

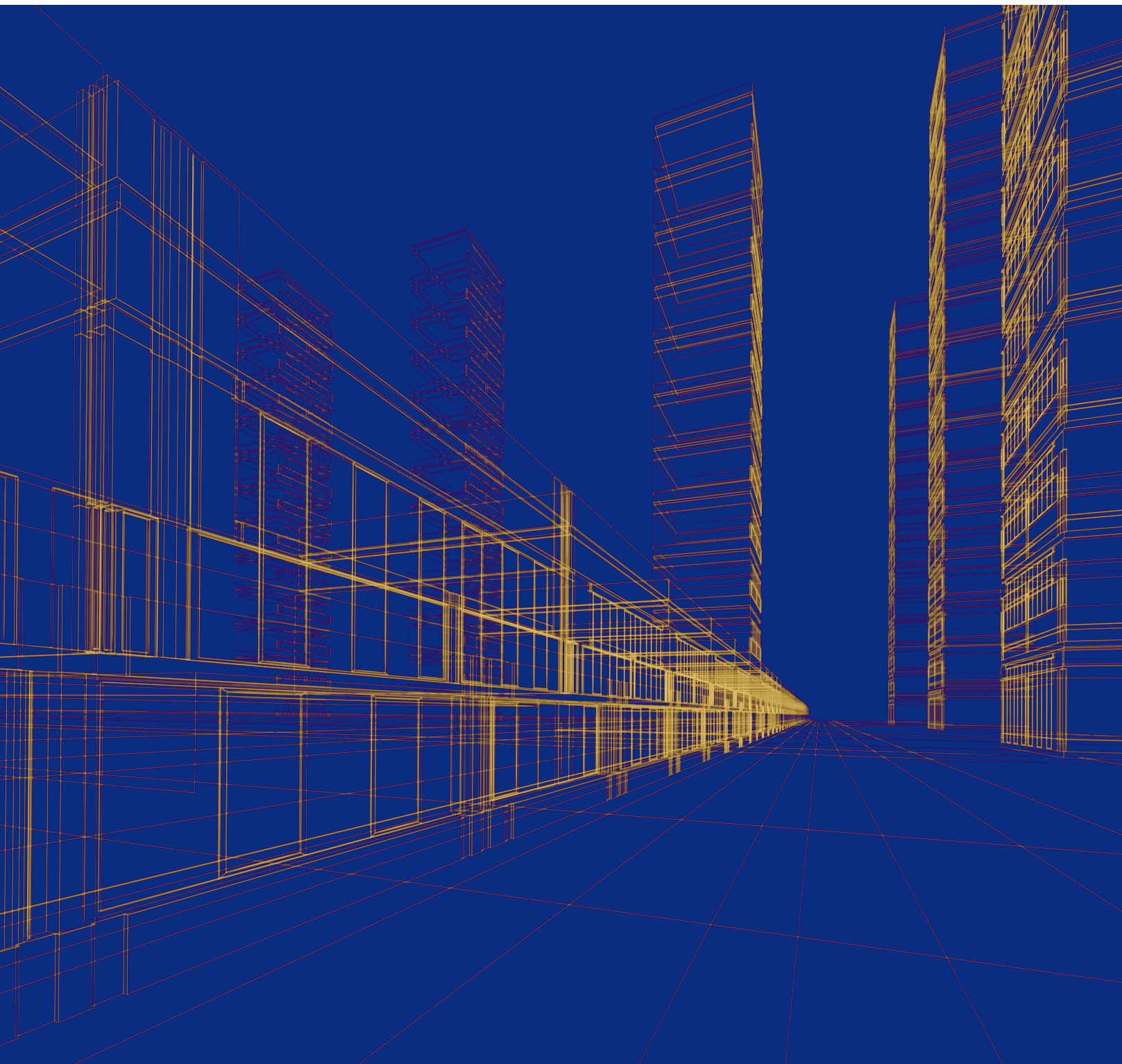


**WWF**

*for a living planet*

# THE ALTERNATIVE URBAN FUTURES REPORT

URBANISATION & SUSTAINABILITY IN INDIA:  
AN INTERDEPENDENT AGENDA



# THE ALTERNATIVE URBAN FUTURES REPORT

URBANISATION & SUSTAINABILITY IN INDIA:  
AN INTERDEPENDENT AGENDA

Sanjeev Sanyal  
Sumati Nagrath  
Gorika Singla

Prepared by



MIRABILIS

Mirabilis Advisory

Lead Author

**Sanjeev Sanyal**

Board Director, Mirabilis Advisory &  
Founder, The Sustainable Planet Institute

Co-Authors

**Sumati Nagrath**

Director, Mirabilis Advisory

**Gorika Singla**

Senior Researcher, Mirabilis Advisory

Research Support

**Amruta Sudhalkar**

**Giovanni Odoni**

**Megha Mukim**

**Prathima Manohar**

**Rohan Panjiar**

Photography, Maps & Graphics

**Amit Verma**

**Mohit Midha**

**Sanjeev Sanyal**

**Sumati Nagrath**

Urban Age, London School of Economics & Political Science

**Vimlendu Jha**

The authors would like to thank the following members of the WWF team who contributed their perspectives at various stages of development of this Report:

