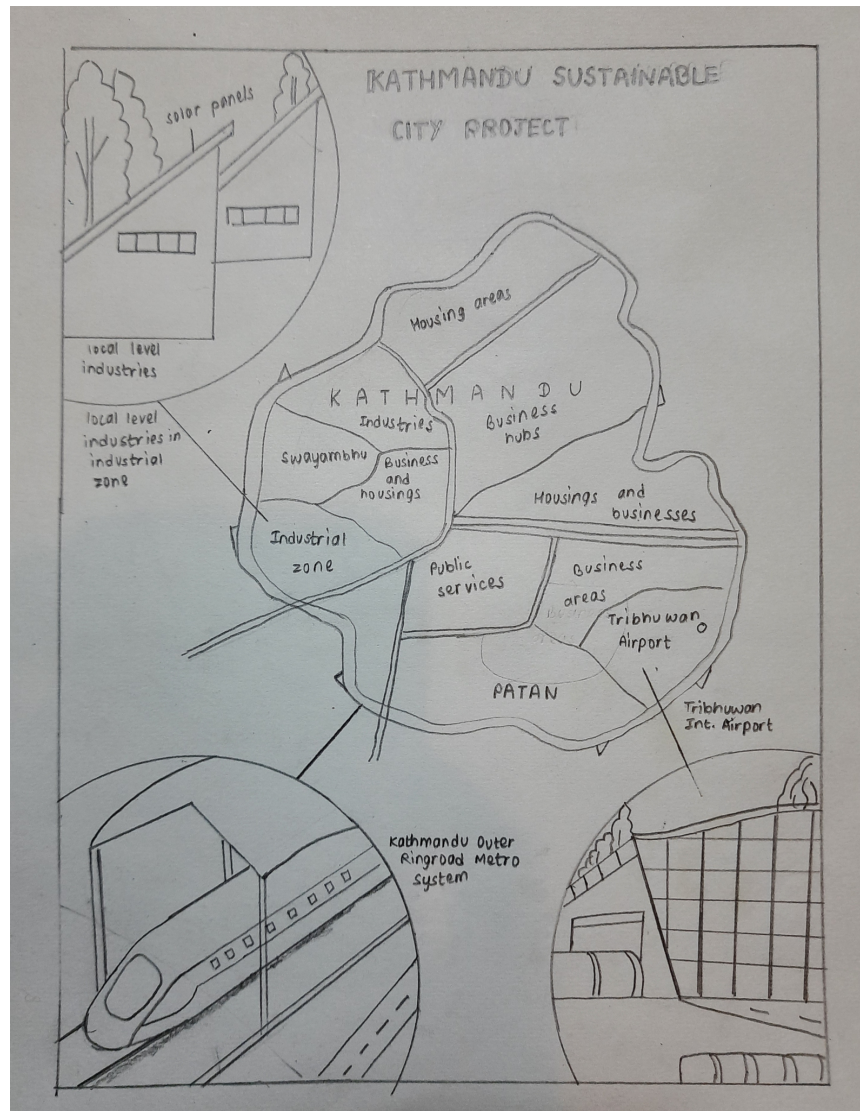


KATHMANDU SUSTAINABLE CITY



Design Kathmandu Contest

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Grade 11

St. Xavier's College, Maitighar

INTRODUCTION



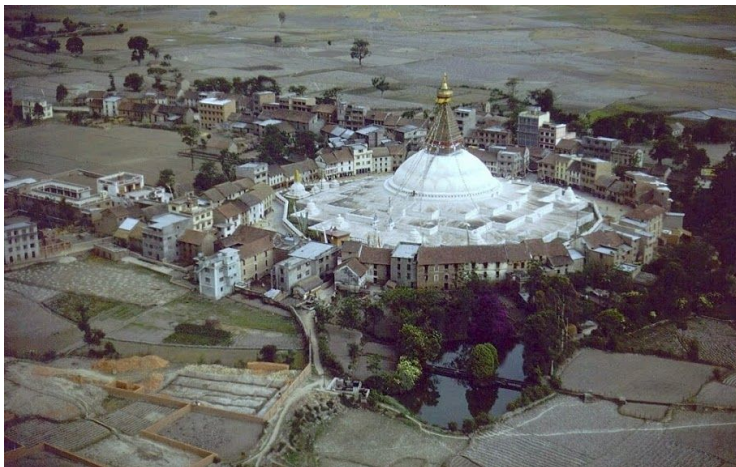
Fig: Kathmandu valley

Kathmandu Sustainable city projects aims to build our capital into a planned and developed city renowned in the world for being self-reliant and sustainable. Our motivation behind the project is to coexist in our environment to provide greater benefit to both the environment and us. With global warming and increased environmental depletion, it is important to focus on building cities which will last long without harming our resources. And this project is the answer to our better future as it will create a city which is self-sufficient as it provides for itself, powers itself and is a safe haven for people who reside in it. Our purpose is to bring technology, human beings and natural resources to create the ultimate city which will be the answer to problems like global warming, excess carbon emission, unmanaged wastes, etc. Kathmandu Sustainable city strives for the better future of our lovely city so it can thrive for generations to come and be an example and basis for many other cities which will be built in the future.

