

Unplanned Urban Development: A Neglected Global Threat

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Abstract

Disasters pose a major threat to cities' development. Consequently, a lot of attention has been put into increasing urban capacity to withstand, adapt and grow no matter what kind of catastrophic event they go through. However, the majority of international campaigns and local actions to reach these objectives, focused exclusively in reducing vulnerabilities, have been proven insufficient to avoid disasters. As argued in this paper, this is because cities are not only vulnerable to disasters, but the epicenter of highly destructive global threats, which are mostly neglected. By using the latest disaster science terminology to examine hazard creation in the cities of Bangalore (India) and São Paulo (Brazil), it becomes clear that unplanned urban development can be considered anthropic-hazard driver. This finding highlights the need for urban planners, researchers and local governments to focus on reducing hazard-creation with the same enthusiasm as they are trying to reduce vulnerabilities in urban settings.

Keywords

Disasters, Development, Resilient Cities, Unplanned Urban Development, Hazards

1. Introduction

Archeological evidences have shown that many communities throughout human history degraded their environment to the point of undermining their own existence (Kennedy, 1984). Now, with the advance of technology and globalization, especially after the industrial revolution, we have significantly increased our self-destructive potential (Beck, 2008). Differently from localized risks created before the industrial period, these side-effects of modern society are manifested as regional and global threats.

It is undeniable that technology has increased life standards in most societies, but at a great risk. At the same time that cars make our lives more comfortable, the level of greenhouse gases in the atmosphere has never been higher (NASA, 2019). Airplanes connect the whole world, but also contribute to spread diseases faster than we can respond, increasing the risk of worldwide pandemics such as the COVID-19. Food production is more abundant than ever (World Bank, 2019), but deforestation in virtually all Earth ecosystems is ever increasing and one million species are currently in danger of extinction (IPBES, 2019). Plastic pollution poses a threat to human well-being on a global scale (Ritchie & Roser, 2018; Zalasiewicz, Colin, & Waters, 2019) and we keep producing around 2.1 billion tons of waste per year (Kaza et al., 2018) which, for the most part, are poorly managed.

These are just a few examples of modern anthropic-hazards that altogether have the potential to push the Earth into a mass extinction event (Beck, 2008; Zalasiewicz, Colin, & Waters, 2019; Ripple et al., 2019). Anthropic-hazard is defined here as “(...) any human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation” (UNDRR, 2017). Differently from what Simon (1981, 1996) and Lomborg (2001) predicted, economic growth and technology are still insufficient to correct, balance or repair the impact of modern society on planet Earth. Moreover, they are risk drivers to technological disasters.

In cities this is most evident. Cities are the dominant organizational form of human society (Sarzynski, 2012). They have become centers of population growth, culture, and are generally associated with stronger economies and technological development (Stephens & Satterthwaite, 2008). Over the years, especially since 1900 when the urban planning field arose (Fainstein, 2019), cities have been constantly transformed, reshaped and are now assuming new functionalities. Terms like “smart-cities”, for example, express the modern concept of urban development where cities would be more compact, connected and clean with net-zero emissions (Coalition for Urban Transitions, 2019).

However, fast urban growth occurs especially in developing countries (Ligtvoet et al., 2018; World Bank, 2019), mostly unplanned and strongly marked by violence, inequalities, and socio-territorial exclusion. It is estimated that almost 1 billion people live in urban slums without access to decent housing, sanitation and clean drinking water (UN-Habitat, 2019; Coalition for Urban Transitions, 2019). Unequivocally, rapid and unplanned urbanization is hazardous in many ways. It puts too many people at risk, creates unnecessary costs, and is intrinsically unfair (Coalition for Urban Transitions, 2019). Therefore, the pattern of urbanization needs to change in order to better respond to the challenges of our time.

Considering that in 2018 more than 54 per cent of the world population lived in cities and by 2050 this number is projected to increase to 70 per cent, “the battle for the planet will be won or lost in cities” (Coalition for Urban Transi-

tions, 2019: p. 2).