**Aarti Khosla**

**Bhoopinder Singh Bali**

**Dennis Pamlin**

**Rajneesh Sareen**

**Ravi Singh**

**Sejal Worah**

**Shirish Sinha**

Design

**Twig Designs**

Printing

**Thomson Press**

---

*This Report is part of an initiative by WWF India focusing on “Urbanisation and Sustainability”. Urbanisation in India is organic and as more and more of India urbanises, coupled with economic prosperity and high standards of lifestyles, demand and stress on resources such as water, energy, food, and goods and services as well as infrastructure will intensify, increasing ecological footprint of urban agglomerations. “Urbanisation and Sustainability” initiative aims to provoke a constructive process of dialogue on how the cities of today will be different from cities of tomorrow through a process of innovation and efficient utilisation and management of resources resulting in reduction of urban footprint. This Report, prepared by Mirabilis Advisory, first in the series, focuses on two crucial areas of urbanisation – urban form and density; and public transportation and walkability.*

# foreword

**T**he future shape of India's cities will determine the viability of its ecological resources and thereby the very future of our rivers, the atmosphere that gives us life and the natural habitats and forests that support India's amazing biodiversity. It is imperative that we urgently employ strategies for urban infrastructure development that are in harmony with our existing 'natural infrastructure'. It is in this context that *'The Alternative Urban Futures Report'* assumes significance.

Interestingly, even though only 30% of India's present population dwells in its cities and towns; it is estimated that urban areas generate over 60% of the country's GDP and account for 90% of the government's tax revenues. These numbers underscore the significance of cities in India's economic and social development; more importantly, they highlight the opportunity cities represent for India in the 21<sup>st</sup> century.

Conventional thinking about the future of India's urbanisation often focuses on megacities like Mumbai, Delhi or Kolkata. The larger cities dominate the imagination and interests of the public, the media as well as intellectuals. Patterns of growth suggest, however, that most of India's urbanisation will take place in smaller cities and towns with population less than 500,000. This facet of urban growth represents a great challenge; equally it can provide the much needed impetus for innovation in sustainable urban infrastructure development.

We believe the first step towards action is a Vision – that articulates an alternative urban future, or more accurately, *alternative urban futures for India*. This Report is an effort to support our policymakers, practitioners, and future urban managers, to take that very important first step. The unprecedented and unmatched urban growth that we are experiencing today demands a radical and proactive response, for which we need to bring collective wisdom and ideas to imagine a new future. This will necessitate a wide range of policies and practices to be conceptualised around new 'sustainability - oriented' and 'environment-friendly' paradigms.

While India can, and should, draw from a variety of lessons from the world that has already urbanised, it can also base its tomorrow on fresh thinking and original ideas provoked within a local context. What follows is a thoughtful attempt to challenge mindsets and provide practical solutions for our common urban future – a future that can be economically stable, socially equitable, and most importantly, environmentally sustainable.

Anupam Yog  
Managing Director  
Mirabilis Advisory

Ravi Singh  
Secretary General & CEO  
WWF - India

# contents

Executive Summary	7
Introduction	9
CHAPTER 1	
THE LINK BETWEEN URBANISATION AND SUSTAINABILITY	11
1.1 What is Urbanisation?	12
1.2 Decoding the Link between Urbanisation and Sustainability	13
1.3 Cities as Key to Sustainability	16
CHAPTER 2	
INDIA NOW, INDIA THEN	19
2.1 The Reluctant Urbaniser	20
2.2 India's Urban Future	22
2.3 India's Urban History	24
2.3.1 Mumbai: A Railway City	24
2.3.2 Delhi: A City of Imperial Grandeur... and Roads	26
2.3.3 Kolkata: A City in Three Stages	30
2.4 The Decline of Small Town India	32
2.5 Failure of New Cities in Modern India	34
CHAPTER 3	
ALTERNATIVE URBAN FUTURES: OPTIONS FOR INDIA	37
3.1 Energy	38
3.2 Transport	39
3.2.1 Drivers of Energy Demand with Respect to Transport	40
3.2.2 Energy Consumption in Transport : Paths to 2050	40
3.2.3 Importance of Walkability	44
3.3 Buildings	49
3.3.1 Energy Consumption in Buildings Sector	49
3.3.2 Energy Consumption by Buildings : Paths to 2050	50
3.4 Waste	53
3.4.1 Transforming Waste to Energy	54
3.5 Water	55
3.5.1 Water Scenario for Delhi in 2050	57