1. RESEARCH ON PRESENT STATUS OF KATHMANDU

1.1 History

The Kathmandu Valley, which was already called “Nepal” centuries before the emergence of the modern nation-state of that name, is a 220 square mile bowl, 4,000 feet up in the lap of the central Himalaya. Its history begins with a myth which tells of how the Bodhisattva (“Buddha-to-be”) Manjushri came down from the north and cleaved the valley rim to release the waters of an enormous lake, thus rendering the valley habitable for the propagation of the Buddhist faith.



The Kathmandu Valley was conquered by King Prithvi Narayan Shah and Kathmandu became the capital of modern Nepal by 1769. Kathmandu has steadily developed ever since and settlement slowly started booming. The valley’s indigenous Newars developed their own distinctive style of traditional architecture, of which the multi-tiered “pagoda” temple is the most emblematic form.

1.2 Administration and Government Status

Nepal has been a federal state with the promulgation of its constitution in 2015, Nepal replaced a unitary government with a federal system of government. This process has made Nepal a federal democratic republic governed with three levels of government: a federal level, seven provinces and 753 local governments. The central power has been decentralized providing opportunities for lower level bodies to develop at a rapid pace.

Nepal as a secular federal parliamentary republic where President Bidya Devi Bhandari is the head of the country while Prime Minister K.P Sharma Oli is the head of government. Our country has been dealing with political uncertainty for years ever since the introduction of democracy.


Nepal's domestic politics have been undergoing a turbulent and significant shift. On December 20, 2020, at the recommendation of Prime Minister KP Sharma Oli, President Bidya Devi Bhandari dissolved the House of Representatives, calling for snap elections in April and May 2021. Oli's move was a result of a serious internal rift within the ruling Nepal Communist Party (NCP) that threatened to depose him from power. Opposition parties and other civil society stakeholders have condemned the move as unconstitutional and several writs have been filed against the move at the Supreme Court (SC) with hearings underway. Massive protests have taken place condemning the prime minister's move. If the SC reinstates the parliament, Oli is in course to lose the moral authority to govern and could be subject to a vote of no-confidence. If the SC validates his move, it is unclear if he would be able to return to power with a majority.

1.3 Geography and Climate

Kathmandu is in the northwestern part of the Kathmandu Valley to the north of the Bagmati River and covers an area of 50.7 km² (19.6 sq mi). The average elevation is 1,400 metres (4,600 ft) above sea level. The city is bounded by several other municipalities of the Kathmandu valley: south of the Bagmati by Lalitpur Metropolitan City (Patan), with which it forms one urban area surrounded by a ring road, to the southwest by Kirtipur and to the east by Madyapur Thimi. To the north the urban area extends into several municipalities; Nagarjun, Tarakeshwor, Tokha, Budhanilkantha, Gokarneshwor and Kageshwori Manohara. However, the urban agglomeration extends well beyond the neighbouring municipalities, e.g. to Bhaktapur, and nearly covers the entire Kathmandu Valley.



Five major climatic regions are found in Nepal. Of these, Kathmandu Valley is in the Warm Temperate Zone, elevation ranging from 1,200 to 2,300 metres, where the climate is fairly temperate, atypical for the region. This zone is followed by the Cool Temperate Zone with elevation varying between 2,100 and 3,300 metres. Under Koppen's climate classification, portions of the city with lower elevations have a humid subtropical climate, while portions



of the city with higher elevations generally have a subtropical highland climate. In the Kathmandu Valley, which is representative of its valley's climate, the average summer temperature varies from 28 to 30 °C. The average winter temperature is 10.1 °C.

1.4 Demography of Kathmandu

Kathmandu is Nepal's largest city with a population of 1.4 million and also the only city in Nepal that has a population that has surpassed the 1,000,000 milestone. However, The Kathmandu valley includes 3 cities – Kathmandu, Lalitpur and Bhaktapur with a total area of 570 sq. km. The population of the valley is 2.5 million with an annual growth rate of 4.63% (3.5 million unofficial). This represents 9.32% of the entire population of the country.