These facts evidence a gap in our understanding of how cities are contributing to both global climate emergency and technological disasters. It is argued here that unplanned urban development put people at risk not only by creating unsafe conditions, or vulnerabilities, but also by materializing new and highly destructive anthropic-hazards. Therefore, to increase our chances to win the “battle for the planet”, unplanned urban development should be properly placed as a potential local and global anthropic-hazard, otherwise we will be keep falling to reduce the risk of disasters, especially for the most vulnerable developing countries.

2. Beyond Resilient Cities

The interdisciplinary field of disaster science and management has made significant progress in understanding disasters. By analyzing the interaction between risk elements such as vulnerabilities, hazards, exposure and local capacities, it became clear that “disasters are more a consequence of social-economic than natural factors” (O’Keefe, Westgate, & Wisner, 1976). Within this framework, social-economic factors are generally understood as vulnerability drivers and the root causes of disasters (Wisner et al., 2003). Vulnerability is defined here as “conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards” (UNDRR, 2017). Based in this assumption, scientific papers and international campaigns to reduce the risk of disasters in urban settings such as the Rockefeller Foundation “100 Resilient Cities” and the UN “Making Cities Resilient: My City is Getting Ready” are exclusively focused in reducing vulnerabilities to increase local resilience. In their own words, resilient cities should be the ones able to “survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience” (The Rockefeller Foundation, 2019).

Even recognizing the contributions of the vulnerability and resilience framework to disaster risk reduction, they are still not enough to avoid the systematic creation of anthropic-hazards in urban areas. As argued here, these vulnerability drivers such as economic, social and political systems are also responsible for unleashing extremely dangerous anthropic-hazards. However, hazard creation in urban settings seems to receive much less attention from the media, governments, and both national and international donors than vulnerability and resilience related issues.

A good example comes from cities of high-income countries. Although their levels of vulnerability and exposure can be considered low compared to most cities in developing countries, they are the highest per capita generators of municipal solid waste in the world (World Bank, 2019; Nation Master, 2019). New York, for example, produces more solid waste than any other city, 33 million tons per year, which is 15 more than Lagos which has a bigger population (Van Lohuizen,

2019).

As in Varkkey (2019), “this is where the global dimension of the problem begins. It is often cheaper for developed countries to ship containers of plastic and toxic waste halfway around the world to be “recycled” in developing countries than to deal with the trash themselves”. No need to mention that these receiving countries are not equipped to safely and securely manage plastic waste, increasing local pollution and creating social harms (Dell, 2019). Thus, even though some municipalities in high-income countries have been reducing their vulnerabilities and increasing their resilience to local natural hazards, they keep stimulating the production of new threats and even exporting them to the most vulnerable regions of the world. The irony is that there is no outside in planet Earth and, no matter how far they send all these hazardous materials, in the long run, they will too suffer the consequences of the current climate crisis and ecosystems disruption (Varkkey, 2019).

An article published by Nature gives us another recent examples of modern, globalized, and neglected threats by establishing a clear connection between consumption in the US and Europe and death caused by air pollution in China (Zhang et al., 2017). This research shows that more than 100,000 Chinese die each year due to atmospheric pollution caused by urban factories to produce and export technology to the USA and Europe. A death toll higher than global deaths caused by all natural hazards combined from 2011 to 2018 (Ritchie & Roser, 2019). Besides, air pollution is transported in the atmosphere causing health problems and death to neighboring regions (Zhang et al., 2017). “People think air pollution is a local problem. On average, we change our phone every six months and it has a health cost on the other side of the world” said economist Dabo Guan, one of the main authors of the article during an interview to the English journal the Guardian.

In general, cities are responsible for three quarters of carbon emissions from final energy use (Coalition for Urban Transitions, 2019). Together, the world’s cities generate more than 2 billion tons of solid waste per year and, with rapid urbanization and population growth, annual waste generation is expected to increase by 70% in 2050 (World Bank, 2019).

In low-income countries, over 90% of waste is often disposed in unregulated dumps or openly burned serving as a breeding ground for disease vectors and contributing to global climate emergency through methane generation (World Bank, 2019).

A study conducted in 422 cities with more than 300.000 inhabitants show that at least 383 are facing conflicts between urban growth and biodiversity (Weller et al., 2018). Among these cities, 33 are considered imminent threats to the world’s most valuable biodiversity (Seto, Guneralp, & Hutryra, 2012; Weller et al., 2018).

