

# Exploring the potential to make Lalitpur City Cycle Friendly

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## Abstract

Cities of developed nations, as a key component of the Sustainable Development Goals (SDGs), are promoting public vehicles and cycles as primary modes of transport. As the innovative world has taken a number of leaps to transform the urban areas into more sustainable and livable cities, cities in our country has been swept up in the vicious cycle of motorized vehicle-centric development, resulting in rampant road widening and continued congestion. Lalitpur is one such city whose heritage significance is still intact and has possibility to make it a cycle city.

To meet the objective of the research of exploring the potential of Lalitpur city to make it cycle friendly was done by identifying the feasible routes for cycle networking and possible strategies to make cycle city. The research follows the exploratory method where the foreign initiatives relevant with the case area was studied. The case area was studied to identify the physical, social and economic aspects that contribute in making Lalitpur cycle friendly. Further the characteristics of site which was necessary to envision the possible cycle networking route was studied. The route analyzed are the ring road route, river corridor route, heritage area and the godawari route. The overall literature review, site study and survey questionnaires further discerned the possible strategies that can be implemented to make the Lalitpur city cycle friendly which are proper bicycle lane and networking, bicycle stands and bicycle sharing system integrated with the public transportation.

## Keywords

Cycle city, Sustainable Transportation, Cycle Infrastructure

## 1. Introduction

Rapid urbanization and increasing economic activities in cities have dramatically increased vehicle ownership and usage in urban areas of Nepal. The current patterns of motorization adversely affect traffic congestion, air and noise pollution, and traffic accidents and injuries. The problems can mostly be attributed to the fact that the policy and infrastructure provisions have not been able to keep up with the rise in population, and thus urbanization, and motorization. The unsustainable trends in transport sector as presently observed would further worsen social equity, lower energy security, increase greenhouse gas (GHG) emissions, and destroy natural habitats and ecosystem, which ultimately have adverse impacts on national productivity and human development. [1] As the innovative world has taken a number of leaps to transform the urban areas into more sustainable and livable cities, Kathmandu has been swept up in the vicious cycle of motorized vehicle-centric development, resulting in rampant road widening and

continued congestion.

## 2. Problem Statement

Each and every study of the Traffic Transportation network of Kathmandu valley ends up recommending promotion of cycle friendly transportation network. Yet, the implementation phase never sees a usable cycle lane/track and the road expansion ends up accommodating more motorized vehicle, only. Time and again, it has been visually observed that increasing road width to accommodate more private vehicles is not going to increase mobility, at least not in the long run. However, promoting cycling helps create safer, vibrant cleaner and healthy cities which is especially true for compact cities like Lalitpur. Especially important is the fact that the narrow streets of without environment and sound pollution motorized vehicles.

### 3. Objective of the Study

The main objective is to explore the potential of Lalitpur city for making bicycle as the mode for sustainable transportation. To achieve them the specific objectives are:

- To identify the physical, social and economic aspects that contributes in making Lalitpur city cycle friendly.
- To identify the feasible cycle routes and analyze how the selected routes can be planned, designed to develop it as cycle friendly city
- To identify the strategy that would encourage people to use cycling as their mode of transport.

### 4. Literature Review

Up until the mid-90ies cycling was major mode of transportation in Kathmandu valley. Around 1974 AD, Basundhara- Mahargunj stretch of ring road was constructed considering gradient required for cycling. But due to invasion of motorcycle and cars after 80ies, cycling slowly loses its numbers and value. There is no pollution from bicycles, they are silent, economical, discreet, and accessible to all members of the family and, above all, bicycle is faster than a car over short urban distances (5 km and even more in the case of traffic jams). The inner ring road area of Lalitpur and Kathmandu where average travel distance is below 5 km, cycling can be promoted as both recreation and transportation mode. [2]