Kathmandu is a city full of people from different casts and racial backgrounds. Some of the most prominent casts or ethnic groups in Kathmandu include:

1. Brahman-Hill (24%)
2. Newar (22%)
3. Chhetri (20%)
4. Tamang (11%)
5. Magar (4%)

Along with that hinduism, buddhism, islam, kirat, christianity, etc are the main religions followed by people in the captial.

Chart and table of population level and growth rate for the Kathmandu, Nepal metro area from 1950 to 2021. United Nations population projections are also included through the year 2035.

- The current metro area population of Kathmandu in 2021 is **1,472,000**, a **3.37% increase** from 2020.
- The metro area population of Kathmandu in 2020 was **1,424,000**, a **3.49% increase** from 2019.
- The metro area population of Kathmandu in 2019 was **1,376,000**, a **3.46% increase** from 2018.
- The metro area population of Kathmandu in 2018 was **1,330,000**, a **4.15% increase** from 2017.

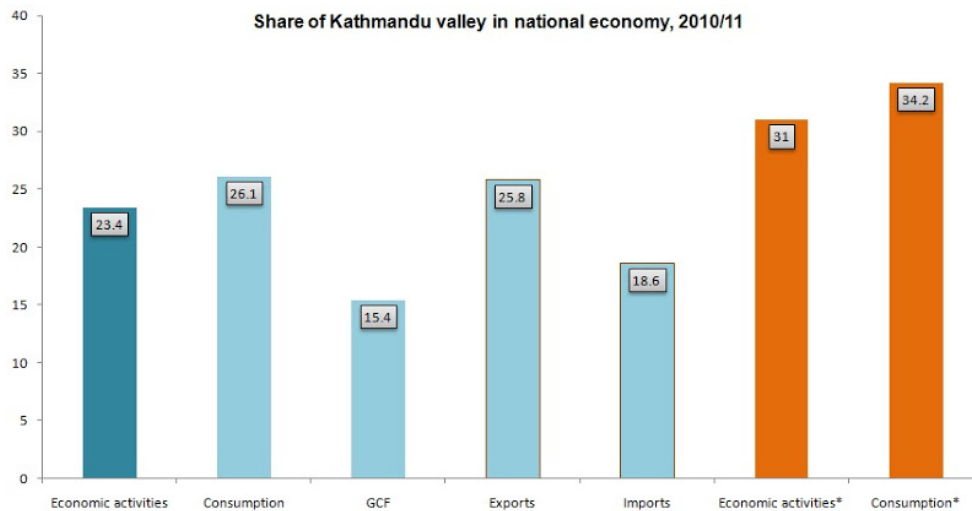
Kathmandu - Historical Population Data		
Year	Population	Growth Rate
2021	1,472,000	3.37%
2020	1,424,000	3.49%
2019	1,376,000	3.46
2018	1,330,000	4.15%
2017	1,277,000	4.07%
2016	1,227,000	4.07%

1.5 Economy of Kathmandu

Kathmandu is the fastest growing and the most developed city of Nepal. The Kathmandu Valley accounts for 30% of the country's gross domestic product and 50% of the total urban population, making it the country's single largest urban economy. With new industries, hotels, schools, hospitals, etc being built, Kathmandu has been creating a lot of job opportunities. The historical and cultural sites destroyed during the earthquake of 2076 B.S are being reconstructed and renovated creating more sources of income.

Before covid, Tourism had a big scope in Kathmandu because of all the facilities in the valley which includes wonderful hotels, beautiful places for sightseeing, great food and hospitality, shopping districts, etc. The main reason why Kathmandu is booming with tourism is because tourists arrive at Tribhuvan International Airport in Kathmandu and move onto other places of Nepal. After tourism, Online business is thriving in the capital

with the rise of digital paying apps like khalti, e-sewa, etc because covid lockdown has made it impossible for people to shop outside.



Source: NRB, 2012

Kathmandu is the main economic hub of Nepal, hosting several major industries such as handicrafts, carpets, garments, finance, and tourism, as well as health care and education. The industrial area in Kathmandu is advancing rapidly as supply and demand of products has increased. And such development will only grow faster in the near future.