# contents

CHAPTER 4	
AN URBAN VISION FOR INDIA	59
4.1 Urban Form & Density	60
4.2 Public Transport & Walkability	63
4.3 The Need for an Integrated but Evolving Framework	64
4.4 The Problem of Municipal Governance	66
4.5 Strategic Interventions Versus Master planning	68
ANNEXURES	70
1 Urban Governance in India	71
2 Brief Overview of Urban Planning in India	76
3 International Collaboration : Bridging the Gap	79
4 Smart Growth and Sprawl	81
5 Analysis of CDPs of 20 Cities vis-a-vis Urban Form and Walkability	82
6 Population Density Charts of Cities	85
7 On Two Legs and a Prayer	86
References	94
Key Informants	99

# executive summary

More than half of the world's population is now urbanised but India is still largely a rural country (65-70% of the population still lives in villages). Indeed, it has been a very reluctant urbaniser compared to other Asian countries. However, as economic development shifts increasing numbers away from subsistence agriculture, the country is about to embark on a period of rapid urbanisation. The explosive growth of Gurgaon and Bangalore in the last ten years is only a foretaste of what we are likely to witness in the next few decades. This process will probably make India an urban majority country by 2040. In other words, urban India needs to prepare for the influx of another 350mn people when it is already struggling with the existing population. Such a shift will have a profound impact on the country's economy, society and, most importantly from our perspective, its ecological footprint. This will not just affect India's environmental sustainability but, given the country's size, that of the world.

To the lay person, it may appear that urbanisation is an unmitigated disaster for the environment. International experience suggests, however, that what really matters is the type of cities we build. Take for instance, Barcelona and Atlanta – both former Olympic hosts with populations of around 2.8mn and with roughly the same standard of living. Yet, studies have shown that the per capita ecological footprint of Atlanta is four times that of Barcelona! Indeed, Barcelona's per capita environmental impact is lower than that of many rural areas of Europe. So, how can we ensure that India's future urban trajectory follows Barcelona rather than Atlanta?

In this report we have analysed both international experience as well as the historical development of Indian cities. We found that the "DNA" of a city gets embedded in its urban eco-system in the early stages of development by the choice of urban form and transport system. Changing this DNA retrospectively can be both difficult and expensive. As India is yet to build most of its urban spaces, we have the opportunity to embed the country with an environment-friendly DNA – an urban vision based on sustainable planning paradigms. In this report we have modelled a number of alternative trajectories and strategies (we focused on energy use but we also briefly looked at water and waste). The implications are clear and unambiguous. The following are the three most important findings:

## urban form & density

Most of the discussion about urban sustainability in India centres around "green codes" for buildings. A number of "green codes" have been initiated including LEED, GRIHA and so on. Our discussions with leading architects, however, suggests that these codes typically give us energy savings of around 15% in the Indian context (higher savings are possible but they involve sharply higher costs). This is a useful saving but it cannot account for the difference between a Barcelona and an Atlanta.

The problem with so-called green codes is that they exclusively focus on maximising an individual building whereas the real gains come from overall urban form. Our modeling illustrates the large difference in trajectories of energy use depends on the density of urban form. There are many ways in which density helps limit environmental damage – reducing land use, encouraging people to live in apartments, the clustering of civic amenities and public transportation, supporting walkability and so on. In short, the factors that matter are: Is the city dense or sprawled? Do people live in apartments or free-standing houses? Is the city designed for public transport? For instance, energy use drops by over 30% just by moving people from houses to apartments even if we ignore the green codes. Similarly, public transport systems do not work efficiently when the city is spread out and commuters cannot easily walk to the bus/metro stop.

## executive summary

If anything, our models are conservative since they have not considered externalities such as how urban expansion is eating into productive farm lands and forests. In other words, we need to give up the flat urban sprawl as a model for urban growth. Note that we are not just arguing large, dense mega-cities. The principle of density works just as well for small towns.

