

# Urbanisation and Climate Change

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Rapid urbanisation is one of the megatrends of the 21<sup>st</sup> century. At the beginning of this century, less than half of the world's population lived in cities. By 2050, no less than two-thirds of humanity, or some 6.5 billion people, will be living in cities. This dramatic growth entails massive pressure on the environment and a galloping demand for essential services, infrastructure, jobs, land, and affordable housing. Almost every city dweller in the world today can relate to this reality.

At the global level, we have been slow to react to this phenomenon. As I write this, the UN estimates that more than one billion people around the world live in slums or “informal settlements” without access to the basic necessities for a dignified life. These settlements have been growing for many decades and are a testimony to our failure to manage urbanisation.

Climate change is another defining feature of the century, and indeed one which we are also failing to address. While grappling with the COVID-19 pandemic, the world has almost forgotten this perhaps much more ominous and long-term crisis. Let us remind ourselves that the COVID-year of 2020 started with the wildfires that burned through the Australian bush in an uncontrollable manner and caused death and damage on an unprecedented scale. In August we experienced the hottest temperature to ever be recorded in the world – 54.4 degrees centigrade – in Death Valley, USA. As I write this, raging wildfires are forcing people to flee from their homes in North America. Not a day passes without the impact of climate change being felt on our lives.

Cities are highly vulnerable to the impact of climate change. We have coined the term “climate refugees” referring to people who are compelled to migrate because of severe weather events and often choose to move to the nearest urban centre, thereby pressuring already scarce resources. Yet cities are also the main contributors to climate change. Cities account for over 70 percent of greenhouse gas (hereafter GHG) emissions and 60 percent of total energy consumption.

So how can we protect cities from the effects of climate change while, at the same time, ensuring that their very negative impact on the environment is minimised?

There are a few global instruments that offer some clues. The 2015 Sendai Framework for Disaster Risk Reduction illustrates how vulnerable our cities are to disasters which are increasingly induced by climate change. The framework highlights the role of land use, urban planning, building codes, and environmental resource management in reducing disaster risks. Goal 11 of the Sustainable Development Goals (SDGs) aims to make cities inclusive, safe, resilient, and sustainable. The 2016 New Urban Agenda offers a 20-year road map for implementing SDG 11 and enhancing the role of cities in attaining sustainable development. Under the Paris Agreement on climate change, world leaders pledged to voluntarily reduce their greenhouse gas emissions to keep the mean global temperature rise below 2°C and ideally below 1.5°C from pre-industrial levels. Countries articulated their ambitions in the Nationally Determined Contributions (NDC) frameworks which outline greening measures to be adopted by cities.

These global aspirations outline what is required for urbanisation to be sustainable. It is certainly a formidable challenge as cities must be able to offer their inhabitants a wide range of opportunities and services that cut across all sectors of our society and economy. They include jobs, affordable and safe homes, health services and education opportunities, electricity, clean water, infrastructure, and public transport as well as safe, green, and clean public recreation spaces. The list goes on. And all of this must be accomplished while coping with the impact of climate change. Regrettably, at the national level, plans, policies, and budgets often do not take into account carbon emissions or climate-related risks. Further, they are not well integrated with national priorities such as National Adaptation Plans<sup>1</sup> (NAP) or NDCs. Despite innovations already underway, setting up systems that track carbon emissions or show risks at the city block scale come at a cost which many cities cannot afford. This means that cities are struggling to demonstrate need, prioritise action, and secure global financing that can bring catalytic investments.

Against these odds, remarkably, the COVID-19 pandemic has created a silver lining. We have seen how video conferencing technology has reduced

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<sup>1</sup> <https://unfccc.int/topics/adaptation-and-resilience/workstreams/national-adaptation-plans>

the demand for air travel. We also learnt that, with the use of digital solutions, we can be efficient and productive at home, thereby reducing commuting emissions and decreasing traffic congestion. As a result, we expect the largest annual fall in GHG emissions ever recorded, perhaps by as much as eight percent. That would be a six times sharper reduction than during the 2008 financial crisis or twice the combined reductions since 1945.<sup>2</sup> This situation presents a historic opportunity to pursue a green recovery and to build sustainable and climate-proof cities. In fact, besides numerous economic stimulus and recovery packages, policy makers and leaders are reimagining the future of cities and investing in bold adaptive solutions to achieve sustainable development.

### **Adapting to Climate Change**

We know that the impact of climate change will be fateful. Here in Bhutan we will see an increase in average temperatures. We will get less rain in the dry season and more rain during the wet season. Rainfall will become both more intense and erratic. This will cause greater threats of hydro-meteorological and geological disasters such as glacial lake outburst floods, landslides, earthquakes, river erosion, flash floods, windstorms, and forest fires. This is the reality that we must factor into our urbanisation plans.

I wish to highlight a few aspects of urbanisation and climate adaptation in Bhutan, and in Thimphu in particular, that UNDP has been working on with national stakeholders and in which we have gained some insights.