1.6 Transportation



Fig: Local bus carrying passengers in Kathmandu

In Kathmandu, the main source of transportation include public buses, battery run three wheelers. However, they are heavily packed and usually try to hold more passengers than

allowed, especially during rush hours. Hence, they aren't very safe. For Long Distance travel outside the valley, Bus Service and domestic flights are available. International flights aren't a hassle for people living here due to Tribhuvan International Airport right in the capital.

1.7 Education

Kathmandu is well facilitated with educational institutions ranging from primary schools to colleges and multiple universities. Durbar High School The first formal school, Durbar High School, established by Jung Bahadur Rana in 1853 in Kathmandu so it is no surprise that there is no shortage of institutions in Kathmandu.

Some of the best as well as expensive schools in Nepal are located within the city. There are plenty of options of school to choose from as the whole valley is flush with schools and colleges. There are multiple colleges that provide quality education in different sectors like Kathmandu Model College, St. Xaviers College, Trinity International College, etc. Educational institutions are monitored by bodies like the Ministry of Education, etc to keep the level of education to par. Along with these facilities, higher levels of education like Phd programs etc are run by universities in the capital like one of the most renowned universities of Nepal "Tribhuvan University."



Not only that, there are other institutions in the valley which provide training programs, language courses, vocational training, etc and one of such institutions is CTEVT which has been helping in the production of technical and skillful human resources required to the nation. There are multiple public libraries in Kathmandu where people can enjoy your books in peace.



1.8 Culture

It is no surprise to see temples of different gods and goddesses surround every corner of the city. From world-renowned heritage sites like Pashupatinath Temple to small shrines with

vermillion-laden stone statues found in every nook and corner, Kathmandu is truly the city of temples. Kathmandu is also home to many significant gumbas like Swayambhunath, Baudhanath, etc and monasteries that people all over Nepal and Asia come to visit.

The city flourished with an uncountable number of temples and historic monuments that make us witness the past glory of Kathmandu. The most interesting things to see in Kathmandu is the lifestyle, food, festivals, jatras, etc.

1.9 Recreation

Kathmandu has no shortage of entertainment as there are plenty of fun things to do around the valley. Over the last decade, the capital has developed significantly in terms of better roads, parks, etc. We have advanced from mushy roads to black topped roads and better transportations. There are fun parks, amusement parks, water parks in the valley where one can enjoy all they want. However, it is to mention that the amusement and fun parks lack behind in a lot of things. They are not as exciting and don't have high roller coasters, etc. There are large grounds for children to play in most localities around Kathmandu. Even though these facilities are getting better over time, it is still not enough as Kathmandu pales in comparison to other capital cities in terms of recreation.




2.1 Sports



Kathmandu houses Nepal's biggest multi purpose stadium "Dasrath Rangasala" in Tripureshwor where national and international games regarding cricket, etc are hosted regularly. Cricket is the most common game played in the capital alongside football. Games like volleyball, badminton, table tennis, etc are also played here. Different varieties of sports are introduced in the school curriculum as well.

There are training centres for people who want to practice these kinds of games professionally. National level games are held regularly in the capital where thousands of



enthusiastic participants participate yearly. Kathmandu isn't short on people who want to pursue their career in the sports field as there are multiple opportunities within the capital.

2. DESIGN OF NEW KATHMANDU

2.1 Short introduction to Kathmandu Sustainable City Project

The small capital of Nepal, Kathmandu is known for being the most developed city in the country. Recognized for being the home to 7 of the 10 world heritage sites of Nepal and having a rich historical and cultural background, it is no surprise that the capital is thriving. Kathmandu has potential to grow further than any other cities in Nepal. My project, "Kathmandu sustainable city" has the vision to develop Kathmandu sustainably using the available human resources, budget, organizations, technology and building materials within our country mixed with foreign technology in a smart manner to build an ultimate city. This project will work towards making our capital self-reliant and sustainable by respecting our environment. Ideas like water treatment facilities, proper sewage systems, solar power plants, solar battery powered vehicles and bicycles, planned housing systems, etc have been introduced in my project for a better future of our lovely valley. Along with these ideas come the effort to protect the biodiversity, historical and cultural diversity within the capital and efforts include causes like a protected sanctuary for wild animals, well facilitated historical sites, etc. The project makes sure that every citizen within Kathmandu has access to basic needs like drinking water, proper accommodation, hospitals, education, and security. After which we move on to a higher level of work which involves building stadiums, malls, etc while also elevating the ones which already exist. This will be done using the power of science and technology and of course, the genius mind of human beings. And this is my project to build a city unlike any other in the world.