Different initiatives in foreign countries has been done as part of literature study. Groningen is one of the city whose context is similar to the Lalitpur city. In the 60s, the number of cars was growing rapidly and they were severely clogging up Dutch cities. The common response was to tear down old neighborhoods and build motorways right through the center of town. However, in Groningen, local politician Max van den Berg decided on a revolutionary policy. Instead of destroying old neighborhoods, he wanted to restore them and convert them into pleasant areas for people to live in. The idea was to discourage motorized traffic and to give priority to pedestrians, bikes and public transport. The essence of Van den Berg's traffic circulation plan, as it came to be called, was that the center of Groningen would be divided in four sections. For motorists, it would become impossible to go from

one section to the other: cars had to take the ring-road around the inner city, whereas cyclists could move freely about on new cycle paths constructed to accommodate them. Driving a car would become a time-consuming affair in the center of Groningen. In the future, travelling by bike would be a much quicker option. [3]

According to case study of C. Springs[4], several key events or initiatives mark a particularly positive change for bicycling in the City:

- Planning for an automated bike share system
- Build a Better On-Street Bike Network
- Design More Bicycle Friendly Streets
- Connect all bike lanes and paths
- Develop infrastructure with clear trail connections for flexibility and variation
- More connected, integrated bike lanes and trails, especially between neighborhoods, would enable bikers to use side streets more instead of major roads or sidewalks
- Don't have bike lanes that just stop; must be continuous [4]

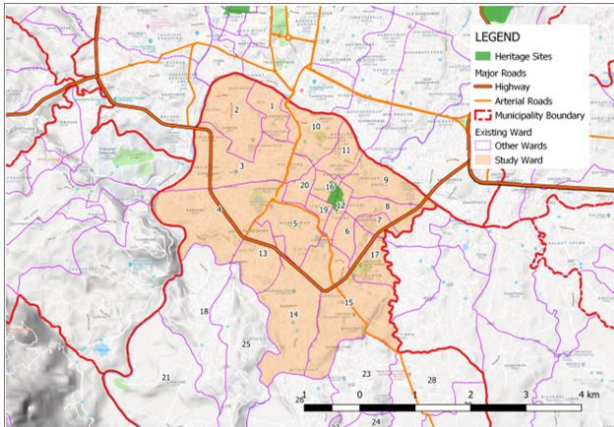
The Vision Network was developed with a goal to provide a comprehensive network of bikeways that connects Colorado Springs residents and visitors to jobs, schools, transit, shopping, open spaces, and recreational opportunities, such as the single-track network. When the Vision Network is built out, there will be direct, convenient bicycle connections to all of these types of destinations. [4]

According to the report London Design Standards [5], there are a number of basic design principles that should be adhered to when designing and implementing cycle infrastructure. These requirements should be considered as objectives by all city types. They can also be used as criteria to assess the quality of cycling infrastructure. Where infrastructure meets these criteria, they are more likely to result in increased use of bicycles.

- Safety
- Directness
- Coherence and Accessibility

- Attractiveness
- Comfort

## 5. Case Area



**Figure 1:** Study area of Lalitpur City

Lalitpur Metropolitan City is the third largest city of Nepal after Kathmandu and Pokhara. It is also known as Manigal and is best known for its rich cultural heritage, particularly its tradition of arts and crafts. [6] Due to the less gradient difference and the preserved cultural value, Lalitpur has the feasibility to develop into the cycle city.

Before designing master plan for bicycle city, an overview of the city through the bird's eye view was visualized. Different characteristics of road, land use, population density, condition of the road and transportation routes was also studied.

## 6. Research Methodology

Exploring how bicycle can be made a means of transportation from perspective of sustainability in context of Lalitpur city is the main goal of this research.

### 6.1 Research Paradigm

The research paradigm adopted for this research study is pragmatic paradigm since the research requires both quantitative as well as qualitative approach of methodology.

### 6.2 Ontology

The ontological claim for the study is that with proper study, analysis and intervention in cycling as

transportation in Lalitpur city, it will contribute in sustainable urban transport system of city.

