

A vision for better subsistence: Design approach of a vertical city, Dhaka

Israt Jahan¹

¹, Department of Architecture, Military Institute of Science and Technology, Dhaka, Bangladesh
E-mail: isratroza08@gmail.com,
roza0513@gmail.com

Abstract - Dhaka is known as the most densely overpopulated city. More than 1500 people are moving every day to this city searching for livelihood, better education. With the load of population, this city is suffering to provide spaces to live and to breathe. This paper presents initially research result of installing tall buildings that employ green design elements to overcome the land-use problem of Dhaka city and provides a healthy comfortable urban atmosphere in conditions of rapid population growth and limited territories. As urban development builds, there is a requirement for new ideas and ways to deal with urban space arranging through the gigantic presentation of elevated structure development. In short, a vertical city is a whole human living space contained in a huge high rise. It is the one of way back to alive Dhaka city demolishing from overcrowded and environment pollution rather than to crushing forests and marshes to manufacture houses, malls, and plants, they can be set in a vertical pinnacle, serving to safeguard the environment.

Key Words: overpopulated, population, rapid, urban, vertical, environment

1. INTRODUCTION

With a quantity of 47,400 individuals for a square kilometre, Dhaka continued the most densely populated city on earth for the third consecutive year. [2] Different assessments recommend that if the current pattern of population growth continues, is expected to occur over the next 10–15 years, Dhaka will emerge as the sixth-largest urban cluster on the planet. [3] The Dhaka mega-urban centre is projected to reach an annual population growth rate of 2.98% by 2030, with the total population in the city territory surpassing 27.37 million by this time. [2] Different assessments recommend that if the current pattern of population growth continues, is expected to occur over the next 10–15 years, Dhaka will emerge as the sixth-largest urban cluster on the planet. [3] The Dhaka mega-urban centre is projected to reach an annual population growth rate of 2.98% by 2030, with the total population in the city territory surpassing 27.37 million by this time. [4] Rural dwellers immigrate to the urban focus either searching for work or to benefit themselves of metro offices, for example, medicinal services centres, training, etc.

City	Population per square kilometer
Dhaka, Bangladesh	47,400
Mogadishu, Somalia	28,600
Al-Raqqa, Syria	27,200
Surat, India	26,600
Mumbai, India	26,400
Macau, Macau SAR	26,100
Hong Kong, Hong Kong SAR	25,900
Tshikapa, Congo	24,100
Vijayawada, India	23,700
Mategaon, India	23,200

Fig -1: Population per square kilometer around the world

Such growth is hazardous not just for the earth as well as for human wellbeing. Urbanization is now one of the global development agendas. Based on the United Nations Sustainable Development Goal 11 (SDG 11), which aims to make urban communities and human settlements comprehensive, protected, healthy, and sustainable, the United Nations extended the SDG Agenda by adopting the New Urban Agenda in 2016. [5] The current urbanization pattern with its fast and uncontrolled expansion, has, however, put Dhaka's critical environment, ecology, and land resources at further risk, especially with the presence of highly eco-sensitive wetland areas in close proximity to the city. Improving the qualitative human experience of this city's environment by turning spaces into places is a key concern among urban planner and architects.

With the development of automobile high-tech, it is almost very easy to transform the horizontal load vertically. Tall structures are the most practical solution for any creating city that faces a land shortage. Vertical urban growth contributes, not only in facilitating more people, whether it is for working or living but also towards the environment. A vertical city, according to a nonprofit promoting the concept, is an "arrangement of interconnected mega towers" that could support hundreds of thousands of people. These buildings could be as tall as 400 floors and contain housing, stores, hospitals, schools, farms, and outdoor spaces, all in one construction or series of connected structures. [6] By creating vertical all structure, we could then utilize the land for food creation, amusement or natural assets, or leave it as

a natural area. These structures could likewise save energy and even produce their power.

The study aims at investigating and establishment the accelerating verticalisation of Dhaka city throughout with new natural spaces. Vertical Cities is to consider the particular idea of densely stuffed elevated structures. To make architecturally an original private skyscraper configuration by consolidating open and private green spaces all through its structure. The plan will start to energize collaboration and advance progressively durable living condition among its clients.

2. Materials and Methods

2.1 Conceptual framework

The chart displays the methodological approaches which include: (1) Data and Information collections; (2) Decision Support & analysis tools and (3) Access tools and Protocols.