To convert Kathmandu into the city of my dream is a big goal. However it is not unachievable. Cities like Amsterdam are being taken into consideration while building Kathmandu as they have long achieved their goals of sustainability and are striving further. Sustainability requires the efficient use of resources. The least carbon- and energy-intensive pattern of settlement today is in compact, walkable cities whose integrated networks of infrastructure allow us to move, eat, drink, play, and survive extreme weather. As our population increases, we will need to build more infrastructure systems to accommodate growth and to increase sustainability. Yet we are building too little, too slow to maintain our existing infrastructure, let alone to facilitate next generation systems that will accelerate our society. Our transportation, water, parks, solid waste, and energy infrastructure systems are crumbling. With little political will for massive public works programs and current practices that are slow and costly, little to no developments

are made in our city. We need to be innovative as it won't take long for our infrastructures to crumble from mishap due to pollutants, mismanagement, etc. We are dreaming big of building a city which can sustain itself. The project is definitely difficult but not impossible. This project needs more than proper planning and budgeting. It requires the effort of everybody residing in the city for our Kathmandu to convert into a beautiful heaven. For now, the main things we need to focus on are:

1. Better housing facilities
2. Industrial zones away from settlements
3. Clean drinking water in every part of the city
4. Efficient transportation system
5. Waste and sewage management plant
6. Water treatment plants
7. Solar power plant
8. A city metro system and electric bus facilities
9. Protected sanctuaries and parks

Our main focus here should be:

1. Producing enough revenue to be self sufficient
2. Employment opportunities for the whole population
3. Basic needs to be fulfilled for every citizen
4. Separated industrial areas and housing area
5. A clean environment where every waste is managed

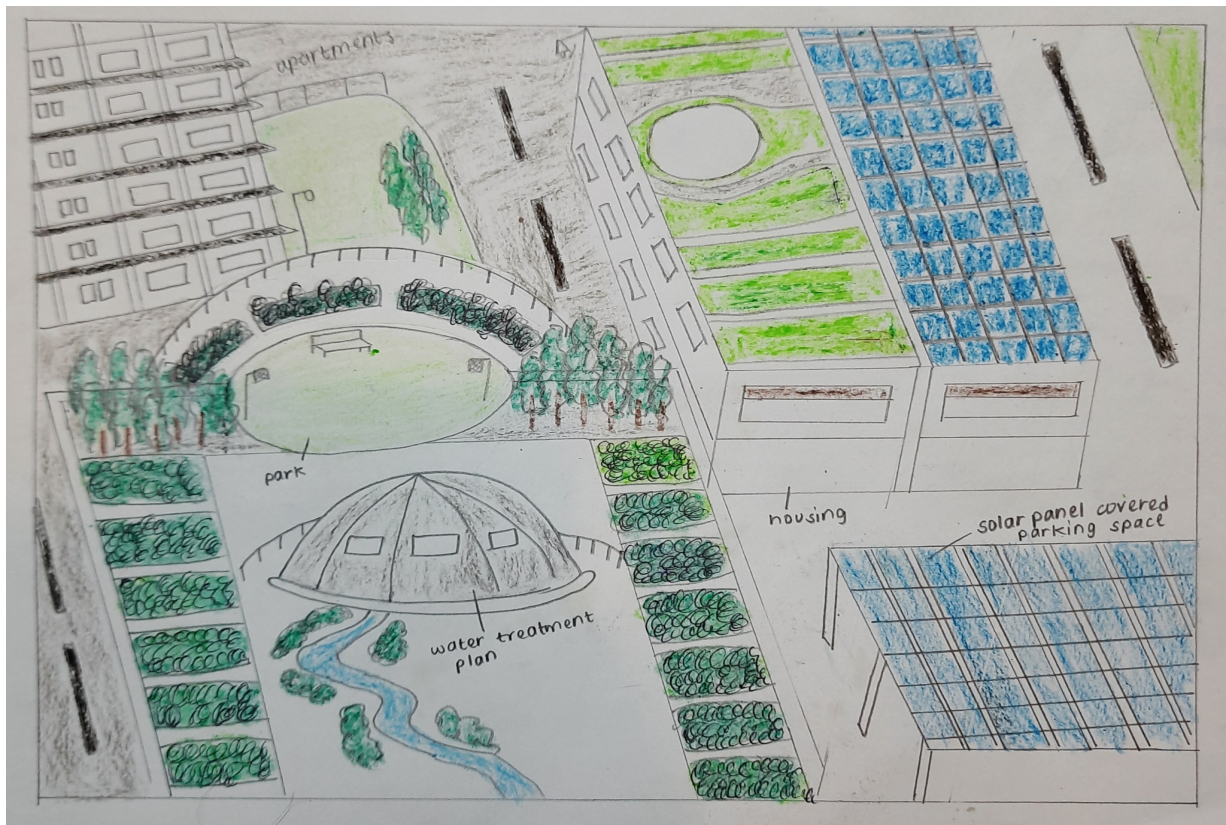
3. ULTIMATE DESIGN PLAN OF NEW KATHMANDU

3.1 Design and Architecture

3.1.1 Housing

The concept of housing for Kathmandu requires the understanding of effectively addressing slums, the urban divide, economic and human development.