### public transport & walkability

Almost all Indian cities suffer serious traffic gridlocks caused by a boom in car ownership. It was once thought that flyovers would solve the problem but experience shows that, at best, these are temporary solutions. Our scenario analysis clearly demonstrates that a shift in modal split in favour of public transport can significantly lower energy use. Public transport systems range from buses to underground railways. However, the simplest and most widely used form of public transport is “walking” (and its sister mode “cycling”). A 2008 study of 30 Indian cities showed that almost 40% of all trips in urban India involved no motorised vehicles at all – 28% walked and 11% cycled. The proportion was sharply higher in smaller towns since distances were usually small and the roads less congested. However, in bigger cities, the proportion of people using conventional public transport was high, and consequently commuters walked the last mile. For instance, in cities with more than 8 million population: 22% walked all the way, 8% used cycles and 44% used public transport. This adds up to 74% of people who rely on non-motorised transport for at least part of the commute.

Walking is a form of transportation that is almost entirely neglected by urban planners in India even though the majority of Indian city-dwellers walk all or part of their journeys. This is unfortunate because it is not just the least ecologically damaging form of transportation but is a critical strategic enabler for other public transport systems to function effectively. Without last-mile walkability, neither buses nor metro-rails would work effectively (note how this fits with the need for dense urban form). Furthermore, it has large positive externalities from social and economic perspectives – it is socially equitable, promotes community/social cohesion, improves health and can give the city a “buzz” factor.

### using strategic paradigms

A central problem with implementing any of our recommendations is that urban India suffers from poor governance. Poor governance affects everything from traffic flows to unauthorised construction, transmission losses in power and pilferage of water. Indeed, repeated attempts to enforce master-plans have failed even in the national capital. Governance is usually far worse in the smaller towns. Of course, urban governance needs to improve but we think civic authorities should use a somewhat different strategy to guide the trajectory of urban growth. This would involve identifying a few simple paradigms that encapsulate the broader effort to build economically, socially and environmentally sustainable cities. The government could then use focused strategic interventions to integrate these paradigms into the urban fabric. We feel that density, public transport and, more specifically, “walkability” should be adopted as the central paradigms for future urban thinking in India. This should be done as soon as possible so that the coming urban boom will naturally absorb this new approach.



# introduction

We live in an urban age. The world's urban population grew from 220 million to almost 3 billion over the 20<sup>th</sup> century. By 2050 about 70 percent of the world's population will be urban. With the urban populations of Asia and Africa set to double between 2000 and 2030<sup>1</sup>, future urbanisation will largely be a developing world phenomenon<sup>2</sup>. India, expected to be an urban majority country<sup>3,4</sup>, by 2040-45, will be at the forefront of this massive socio-economic shift. We believe the manner in which the subcontinent responds to urbanisation over the next two decades will define the social, economic and environmental future of not just the country, but also of the world. While the more conventional challenges of urbanising societies of providing adequate housing, public transportation and other civic amenities are recognised, we feel the overall environmental impact of India's urbanisation has not yet been fully understood or studied. As a result, little thought is being given to the different future trajectories available to urbanising India. This view is corroborated by independent research, which confirms that environmental issues (fresh water, pollution, climate change, waste) do not figure very high on the agenda of city planners and local/national development authorities in India<sup>5</sup>.



Brand New Office Complex in Gurgaon

© Verma, A.

In 1992, William Rees developed the concept of the 'Ecological Footprint' to assess the reliance of the planet on its natural resources and ecological assets. Ecological footprint is a measure of how much biologically productive land and water an individual, population or activity requires to produce all

<sup>1</sup>United Nations Population Fund (UNFPA), 'Unleashing the Potential of Urban Growth', State of World Population Report 2007

<sup>2</sup>According to United Nations Department of Economic and Social Affairs/Population Division; World Urbanisation Prospects: The 2003 Revision Population Database; In developed countries, 75 per cent of the population already lives in cities, compared to 35 per cent in developing countries. But the rate of urbanisation in those countries is much higher – 3 per cent compared to 0.5 per cent in developed countries. Estimates show that by 2030, about 84 per cent of the population of developing countries will be living in cities.