A closer look at cities’ metabolism also reveals that rapid and unplanned urban growth is not only a global threat, but also a local driver for a great variety of anthropic-hazards, as evidenced in the case studies of Bangalore (India) and São

Paulo (Brazil). Here, unplanned urban development is defined as the absence of planning standards and organizing urban laws leading to informal settlements that lack basic infrastructure, services and contribute to hazard creation.

3. Unplanned Urban Development: An Anthropic-Hazard Driver

3.1. Bangalore

The city of Bangalore, once admired as India's "garden city" (Ramachandra & Aithal, 2016b) is now facing an unprecedented water crisis. For centuries, the local population had built an intricate network of water infrastructure, creating artificial wetlands environment, lakes, reservoirs, and canals. However, due to political, social and economic forces, the city grew rapidly and poorly planned. Data from the past four decades, shows that the built-up area of Bangalore increased by 584% and the vegetation correspondingly declined by 66% (Ramachandra, Aithal, & Sanna, 2012). Goldman and Narayan (2019: p. 99) also found that "80% of the 105 water bodies have been encroached upon, converted from lake to dry bed to urban real estate, with 'lake catchments [...] used as dumping yards for either municipal waste or building debris". The remaining water bodies are extremely polluted. The city's largest lake spewed large quantities of toxic foam onto the streets in 2017 (Upadhya, 2017) and the year after caught fire multiple times due to the abundant toxins and debris that were dumped in it (Goldman & Narayan, 2019).

Bangalore is now the second most likely city in the world (behind Cape Town) to run out of drinking water in the near future (BBC, 2018) and experts fear it could be inhabited by 2025 (The Guardian, 2017) due to an ever increasing "urban expansion fueled by different engines of growth" (Ramachandra & Aithal, 2016a). Even considering the effects of anthropogenic climate change in the water cycle and rain patters across India, the water crisis in Bangalore is not as much a problem of supply, as it is of distribution (Kumar-Rao, 2019) and planning (Goldman & Narayan, 2019). Moreover, a quarter of Bangalore's population, living mostly on its periphery, is not connected to the river water supply and is forced to mine groundwater to survive, which is now muddy, contaminated and severely diminished (Kumar-Rao, 2019).

The water crisis in Bangalore illustrates how economic and political forces create both vulnerabilities and anthropic-hazards and how they are intrinsic related and mutually reinforcing. In this case, a vulnerable condition increases environmental degradation and pollution, which become new hazards to the already vulnerable population. However, paraphrasing Lewis (2012), it is not poverty or the practices of poor people not connected to the water supply that set pollution, contamination, and human-induced drought in motion, but the greedy and unjust behavior of concessionaires, politicians, and law enforcement officers involved in Bangalore urban expansion. This created the vulnerable environmental and social conditions for water scarcity and human-induced drought disaster.

3.2. São Paulo

The city of São Paulo (Brazil) has the biggest constructed urban area in Latin America and a total population of almost 20 million people. Its fleet counts with around 8 million vehicles which are directly responsible for more than 90% of the total emission of CO (carbon monoxide), HC (hydrocarbons) and NO_x (carbon oxides) (CETESB, 2006) and 31% of the total emission of SO (sulfur dioxide) (Martins & Andrade, 2008). As from 2015, the daily concentration of air pollution continuously exceeds the limits established by the World Health Organization causing around 11,200 premature deaths per year (Nobre & Young, 2011; Vormittag & Saldiva, 2015). Again, a death toll higher than any disaster in the country, but not included in the disaster's statistic and not even legally treated as a disaster. The city doesn't declare emergency due to pollution and, therefore, doesn't trigger the legal mechanism to receive federal funds and technical support to respond to this emergency. Imagine if instead of human pollution a natural formed toxic cloud would kill more than eleven thousand people every year. How it would be treated? Who would be responsible?

Just in terms of comparison, a dam burst in the city of Brumadinho, in the neighboring state of Minas Gerais, killed almost 400 people. The mining company, Vale, was sentenced to pay compensation for each family who lost a member and for each property impacted. A total of more than 1 billion dollars. Annually, air pollution in São Paulo kills 28 times more than the toxic mud from the dam burst killed just once in Brumadinho, even so no one sues the municipality or the vehicle makers. No one is compensated. No one is held responsible.