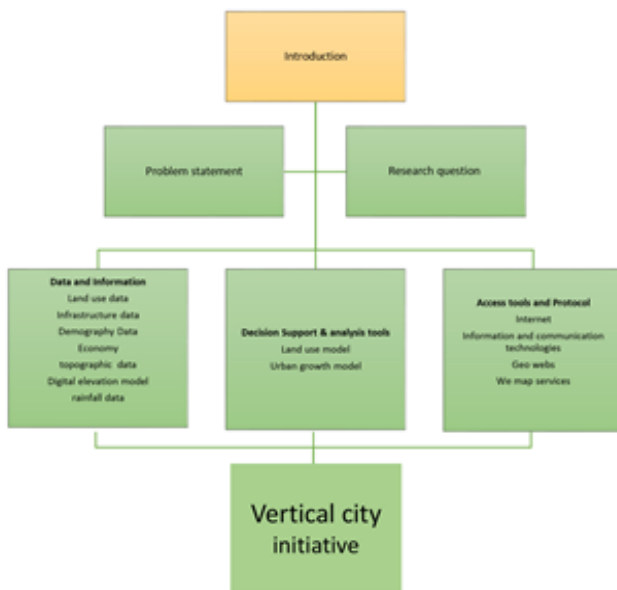


Fig -2: Conceptual Framework
Source: Author

2.2. Study Area

Dhaka city is located just north of the Buriganga River, a channel of the Dhaleswari River, in the south-central part of Bangladesh. Dhaka has the unique position of being at most centrally located (23.3–24.6° N and), covers a total area of 306.38 square kilometres (118.29 sq mi). (Figure 3). As the capital city, the populace, region, and social and financial assorted variety of Dhaka have developed massively. Along with its stream port of Narayanganj, 10 miles (16 km) toward the south, Dhaka presently is one of the most densely

industrialized locales in the nation.

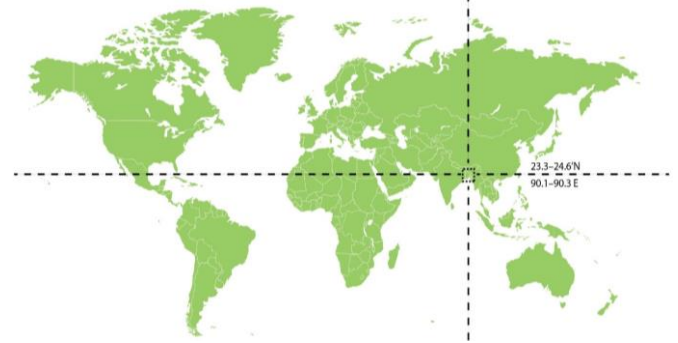


Fig -3: World map (locating Dhaka city)
Source: Author

It is now the heart of commercial development, giving significant financial, social, and social open doors for the whole country

Dhaka's urban development has not kept up with the city's fast growth; its urbanization process has been untidy and uneven. The need for satisfactory arrangement has led to congestion, destitute liveability and vulnerability to surges and earthquakes. Dhaka's numerous inhabitants include 3.5 million slum tenants. [7]



Fig -4: Thana distribution, Dhaka
Source: <https://www.google.com/search?>

Between 1995 and 2005, the area of the street surface in Dhaka grew by around five per cent, while the city's population grew by 50% and its activity by 134%. Overcrowding in Dhaka wastes 3.2million working hours per day. [7]

Figure 4 displays the location of Dhaka with sub-district (Thana) boundary distributions. Figure 5 appears that two patterns are clearly recognizable from the figure: (1) Built-up zone and uncovered soil expanded slowly over the periods; and (2) water body and vegetation declined steadily. More particularly built-up zone expanded by 88.78% within the past 20 years, from 1989-2009. The map results propose that around 49% and 57% of the Dhaka city region will be changed over into build-up area land.

Dhaka City, which is continuous with areas comprising the more extensive metropolitan region, was home to more than 15 million people as of 2013. The population is increasing by an estimated 4.2% every year, one of the highest growth rates among all Asian cities.

This growth rate influences migration movements from rural zones to Dhaka, which accounted for 60% of the city's expansion between 1960 and the 1980s.