Our first effort is to create these housing facilities far from industrial zones which will be located in the Balaju area. Places like manohara, baneshower, etc. are suitable for settlement. However, like industrial areas, housing won't be limited to one part of the city only. It will be built around the city but further from the industrial area.



This can be achieved by creating separate colonies, housing complexes for people from different economic status. Mixed class housing complexes will also be built to lessen the gap between rich and poor. Rich people will live in better facilitated complexes but it also comes with much higher revenues. These complexes will be built in a way people from lower economic classes can also afford them. However, the more facilitated the complexes, the higher the revenues.

Every apartment complex in the housing should at least have:

1. A bedroom, a bathroom, kitchen and living room at the least
2. Clean drinking water
3. Electricity

Every such housing complex will have:

1. A green playground where people of every age group can hang out
2. Solar panel covered parking lots, balconies in flats and rooftop in houses within the complex to generate more electricity
3. Water treatment plan within the complex to treat the used water in the facility to reuse it again
4. Waste collection and separation building to reuse, reduce and recycle wastes

3.1.2 Heritage Sites and Conservation

The historical and cultural sites of Kathmandu are an important part of its identity. Hence, it is important to keep these sites in proper state not only because they identify us but because it is important for the future generations to experience them too. Some of the famous heritages sites in Kathmandu are:

1. Pashupatinath Temple
2. Swayambhunath Temple
3. Basantapur Durbar Square, etc

Ways to promote the state of these sites are:

1. Regular maintenance and monitoring from government
2. A volunteer group for each important sites to clean it every week
3. Security in each sites to protect it from vandalism
4. Charge fees for tourists for entry to such sites

It is very important to keep such attractions clean and safe not only to attract tourists but also because they are our history and what reflects the glory of Kathmandu.

3.1.3 Roads and transportation

Transportation can be a big struggle to alternate in order to build a sustainable city. As difficult as it sounds to keep the carbon emissions low and protect the environment while also transporting masses of people everyday, an elaborate plan is needed.

Kathmandu lacks any kind of train or metro system so petrol and diesel is used to run buses and cars for transportation. Transportation that uses solar powered batteries or electricity should be used to reduce the use of fuels.

In order to make sustainable Kathmandu possible, following things are required:

1. Electrically conducted metro system on the outer ring road.
2. Solar panelled waiting stations for passengers all around the city
3. Promotion of three wheelers
4. Construction of better and larger roads surrounded by plants
5. Establishing Kathmandu as the cycle city by promoting biking
6. Better road safety and traffic light with in built solar panels

Kathmandu faces a lot of traffic jams in the present day and only increasing the side of the road isn't the solution. An answer to this question is building the city with a lot of overhead bridges where driving can be done efficiently. An overhead metro system which runs above the famous parts of the city will be established.



Fig: Sky metro system



Fig: overhead and underhead road system in USA

The overhead monorail system will run from Manohara to Baneshwor to Swayambhu and from Koteshwor to Kalanki, following the main highway. This will decrease the burden on buses and this whole system will be run with the electricity produced by hydroelectricity plants in the nation.