Floods are also amongst the most deadly hazards in the city of São Paulo. A study conducted by USP and CGE, however, concluded that the influence of unplanned urban development is significantly higher than the influence of global climate change in the increasing rates of floods and heat-islands (Nobre & Young, 2011). When investigating the root causes of annual floods in the city, researchers also concluded that they could be attributed to 1) soil sealing by the use of concrete (Nobre & Young, 2011); 2) changes in urban river and channel flows that limit runoff during heavy rainfall (Konrad & Booth, 2002; Santos, 2013) (iii) land occupation over rivers and watercourses (Nobre et al., 2011; Nobre & Young, 2011; Santos, 2013). Here, there is a blur line between vulnerabilities and anthropic-hazards. While the last one is clearly a condition that makes people exposed and more susceptible to disasters due to economic forces, or a vulnerability, the first two causes of flood in São Paulo could be classified as anthropic-hazards. They are both human activities directly responsible for floods in the city, which annually cause social and economic disruptions and loss of lives.

Heat-islands are also a consequence of unplanned urbanization. This phenomenon is characterized by a great difference in temperature in different areas of the city. In the same day (September 3, 1999), the maximum temperature in downtown São Paulo exceeded 30°C, while in the periphery it reached 27°C and only 24°C in

areas where the natural environment was preserved (Takiya, 2002; Nobre & Young, 2011). Extreme temperatures increase mortality risk especially among children and elderly people. As observed by Gouveia, in the city of São Paulo for every 1°C increase in temperature above 20°C, there is a 1.5% increase in overall adult mortality, a 2.6% increase in children and a 2.5% increase in the elderly.

4. Avoiding Hazard Creation in Urban Settings

Social, political and economic forces create both vulnerabilities and anthropic-hazards. A lot of attention has been put in the social construction of vulnerabilities while the processes underlying hazard creation, such as unplanned urban development, receive much less attention by the disaster research community.

For avoiding hazard creation in urban settings, we need to understand how social, economic and structural vulnerabilities influence both natural-hazards intensification and anthropic-hazards production, and the whole chain of events and motivations behind the production of hazardous materials. Despite some studies on the effects of human-induced air, soil and water pollution in cities, which have greater impacts than disasters caused by natural-hazards, there are still many questions regarding responsibilities, attributions and solutions. Answering these questions requires, first, taking into account some neglected forms of human threads (Wisner & Gaillard, 2009) as well as an equalization between on-set and creeping technological disasters. It is to say that air pollution that causes hundreds of thousands of deaths in cities across China should follow the same procedures of attribution, responsibility and compensation as a dam burst or a radioactive leaking.

Attribution of the causes of technological disasters is crucial to determine whether disaster risk reduction should focus on human actions that create hazards and vulnerabilities or if we should keep just mitigating the impacts of human-induced disasters. In practical terms, are we going to mitigate the climate emergency by investing in reverse engineering, consumer's education, cooperation, anti-corruption policies, fair trade, externalities inclusion, social ethics and etc.? Or are we going to keep buying air conditioners that put us in a vicious cycle, "where temperatures go up, so we run more air conditioners, which only makes it hotter, and on and on"? (Gates, 2019)

Making this decision requires knowledge of why anthropic-hazards are still neglected as major risk drivers for technological disasters and the current climate crisis. As in Wisner and Gaillard (2009: p. 155) "neglect extends to the understanding of and attention to the issue of why people suffer as well as who suffers from disasters and who does not".

Furthermore, better understanding of how public and private sectors, civil society organizations, the academy and lay citizens perceive their role and their responsibilities in avoiding anthropic-hazard creation in cities are also needed. Urban actors are not passive victims of technological disasters. Instead, they all contribute to anthropic-hazard creation and consequent technological disasters in ur-

ban settings. Therefore, disaster research and global campaigns to reduce disasters in urban settings should no longer view rapid and unplanned urban development solely as a vulnerability driver, but instead consider it as the main source of anthropic-hazard creation and the complex interaction between both.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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