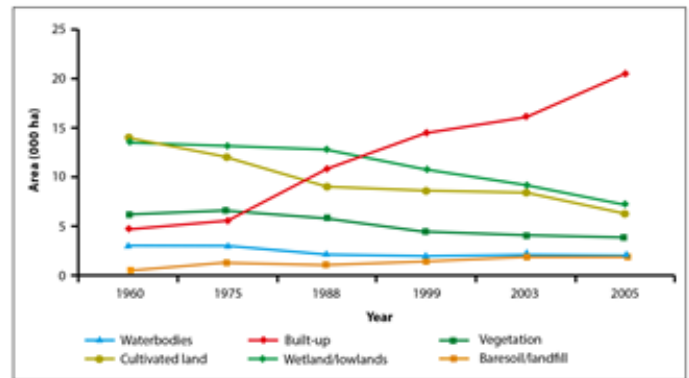


Fig -6: Chart of land use pattern, Dhaka city
Source: Google.com

The Far Eastern Economic Review estimates that Dhaka will have a population of 25 million by 2025. [8]

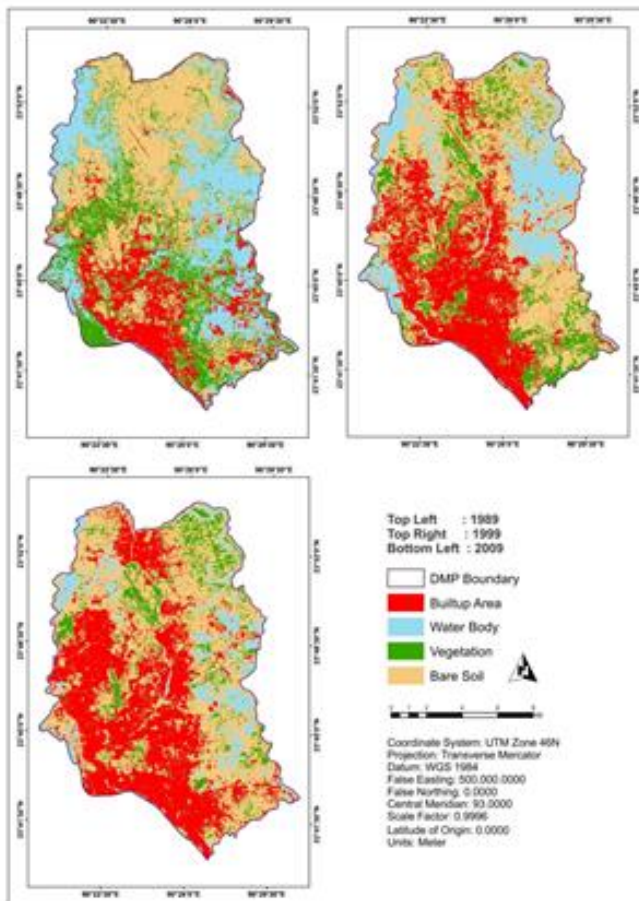


Fig -5: Land use map of Dhaka city

Source: <https://www.google.com/search?q=land+use+map+of+dhaka+city&sxsrf=ALeKk03b9SAptgRjnqXBox5Q3-YZXPQEXA:1592660364120&tbm=isch&source=iu&ictx=1&fir=rQGANqRO6Z>

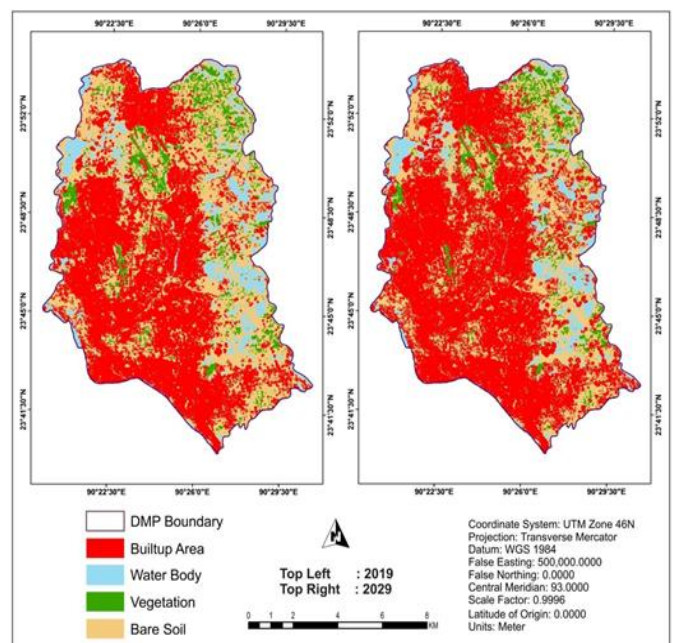


Fig -7: MLP Markov model simulated land cover maps of Dhaka city area (2019 & 2029)

Source: Asia Times. Planet of Slums by Mike Davis. Asia Times. 20 May 2006. Available online: http://www.atimes.com/atimes/Front_Page/HE20Aa01.html (accessed on 8 May 2010).