<sup>3</sup>United Nations Population Division; World Urbanisation Prospects: The 2007 Revision Population Database

<sup>4</sup>Currently 30 per cent of India's total population, or approximately 330 million people live in urban areas

<sup>5</sup>According to Urban Age, London School of Economics & Political Science (2008), 'Integrated City Making, Governance, Planning and Transport'; Only 12% of the respondents drawn from every level of Indian government and civil society mentioned the environment as one of three key challenges for urban India. The other key challenges included Planning (47%), Transport (41%), Governance (32%), Infrastructure (24%), Migration (18%), Housing (18%), and Inequality (12%).

the resources it consumes, and to absorb the waste it generates using prevailing technology and practices. Ecological Footprint is usually measured in global hectares. At a macro level, India appears to be doing well on this measure with an average per capita ecological footprint of 0.8 global hectares. In comparison, developed countries have an average per capita ecological footprint of 6.43 global hectares<sup>6</sup>. India's relatively small ecological footprint is mainly due to low standards of living in both urban and rural areas. With the economy growing, even a small increase in income levels is likely to lead to an increase in the per capita ecological footprint of India. Furthermore, it must be noted that while the per capita consumption might be low, given the absolute numbers of people who live in India, the total consumption of natural resources is already quite significant. Overall, therefore, the relatively small per capita ecological footprint does not necessarily translate into an environmentally sustainable development trajectory, particularly in the context of urbanisation<sup>7</sup>.

Already, India is the world's fourth largest carbon dioxide (CO<sub>2</sub>) emitter with emissions amounting to 1.34 billion tonnes per annum<sup>8</sup>. The top three emitters of CO<sub>2</sub> are China with 6.2 billion tonnes, the US with 6 billion tonnes, and Russia with 1.5 billion tonnes. Even if India holds on to its promise of keeping its per capita emissions lower than that of developed economies, given its current rate of population and economic growth<sup>9</sup>, it will soon outstrip Russia to become the third largest emitter and, if unchecked, will ultimately catch up with the other two. A similar story can be told about the patterns of waste generation and water consumption in India.

The fact that most of these emissions will come from India's growing urban agglomerations<sup>10</sup>, make the need to build environmentally sustainable cities an immediate and urgent one. Today, three of India's cities: Delhi, Kolkata and Mumbai figure among the 10 most polluted cities in the world<sup>11,12</sup>. This dynamic is further underscored by the relationships that exist between urban agglomerations and their rural hinterlands; unplanned growth of cities is likely to have a negative impact on rural environments and livelihoods as well.

So what should be done? In this report, we first decode the link between urbanisation and environmental

## [INDIA'S] RELATIVELY SMALL PER CAPITA ECOLOGICAL FOOTPRINT DOES NOT NECESSARILY TRANSLATE INTO AN ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT TRAJECTORY, PARTICULARLY IN THE CONTEXT OF URBANISATION

sustainability by looking at international experience. Next, we look at the historical development of Indian cities and at the future of urbanisation in the country. Thirdly, we model the implications of different urban development trajectories, especially with regards to energy use. Finally, we draw concrete conclusions from the analysis, and make recommendations to achieve sustainable urbanisation in India.

<sup>6</sup>World Wide Fund for Nature (2006), Living Planet Report

<sup>7</sup>Across the world it is cities or the most urbanised regions that generate the greatest proportion of CO<sub>2</sub> emissions. According to D'Monte, D. (2007), 'The Role of Cities in Climate Change', InfoChange News & Features; Three-quarters of the carbon dioxide in the world, which is the biggest greenhouse gas, is emitted by cities.

<sup>8</sup>Fitter, P.M. (2008), 'The Green Trade', Business World, 22 September

<sup>9</sup>The challenges associated with India's pace of urbanisation and population growth have been well recognised across the board. For example, World Economic Forum and the Confederation of Indian Industry, 'India @Risk 2007', explicitly state that the pace of upward mobility, urbanisation and industrialisation pose significant adjustment costs and risks to policymakers.

<sup>10</sup>A study by Kumar and Bhattacharya (1999) has shown that between 1975 - 1995, while the economy grew 2.5 times, industrial pollution grew 3.47 times and vehicle pollution 7.5 times. The situation is thought to have worsened since then.

<sup>11</sup>Megacities' populations and average suspended particulate mass concentrations in µg/m<sup>3</sup>; Tokyo: population: 35 million, particulates: 43; Mexico City: population: 18.7 million, particulates: 69; New York: population: 18.3 million, particulates: 23; São Paulo: population: 17.9 million, particulates: 46; Mumbai: population: 17.4 million, particulates: 79; Delhi: population: 14.1 million; particulates: 187; Kolkata: population: 13.8 million, particulates: 153; Buenos Aires: population: 13 million, particulates: no data; Shanghai: population 12.8 million, particulates: 87; Jakarta: population: 12.3 million, particulates: 103 (Source: <http://planetearth.nerc.ac.uk/features/story.aspx?id=148>)

<sup>12</sup>According to United Nations Environment Programme (2008); New Delhi, Kolkata and Mumbai feature in the list of 13 megacities where Atmospheric Brown Clouds are reducing the sunlight hitting the Earth's surface making the cities 'darker or dimmer'.