### **Infrastructure**

The quality of infrastructure - the engineering methods and types of materials used - will determine how resilient a city will be when disaster strikes. Thimphu, and indeed most urban areas of Bhutan, are vulnerable to earthquakes, flash floods, and fires. Examples of how we can make our infrastructure more disaster proof includes increasing bridge clearances to accommodate higher water levels, increasing design specifications for culvert diameters, and reconsidering the design of road underpasses to account for heavy rains and flooding. Evidently, climate and disaster-proofing of public infrastructure require significant investments, but superior quality infrastructure can better withstand heavy use and adverse

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<sup>2</sup> Global Energy Review 2020, IAEA

weather conditions, will last longer, and is much safer. City leaders must recognise that major development decisions taken today in cities will certainly avoid greater costs in the future. Many disasters have taught us that “one dollar of prevention today can avoid as much as four dollars of post-disaster reconstruction expenditure in the future”.<sup>3</sup>

### **Energy Efficiency and Security**

Making our buildings more energy efficient through better insulation and residential-based heating systems (such as solar thermal technologies) is a concrete example of cities contributing to climate action. Buildings in Bhutan are not appropriately built for its temperate climate and, in 2014, buildings consumed 42% of energy nationally.<sup>4</sup> Bhutan’s Green Building Guidelines already propose several practical steps, but their implementation require both incentives and enforcement. As Bhutan builds its in-house capacity in the construction sector through the Build Bhutan programme, we have a once in a lifetime opportunity to “future-proof” our infrastructure by training personnel and shifting the focus towards investing in quality. This will ensure that the infrastructure we build today is low-emission, resource efficient, safe, and resilient.

Strengthening energy security is an important aspect of building climate resilience. Bhutan is heavily dependent on hydropower for electricity which is vulnerable to fluctuations in precipitation, snowpack, and the volume and timing of stream flows. Strengthening energy security by diversifying energy sources – such as solar panels, biogas, and other renewable energy tools – has become a priority. Progressive investments in renewable energy should be part of Bhutan’s adaptation strategy and green recovery plans from the COVID-19 crisis.

### **Transport Sector**

Bhutan enjoys the reputation for being carbon negative. But we should not drop our guard. The transport sector is a major emitter of GHG, accounting for more than 30 percent of the total energy consumed in the country.<sup>5</sup> In recent years, the number of vehicles has been growing by 10 percent every year and this has led to traffic congestion, deteriorating roads,

<sup>3</sup> GFDRR 2010

<sup>4</sup> Ministry of Economic Affairs, Royal Government of Bhutan

<sup>5</sup> Bhutan Energy Efficiency Baseline Study, 2010, Ministry of Economic Affairs and UNDP Bhutan

and excessive on-street parking, also affecting the air quality. One study has shown that unless bold action is taken in terms of reducing oil consumption in the transport sector by introducing energy efficient vehicles, electric vehicles, and public transportation, Bhutan's GHG emission will exceed carbon sink by 2030.<sup>6</sup> In other words, Bhutan will then no longer be carbon negative. Efforts to shift investments from fossil-fuel to electric vehicles, improve existing bus services, promote non-motorised transport such as pedestrianisation and cycling, strengthen enforcement of emission standards requirement for all existing vehicles must be accelerated. For instance, as part of their response to the COVID-19 crisis, cities like Paris, Rome, and Bogota built new or repurposed existing bicycle lanes to reduce crowding on public transport and help prevent the spread of the virus, improve air quality, and facilitate delivery of services during the crisis and the post lockdown phase.

### **Water and Sanitation**

Climate change and water supply are intricately intertwined as water sources, including wetlands and lakes, are drying up. Climate change aggravates water resource constraints, particularly for the urban poor. Growing demand and shrinking availability will cause water prices in cities to increase and have a profound impact on public health, affecting both personal hygiene and public sanitation. Changes in global temperatures and precipitation can also lead to the greater prevalence of dengue, malaria, and other infectious diseases in densely populated areas. Today, 700 million urbanites live without improved sanitation, contributing to poor health conditions and heavy pollution in waste water, and 156 million live without improved water sources.

In Bhutan, almost 99.5 percent of people have access to improved water sources, yet only 63 percent has 24-hour access to drinking water. In water-rich Bhutan, 32.9 percent of people still consider adequate water a primary concern. The water system in Thimphu is faced with a myriad of problems such as inadequate and unequal distribution, illegal tapping and diversion, and the high presence of *Escherichia coli* (*E. coli*) at certain sections of the Wang Chhu. To make matters worse, the old distribution system causes losses of huge volumes of water – up to 50 percent. That is a figure worth reflecting on – almost half of all the water supplied to Thimphu is lost

<sup>6</sup> Economic-wide effect of Carbon Neutrality on Bhutanese Economy, National Environment Commission, 2019

and will never reach its intended users. With the application of sensing technology and proactive management systems, many cities around the world have overcome this conundrum. The city of Tokyo, for example, reduced water loss from 20 percent in 1956 to just 3.6 percent in 2006 through the use of leakage prevention and detection technologies.<sup>7</sup> Another example of making the most of available resources is Singapore’s “toilet to tap” concept. If we invest in well-tested technologies to reduce wastage and optimise existing water resources, we might be able to ensure adequate water for all.