### 6.3 Epistemology

Epistemological consideration in the research is guided by past researches, literature review, international initiatives for making cycle city and data collected from different sources, the local residents, and other involved organizations. Emic approach was applied to identify and obtain the data. For this I got involved as the member of Nepal Cycle Society and work with the team. Besides, I used participatory tool where I ride my bicycle through the city of Lalitpur to study the current condition and analyze the possible design for the cycle city.

### 6.4 Methodology

To meet the objectives, the research follows both qualitative and quantitative data approach. At the initial phase the superficial study was done through the study of existing transportation master plans and other related data and maps. From the insights gain through the study of cycle infrastructures, the map of the Lalitpur city was analyzed through the bird's eye view to identify the possible routes or segments for connecting the city through different types of cycle lane.

Interviews was taken with stakeholders, local, motorcycle riders and survey were also done to derive quantitative as well as qualitative data. The cycle count survey was done at eight different points of Lalitpur city was done. Their perception regarding the strategy for cycle city was also noted.

## 7. Findings and Analysis

### 7.1 Physical Aspects

Different characteristic of road, land use, population density, condition of the road and transportation routes were studied.

#### 7.1.1 Population Density

Any demand for infrastructure or service depends on the population and its spatial spread. The population density was found to be higher in and around the core area. Higher population density warrants higher local and short movements for daily commute which can be supported or replaced by bicycle as the means of

movement.

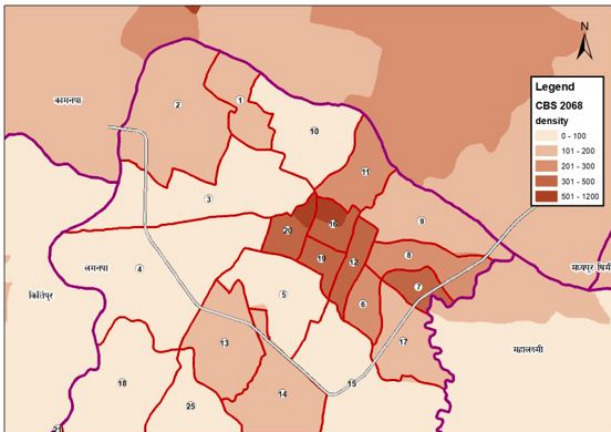


Figure 2: Map showing population density

7.1.2 Classification of road

The existing road network is categorized into a road hierarchy with four classes of road - A, B, C and D. The roads of hierarchy A (5 in number) and B (13 in number) are major arterial/sub-arterial roads that supports higher traffic volume and thus, mobility within the metropolitan city and towards the adjoining hinterland. Class C are collector/distributor roads and Class D roads function as local access roads.

7.1.3 Public Transportation route

Roads that support public transport reflects preliminary preparedness of the road to support cycle lanes and cycle infrastructure. Through the study it was found that there are 3 terminals and 15 bus stops for the Lalitpur city.

7.1.4 Land Use

Land use is one of the important criteria to study before planning for bicycle network or infrastructure in the city. The map below shows the different type of land use zone.