3. Implementation of vertical city

3.1. Typology of building

According to the land use map, Dhaka city is labelled with different zones like residential, industrial, commercial, mixed-use, etc. Concerning the prototype vertical tall tower can be established. As figure, a conceptual section where building is marked with color regarding its user type.

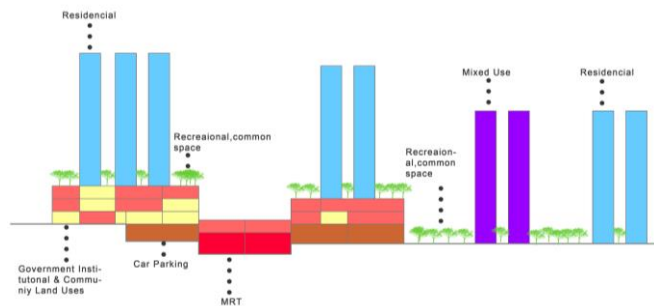


Fig -8: Conceptual section of vertical city
Source: Author

3.2. Transitioning horizontal to a vertical living

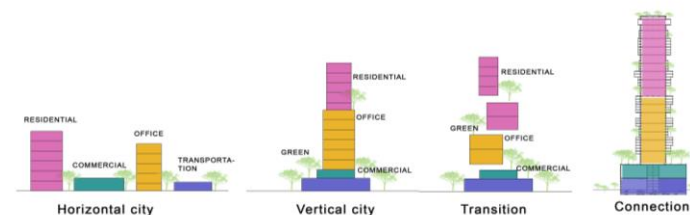


Fig -9: Transition of vertical city
Source: Author

The vision was to make the very best quality modern living and workplace by emphasizing daylight, fresh air, and a central connection to the outside. On a basic level, living and dealing during a structure several accounts high makes an excellent deal of sense; it decreases air contamination and lessens the need for all the streets that administration is even urban communities. This new understanding would permit occupants to understand a more advantageous way of life, regarding characteristic components and improving their neighborhood network.

3.3. Design approach

The concept was to re-interpret it as an opened structure, with green areas on each level and more natural light and ventilation. The building's design is predicated on a modular structural prefabricated element, which is repeatable horizontally also as vertically. The design can be procedure into three divisions. 1) Urban scale, 2) nationhood scale, 3) unite scale

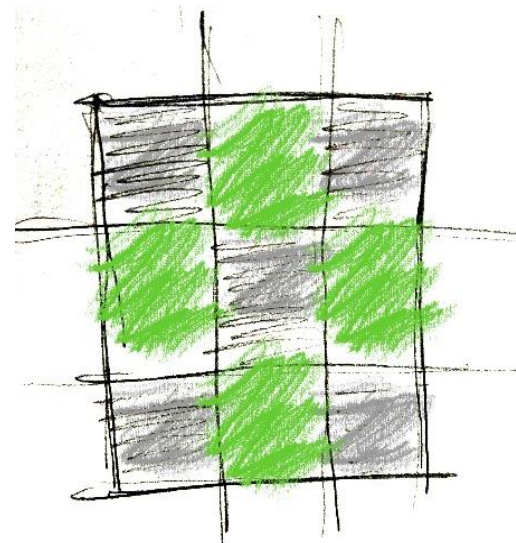


Fig -10: Conceptual sketch of dividing urban scale
Source: Author

On unite level if we discuss, the city-building is needed to allow the circulation of air and lightweight on each level, treating green areas and vertical gardens.



Fig -11: Section of model
Source: Author

The form of the tower is derived from an inverse of the tower, this design can be use as prototype, which is typified by a dense modular structure.



Fig -12: Birds eye view_01



Fig -13: Birds eye view_02
Source: Author

Applying this archetype in a densely horizontal city, we can hopefully get some space to breathe and a more desirable environment to live. According to S. Nepomnyashchy, for 1 hectare of land in a heliocluster with a height of up to 35 floors, there will be 100,000 square meters of housing and 100,000 square meters of additional infrastructure, including offices, parks, traffic intersections, shopping areas and service facilities. [9]