## Waste Management

The image of an overflowing trash bin has become an icon of urban life. Globally we generate a staggering 2.01 billion tonnes of solid waste annually and, on average, one individual generates 0.74 kg of solid waste every day. Urbanisation is clearly exacerbating this problem. In developing countries, solid waste disposal systems are often inadequate or non-existent. Solid waste is frequently dumped and accumulates in canals, waterways, and areas otherwise intended for water runoff or flood control, making these cities particularly vulnerable to floods and contamination of ground water. The average urban household in Bhutan generates almost twice as much waste as the average rural household. Thimphu’s only landfill has reached its capacity, and our ground water is threatened with contamination. The principle of three Rs - Reduce, Reuse and Recycle - must be rigorously pursued before the waste management situation becomes completely unsustainable. Current waste management practices can be transformed through a portfolio of solutions that have been rigorously tested and proven effective in terms of creating required incentives for people to change their behaviour. UNDP, together with the Royal Government of Bhutan, recently conducted a rapid perception survey which showed that people do understand the need to segregate waste at home. However, they do not segregate because they believe the “segregated waste” will be mixed in the landfill anyway. This shows that citizens need to be convinced about the efficiency of existing systems and that their actions and choices make a difference. A systems approach to waste management is critical since infrastructure alone will not solve the problem. Similarly, conventional public awareness campaign materials such as posters and jingles will not always

<sup>7</sup> [https://www.c40.org/case\\_studies/tokyo-world-leader-in-stopping-water-leakage](https://www.c40.org/case_studies/tokyo-world-leader-in-stopping-water-leakage)

lead to behavioural change. It takes time to identify the right messages and tools that nudge behaviour through a series of experimentation.

Organic waste presents promising potential for a circular economy. In Bhutan, waste accounts for five percent of GHG emissions. About half of that is food waste from households and hotels. If this can be productively turned into compost to support the country's flagship programme on organic farming, it will help reduce GHG emission while at the same time boosting the cultivation of clean and healthy crops. This, as mentioned earlier, requires substantial investments in behavioural changes to ensure segregation of waste at source, logistics networks for effective collection of waste, as well as adequate and reliable technology to turn waste into compost. The proactive engagement of private sector partners is essential to ensure sustainability of the circular economy model.

### **Re-imagining Future Cities**

Around the world, the COVID-19 pandemic has exposed the fragility of cities and deep inequalities in urban societies. One of the critical deficiencies of existing city plans globally is that they are often developed in a top down and technocratic manner. Plans will only be realistic and practical if the planning process engages both existing and future stakeholders of the city. Such stakeholders must include vulnerable members of the community including the elderly, people living with disability, people lacking digital solutions, women, and low-income households. The study assessing the impact of climate change on women confirm, for example, that the experiences of climate change are not gender-neutral, hence requiring differentiated responses.<sup>8</sup>

Data plays a critical role in understanding how the impact of climate change and rapid urbanisation in general affect these vulnerable groups. To ensure no one is left behind and guarantee equitable access to supplies and support to the marginalised population during disasters, we must invest in disaggregated data. Similarly, real-time data to obtain the pulse of the residents' experiences has allowed many people-centred city governments to ensure uninterrupted access to essential public services for all. It can be asking about everything from the satisfaction with water services to waste

<sup>8</sup> Gender and climate change, National Commission for Women and Children and UNDP Bhutan, 2019

collection services. Frequent and proactive use of big data to gauge the experience has added benefits as it enhances accountability and response efforts during disasters.

Capacities of local governments should be strengthened to steer sustainable development. In the case of the Thimphu Structure Plan, the assessment found that effective implementation has been constrained by a lack of clear governance guidelines, weak human resource capacities, as well as weak ownership of the plan among stakeholders. City leaders, planners and administrators must recognise that city governments are the drivers for reducing and addressing risks and providing critical basic services to the most vulnerable. City officials must mainstream risk reduction into urban planning, budgeting, financing, and management. Recognising that significant financial resources are needed, city leaders must foster partnerships with the private sector and explore innovative financing solutions. Business as usual will not keep up with the pace of either rapid urbanisation or surging climate change.

As policy makers around the world are thinking through the post-COVID world, we can reimagine the future of our cities. Efforts to adapt our cities and build their resilience require long-term vision and commitment. Cities that anticipate and integrate adaptation and resilience measures are likely to achieve sustainable development even in the face of a changing climate and high levels of urban migration.