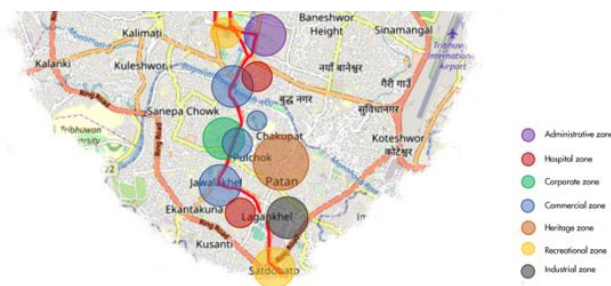


Figure 3: Land Use zones

Cycle count survey

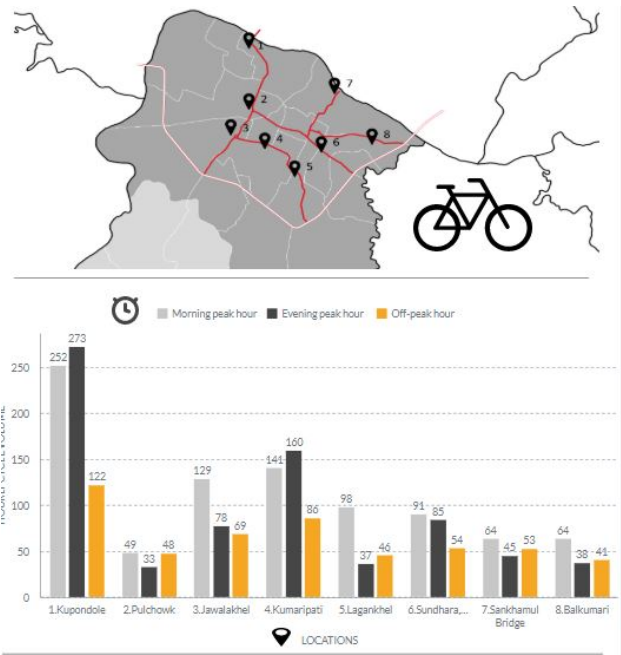


Figure 4: Map and graph showing the data of cycle count

Working with the Nepal Cycle Society, the cycle count survey was done at 8 different locations of LMC.

- It was found that Kupondole – gateway to core city Kathmandu, has the highest number of cycle count i.e. 273 cycles in evening peak hour.

7.2 Social Aspects

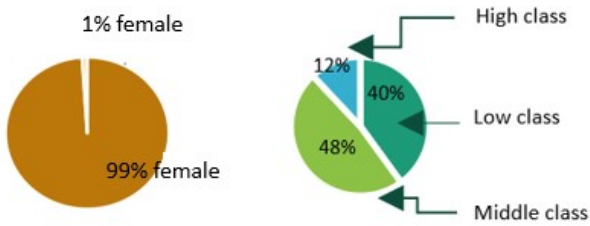
7.2.1 Gender Survey

The gender survey also showed that the 99% of cyclist were male whereas 1% was female. The non-cyclist female when were interviewed about the reason, majority responded that its unsafe. Some responded due to patriarchy, gender biased infrastructure design, the social perception and the harassment.

7.2.2 Class Survey

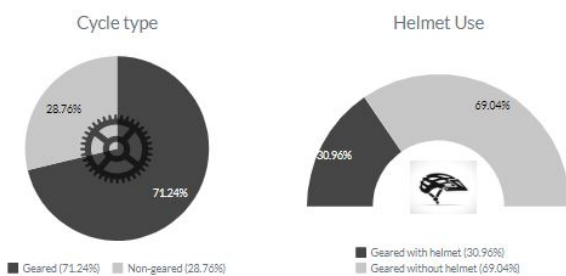
It was found that lowest number of cyclists were high class people who used cycle as a recreational purpose. 48% of cyclist were middle class who used them for daily work. 40% of cyclist were low class people. They are usually service provider from the formal sector (postman, electricity line repairman) or the informal sector (gardener, domestic worker, mason, security guard). The cyclist is a delivery man – delivering milk, restaurant food, mineral water, cooking gas cylinders; a street vendor – selling vegetables, groceries, sweets.





**Figure 5:** Chart showing gender survey and class survey

### 7.3 Economic Aspects



**Figure 6:** Chart showing cycle type and helmet use

In terms of economic aspect, the survey was done for type of cycle used by the cyclist and the helmet use. It was found that 26.76% cyclist use non geared type which are again the low-class people and the service providers whereas remaining 71.24% cyclist used geared cycle. Similarly, only 30.96% used helmet for safety whereas 69.04% of cyclist didn't use helmet. since is expensive and low-class people can't afford it.