3.1.4 Stadiums and Business Centers



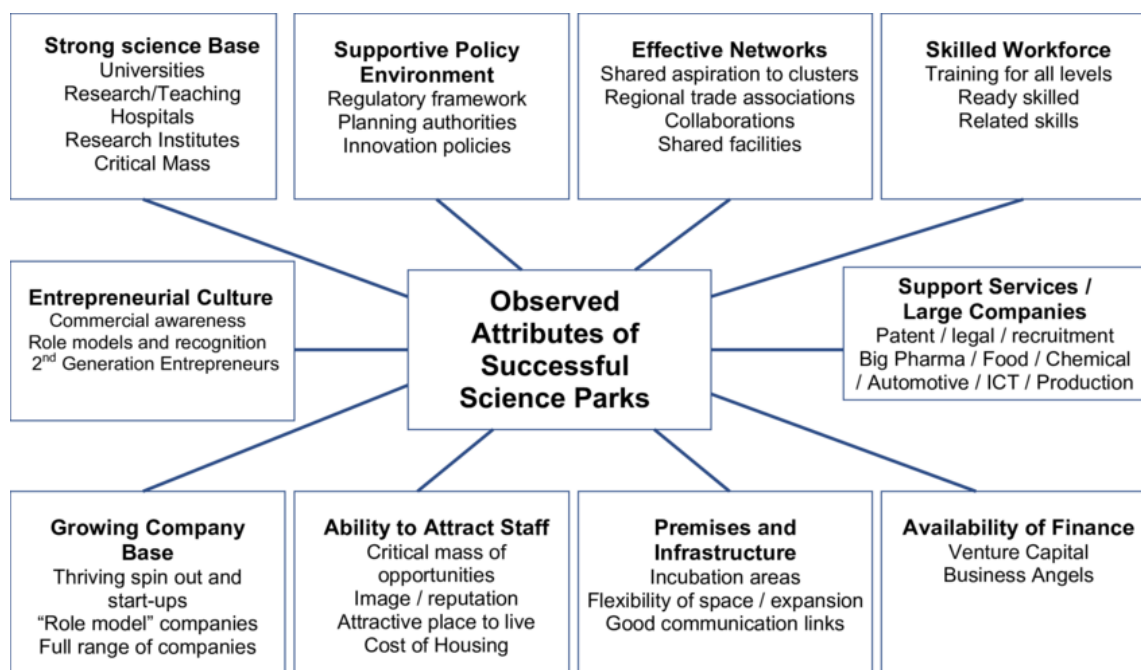
Fig: Eugenio Marongiu : Shutterstock showing a sustainable skyscraper

Kathmandu will be the hub of main businesses within the country. And this requires better business centres and grand hotels. The business complexes in Kathmandu like shopping centres, etc. As important as it is to make Kathmandu sustainable, it is equally necessary to modernize it at the same pace. So skyscrapers are the options here. Kathmandu will be filled with sustainable skyscrapers which will be powered by renewables: wind, solar and geothermal energy are combined to supply both towers with electricity and heat. Each skyscraper will have its own wind turbines and 500mq of solar panels on its roofs. Rain and greywater will be collected for further use.

3.1.5 Science parks and Museums

Kathmandu has plenty of museums around the NarayanHiti Museum, etc. Museums can boast both domestic and foreign tourism while also proving employment. In order to make them sustainable, we need to focus on reducing its consumptions i.e producing less waste and Implementing recycling and reusing measures of materials and implementing environmental management systems.

Nepal doesn't have an official science park. However, it does have an Information Technology Park situated in Banepa. Construction of a well functioning Science Park will be done to facilitate growth for businesses, entrepreneurs, start-ups and communities in fields like **IT**, AI, machine learning, IoT, biotech, virtual reality, robotics and more.



Source: UKSPA

3.2 Society, civilization and religion

Our society will have progressed in the future meaning there will be changes to people's mindset and developments to current societal beliefs. We will deal with important stuffs like:

1. Gender equality
2. Increase in number of educated people
3. Better safety and security
4. People aware about environment concerns

In the future, Kathmandu will still be full with people from different racial backgrounds. And Kathmandu will be more inclusive with other religions blurring the lines between them. So, people will tolerate and co-exist with people from other casts, race, religion, etc.

3.3 Environment and Wildlife

The things we have discussed above with aid to Kathmandu being a sustainable eco-friendly city on its own. So, it is no surprise that the wildlife will also thrive in Kathmandu. We have sanctuaries, protected spaces, forests within Kathmandu for a green environment. Hills around the valley will be protected and housing areas will have their own green space.



Moreover, to protect wildlife, following will me done:

1. Facilitate already existing wildlife sanctuaries, gardens, forests, etc
2. The hills around the valley will be off limits to building civilizations and will be a protected area used for agriculture and protection of biodiversity.
3. Plantations on the hills and proper waste management will be done will keep the areas clean.
4. Destroying the biodiversity of the protected areas and vandalization will result in punishment by law.

5. Proper irrigation will be done to the crops using grey water from water treatment plants from housing facilities so farmers don't have to wait for rain to water crops.

If every citizen follows the given plan, Kathmandu will emerge as a city rich with nature engulfed in science.

3.4 Research, Development, Innovation and Industries

We have already discussed multiple times about the development process while building this grand capital. Building of science parks, science museums, education people, etc will establish Kathmandu as Nepal's capital for technology as well.