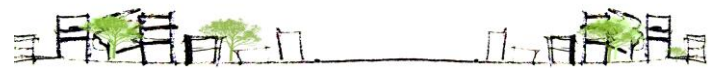


Fig -14: Present condition

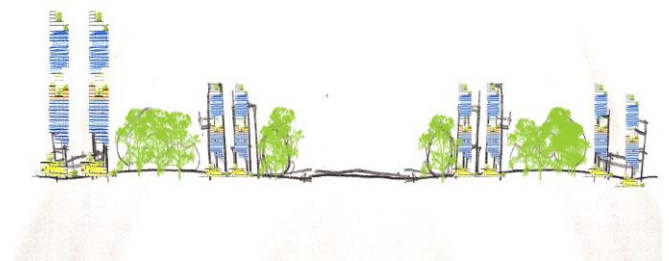


Fig -15: Expected scenario
Source : Author

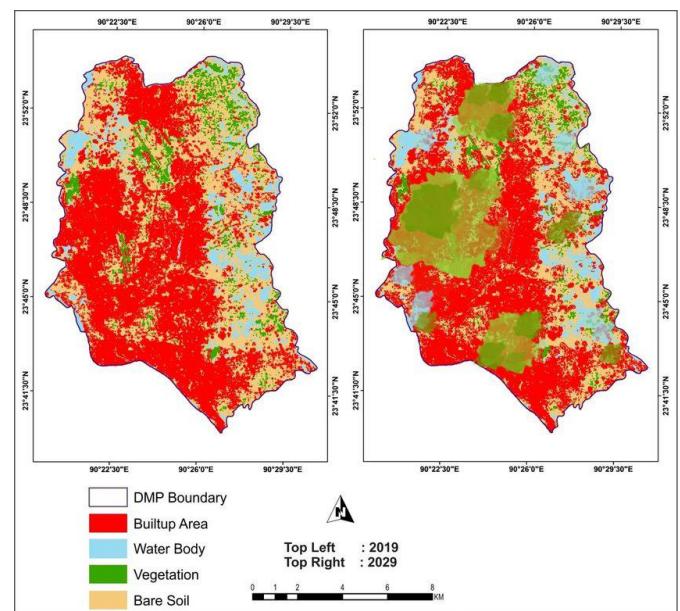


Fig -16: Expected land use pattern

The following figures are the scenario of what we have and what we can accept to establish a vertical city.

4. CONCLUSIONS

At present, the idea of vertical urban areas of Dhaka city is hypothetical. However, cities like Singapore and Shanghai create vertical towns, which is the next logical platform of development. With this consistent advance in the development of urban planning the formation of a humane ecological urban environment. Through establishing Vertical Cities, we can spare vitality, sustain our developing populace, and safeguard our even spaces for food creation, nature, and amusement.

REFERENCES

[1] <https://www.businessinsider.com/dhaka-bangladesh-most-crowded-city-in-the-world-2018-11>

[2] <https://www.dhakatribune.com/bangladesh/dhaka/2018/10/14/dhaka-remains-the-world-s-most-densely-populated-city>

[3] Klaufus, C.; van Lindert, P.; van Noorloos, F.; Steel, G. All-Inclusiveness versus Exclusion: Urban Project Development in Latin America and Africa.

[4] United Nations. The World's Cities in 2016: Data Booklet. Econ. Soc. Aff. 2016, 29. Available online: http://www.un.org/en/development/desa/population/publications/pdf/urbanization/the_worlds_cities_in_2016_data_booklet.pdf (accessed on 20 September 2017).

[5] Klaufus, C.; van Lindert, P.; van Noorloos, F.; Steel, G. All-Inclusiveness versus Exclusion: Urban Project Development in Latin America and Africa. Sustainability 2017, 9. [CrossRef]

[6] <https://www.planetizen.com/blogs/101788-vertical-cities-can-mega-skyscrapers-solve-urban-population-overload>

[7] WorldBank.AModernDhakaIsKeytoBangladesh'sUpper-MiddleIncomeCountryVision;WorldBank: Washington, DC, USA, 2017. Available online: <https://www.worldbank.org/en/news/press-release/2017/07/19/modern-dhaka-key-bangladesh-upper-middle-income-country-vision> (accessed on 10 September 2018).

[8] Bangladesh Bureau of Statistics (BBS). 2011 Population and Housing Census: Preliminary Results; BBS: Dhaka, Bangladesh, 2012. Available online: http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/7b7b171a_731a_4854_8e0a_f8f7dede4a4a/PHC2011PreliminaryReport.pdf(accessed on 8 September 2018).

4a/PHC2011PreliminaryReport.pdf(accessed on 8 September 2018).

[9] Bangladesh Bureau of Statistics (BBS). 2011 Population and Housing Census: Preliminary Results; BBS: Dhaka, Bangladesh, 2012. Available online: http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/7b7b171a_731a_4854_8e0a_f8f7dede4a4a/PHC2011PreliminaryReport.pdf(accessed on 8 September 2018).