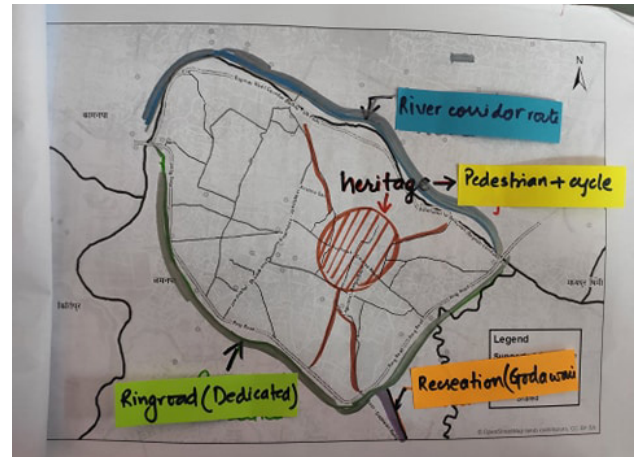
## 8. Recommendation

With the in-depth study of literature, international case study for initiatives in foreign countries and the survey and site study, it was analyzed that following strategies in physical, social and economic aspects if implemented effectively could impart in achieving the goals.

### 8.1 Physical Aspects

#### A . Feasible Cycle Networking

After the study of different characteristics, the preliminary cycle networking in the feasible area was identified. Those major routes are described below:



**Figure 7:** Sketch showing feasible cycle networking

#### • Ring Road Route

It is the highest ranked road as per Preliminary Cycle Network analysis primarily due to scale of the road and the connectivity it provides. The extended ring road was expected to have a dedicated cycle lane but it was skipped during construction.

Although in terms of connections, it does not provide shortest distance between the points, cycle lane in ring road is very important in terms of promoting cycle within the city especially when we consider the way ring road has been constructed. Since in present situation it is difficult for motorized vehicles to cross ring road, providing two ways cycle lanes on each side will make cycling the best way to travel around ring road. The existing overhead bridge can be made cycle friendly by providing space for cycle to move to other side. This should be mandatory for new overhead bridge.



**Figure 8:** Dedicated cycle lane in ring road

- **Core city route**

The core area has a density nearly three times the average of the metropolitan city. With a world heritage site at its heart, the area attracts a large number of tourists and local visitors to the open spaces of the heritage area. The origin and destination survey conducted by the study shows that the major trip attraction centers namely Saatdobato, Lagankhel, Kumaripati, Jwalakhel and Gwarko lies within or along the periphery of the historical core area. The pedestrian count shows more than 52,000 people visiting the Durbar Square area a day.

Core city area are mostly crowded due to four-wheeler vehicle as well as motorbikes. No proper management of parking space is another problem with the increasing population day by day. To solve these problems in core area, we need to make more pedestrian friendly road with giving priority to cycle.



Figure 9: Pedestrian friendly core area

- **River corridor route**

River corridor are the most important road for cycle lane due to the width of the road as well as the easy access and connectivity in short distance. Currently the condition of the road is not so applicable but for future if properly build with dedicated lane then it will surely make a big for the local people to use cycle. Another advantage is that most of the park falls under this route that gives another advantage to make more environmentally friendly as well as cycle friendly area to protect bagmati river from getting polluted.

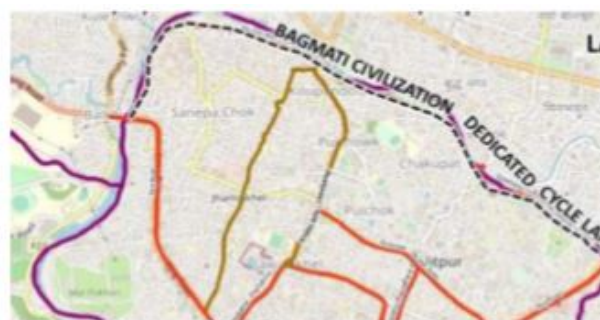


Figure 10: Cycle lane at river corridor

- **Godawari Route**

Godawari is one of the most popular destination for the people living in Lalitpur mostly for recreational activities. In this context a dedicated cycle lane would be a best route for a long-distance cycling experience. In future with the existing wide road cycling would be expanded to other area as well. This attracts cyclist around the world to come to Nepal which ultimately supports tourism development