For development programmes, extending already existing institutions, industries will be done. So Tribhuvan International Airport will be extended and renovated to accommodate a large number of airplanes and air traffic. Similarly, local and domestic businesses will have more chances to foster. Similarly, already existing big industries will continue to develop further with funds from the government.

Industries shouldn't hamper major settlements but instead be away from them. Hence, we are building industrial zones away from settlements. And they should follow protocols like:

1. Filtration and separation of different wastes produced from the industries
2. Plantation of trees and green plants around the industries
3. Filtering of smoke should be done before getting released into the atmosphere
4. Reduction of packaging is to be done in every industry and waste reduction policy should be followed.

These rules are simple yet effective to reduce industrial wastes taking us to a more sustainable future. And regarding innovation, the future generations are growing and introducing new ideas, scientific discoveries everyday. And such people will be rewarded by the government generously. It is highly encouraged.

3.5 Policy and planning

With a city like Kathmandu in mind comes a big responsibility. After all, only modernizing the city won't guarantee its well-being until every citizen cooperates and follows the plans and policies of the city without excuses. Here are the major plans to introduce and keep Kathmandu a sustainable city for as long as it exists:

1. Every citizen has to live in the residential areas scattered around the city with what they can afford. There will be a separate settlement area for the homeless, mentally ill people, etc which will be taken care of by the government.

2. People who are eligible to work must be employed if not certain times of around 6 month will be provided to the person with unemployment income to sustain the person. Every family must have at least 1 working person to live in the housing facility.
3. Waste from every housing facility, restaurants, hospitals, etc should be classified and collected in various categories to reduce, reuse and recycle.
4. Throwing garbage, mixing wastes into the river, public places, etc is strictly prohibited.
5. Everybody has to pay income tax and other taxes according to their annual income.
6. Wildlife and other animals like stray dogs, cats, etc aren't to be harmed but instead to be reported to animal shelters.

These policies are just examples of what will be in the actual Kathmandu in the future. With the need of time, these plans will be extended and implemented. Well mannered citizens are what fosters a sustainable city.

3.6 Education and Hospitals

Kathmandu already has multiple numbers of schools and hospitals all over the valley. Both education and most of the hospital facilities will be made free. This will be done with the help of income taxes levied on people to run these hospitals and schools. They will be located near housing settlements and low density business areas.

In terms of schools, government institutions will be promoted and developed more. Quality education and facilities will be provided to students free of cost. E-learning, practical classes, facilities, etc will be improved massively. Similarly, hospitals will be upgraded with more beds, ventilators, modern devices, etc.

The wastes from these institutions will be separated into different categories to reuse and recycle. More focus will be put into reduction of wastes.

3.7 Income source of Kathmandu

Kathmandu will have plenty of income sources with the sustainable city. Most prominent sources of income include:

1. Revenues from people as the majority of the people will be employed.
2. Tourism
3. Industries
4. Business like hotels, fun parks, etc.
5. Housing facilities

More government schools will be built according to need and healthcare will be made free. However, more tax will be deducted from people's earnings. It is a necessary price for a better future and life.

4. CONCLUSION

Based on the current status of Kathmandu in various aspects, the "Kathmandu Sustainable City" project will develop this city into a sustainable, developed and eco-friendly city. This project will improve the housing of all classes of people, build a convenient and long lasting transportation system, and build various stadiums and business infrastructures. It will preserve the heritage sites of cultural and historical importance. It will also build various science parks and museums.

This project not only focuses on the design and architecture of new Kathmandu City but also on other aspects such as Education and Hospitals, Income sources of the city and various policy and planning. Through education and campaigns, this project will develop the mindsets of the residents into being aware and against social problems such as gender inequality, domestic violence etc. As a sustainable and eco-friendly project, the conservation of environment and wildlife will be ensured along with the development of the city.

We are dreaming big, to convert a city like Kathmandu into a sustainable and self-sufficient city. With proper planning, execution, budgeting, human resources, technologies, etc is needed to reinforce Kathmandu in the future. Regardless of the problems we might face, our top priority is to save our environment and connect it with technology. Collaboration between citizens and government is utmost important in this project. This project is for the better future for all the citizens along with a healthier environment where nature can thrive.

Furthermore, even after the completion of this project, Kathmandu will be able to sustain itself by balancing income and outcome for the development and betterment of the city. This project has tried its best to cover the main area of focus to bring an outcome that will take Nepal to succeed on an international level. Hence, making Kathmandu an example to the world to admire.

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(The photographs in this project isn't owned by me)

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