recent EU-funded project known as the '**CitiZen project**' aims to "quantify and understand current air pollution distribution and development in and around selected megacities, including the interaction across the different spatial scales". It gathered a wide range of important, but previously disparate, areas of research in order to provide a general picture of the mechanisms by which megacities impact the environment.

Some Possible Solutions

- Making the switch to cleaner means of mass public transportation/personal transport
- Conservation of energy
- Efforts towards increased recycling/environmentally conscious alternatives to disposal of waste
- Government initiatives IE: ?? a few examples
- Urban planning

⁶ Picture source: theguardian.com



- Raising awareness
- Personally become vegan

Source: theguardian.com

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APPENDICES

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