Figure 11: Dedicated cycle lane for Godawari route

**B . Bicycle Infrastructure: Bicycle lane**

The people who owns a bicycle are not comfortable to use for daily ride since city lacks cycle lane and is life threatening to share the road with big vehicles. If proper cycle lane as described above at four routes can be brought into effect, with proper networking and integration with public transportation, it eventually encourages people to cycle to their destination.

**C . Cycle Stand**

For those who have cycle another main problem is the risk of being stolen. There is no cycle parking or stand. This discourages the riders to

take their cycle for their daily ride to destination. With the initiative of Nepal Cycle Society, there have been 12 cycle stands installed in different areas of city. But currently, the cycle stand is being used as motorcycle parking. So, proper signage with strict rules should be implemented.

#### D. Cycle Sharing

This seems another effective strategy of making a city cycle friendly. There should be easy system of renting for those who wants to ride cycle but do have one. The cycle sharing dock at different places integrated with the public transportation or bus stop is important.

#### E. Provision of one-way vehicular system

Though a sudden, big change in the city is not possible overnight, a systematically planned and executed action can bring a gradual change in the city. Vehicle prohibition could be challenging at initial phase. So, the policy of one-way vehicular system could be imposed instead.

#### F. Public Cycle Park

In any city, there needs to be adequate space for children to learn and practice cycling. It would not provide an open space to cycle but also acts as a multi functional outdoor space for exercise, recreation and leisure catered to all ages and demographics.

### 8.2 Social Aspects

- Cycling infrastructure considering the safety for women should be designed. Women cycling with children and shopping bags may need more width of the track and safe space at parking areas where they can unload children and bags comfortably. They would have longer acceleration times and need longer leads at green phases of the signals.
- Awareness programs should be conducted to make people realize the benefits of cycling. The school syllabus can also incorporate the education related to cycle and its benefits with the practical classes for cycle training.
- Female friendly bicycle should be made easily available so that the women wearing sarees or skirts can ride bicycle easily.

- There should be implementation of strict rules and regulations to root out the women harassment and abuse.

### 8.3 Economic Aspects

- Providing incentives to the low-income cyclist so that the geared cycle is affordable to them.
- Employers can play a key role in incentivizing and promoting cycling amongst staff, which would boost staff morale and improve environmental and economic outcomes.

## 9. Conclusion

By making the city cycle friendly, it imparts a lot in the sustainable transportation. Besides the environmental benefits, health benefits, economic benefits, social equity etc. makes the cycling an important mode of transportation.

The objective of the research to explore the potential of Lalitpur city to make it cycle friendly was done by identifying the feasible routes and strategies. The research was carried through the study of literature review done through the map and other related drawings as well as the transport policies and guidelines. The international literature review gave insight of different strategies and initiatives taken to change the motorized city into cycle friendly city. The study also sought to identify different parameters and design principles that should be adhered to when designing and implementing cycle infrastructure. Through the study of case area, the physical, social and cultural aspects were analyzed. The characteristics and variables of the sites such as transportation routes, land use, density etc. were identified which assisted in sorting out the probable routes for cycle networking. The study of literature review, foreign initiatives, case area study and survey questionnaire then contributed to meet the objectives of the research of exploring the possible routes and strategies to make the city cycle friendly.

Overall, the survey questionnaires and focus groups showed that safety was the most significant issue for potential cyclists, particularly in relation to vehicle driver behavior and traffic volume. Dedicated, priority ad shared lane depending on the type of road should be facilitated. Cycle lane at a single stretch is of no use. The example of it is ineffectiveness is evident in the Maitighar to Tinkune cycle lane. So, the cycle lane

should be promulgated in such a way that integrates with other cycle lanes and public transportation.

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