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Road Expansion and Urban Highways: Consequences Outweigh Benefits in Kathmandu

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Rapid urbanization has transformed Kathmandu Valley, Nepal, one of the fastest growing metropolitan regions in South Asia. This urbanization, in turn, is leading to considerable social, economic, and environmental stress. The region has seen unplanned growth despite continued planning exercises. In 2011, in response to the rapid urbanization then Prime Minster Baburam Bhattarai initiated road expansion throughout the city to reduce traffic congestion. By mid 2015, it was clear that the road expansion induced greater demand leading to further traffic congestion rather than alleviating the problem. Today, non-motorized (pedestrians and bicycle) road users are more unsafe on the roads than ever before, and the plight of public transport users has remained the same. Traffic congestion has become a more serious problem. Air pollution associated with road construction and an increasing number of vehicles has turned the Kathmandu Valley into a dust bowl with potential for serious human health consequences. Along with road expansion, the government's inability to regulate land use has contributed to Kathmandu's current urban sprawl. Road expansion done without proper planning has threatened traditional settlements, many with heritage sites, and led to loss of public spaces and temple courtyards to make space for increasing demand for parking. Another major landscape change has been the building of concrete embankments and exclusive motor roads along the river corridors. The road expansion campaign is still ongoing and is a top priority of the government's efforts to reduce congestion and improve urban transportation. It is high time the government of Nepal rethinks its vehicle-centric urban transport policy and adopts policy where mobility of people is prioritized. Urban transport planning should work to build a more equitable and inclusive city while addressing accessibility, safety, and environmental health risks of its growing urban population.

Keywords: road expansion, traffic congestion, environment.

Kathmandu's Tale of Urbanization and Vehicle-Centric Transport Planning

Over half of the world's population was living in urban areas in 2008 with an expected rise to almost five billion by 2030 and with more than 90 percent of urban population growth occurring in developing countries (Obaid 2007). In particular, Asia is predicted to contain more than half of the world's cities with populations of 500,000 or more (Seto et al. 2010). Urban living thus forms the foundation of modern human ecology, acting as a main force towards determining our social, economic, and environmental characteristics (Seto et al. 2010). In South Asia, Nepal is one of the least urbanized countries but the fastest urbanizing country with about a five percent annual average urban population growth rate (Muzzini and Aparicio 2013).

Today, rapid urbanization has transformed Kathmandu Valley, Nepal, into one of the fastest-growing metropolitan regions in South Asia (Muzzini and Aparicio 2013). The 2011 census showed that the urban areas in the Kathmandu Valley have a population density of 14,355 people per square kilometer with a nearly four percent average annual population growth rate in the past between 2001-2011 (Central Bureau of Statistics 2012). This rapid urbanization in the Kathmandu Valley is uncontrolled, haphazard, and environmentally unsustainable. According to a World Bank report, if the urban expansion of the Valley continues at the same pace, the Valley will face unprecedented stress on land resources and also significantly increase vulnerability to disasters, including earthquakes (Muzzini and Aparicio 2013). As aligned with Muzzini and Aparicio 2013, many believe that the large death toll during the great earthquake in April 2015 can be attributed to haphazard urbanization.

Kathmandu's tale of modern urbanization can be traced to the end of the Rana era in the 1950s. The construction of the Tribhuvan Highway linking Kathmandu to India in the 1950s and subsequent building of the Arniko Highway linking the city to China in the 1960s promoted trade with China (Thapa, Murayama, and Ale 2008). Such developments not only promoted trade, but also the movement of people into the capital. Kathmandu's transformation from rural clusters into its current urban sprawl started in the 60's as well. The Kathmandu Valley Town Development Implementation Committee (KVTDC) was established in 1976 for the three districts of the Valley to oversee the city's urban planning and growth. In the 1970s the KVTDC oversaw the construction of the 27-kilometer Ring Road around metropolitan areas of Kathmandu and Lalitpur with the financial and technical assistance from Chinese government (His Majesty's Government of Nepal 1969). Rapid urban expansion within and outside of the radial Ring Road took place without proper planning turning fertile agriculture lands to urban settlements lacking proper urban infrastructures such as drinking water, drainage system, service roads, public transport access, electricity, etc. The urban/built-up areas grew from 2.9 percent of the total land in 1967 to 4.9 percent in 1978, and most of the area within the Ring Road was considered built-up by 1991 (Japan International Cooperation Agency and Ministry of Physical Planning 2012). After the promulgation of Town Development Act in 1988, KVTDC introduced a land pooling scheme and Guided Land Development (GLD) program under which 475 kilometers of roads were to be developed (International Centre for Integrated Mountain Development 2007). Such a focus on expanding the kilometers of roads without integrated urban and transport planning policies have contributed to haphazard urbanization and an unprecedented rate of motor vehicle use in Kathmandu. Increasing growth in the Valley can also be attributed to increase in household income largely due to influx of remittance and increasing population.

Starting in the late 1960s a Structural Plan of Kathmandu Valley was created with help from the United Nations Development Program and the World Bank, which aimed at guiding the urban development of Kathmandu for the next 50 years. The first Physical Development Plan for the Kathmandu Valley was in fact prepared in 1969. But due to democratic changes in the 1990s, this policy was abandoned for Kathmandu Valley Urban Development Plans and Programmes in 1991 (His Majesty's Government of Nepal 1991). This plan focused on urbanization in the peripheral regions of the Ring Road, while also aiming for a holistic urban development that considered environmental, infrastructural, financial, and managerial concerns. Stemming from this plan, a new Long Term Development Concept for Kathmandu Valley was formulated in 2002 with the aim of guiding the developing the Kathmandu metropolitan area until 2020 (Kathmandu Valley Town Development Committee 2002). Even though this plan promoted conservation of agricultural land, a new outer Ring Road, and regulation of environmentally sensitive areas, such plans have not had a life outside of their documentary status in Kathmandu offices (Thapa and Murayama 2011). After the first physical development plan in 1969, many such development plans for Kathmandu Valley were prepared but never implemented due to institutional, legal, or financial impediments (Department of Urban Development and Building Construction. 2016).

In response to the rapid urbanization and increase in motorization in the Kathmandu Valley, in late 2011, the

then Prime Minster Baburam Bhattarai directed Metropolitan Traffic Police Division and Kathmandu Valley Town Development Committee, later established as Kathmandu Valley Development Authority (KVDA) in April 2012, to initiate road expansion throughout the city in order to reduce congestion by demolishing houses and structures. The KVDA, which was formed to promote integrated urban planning, has subsequently primarily engaged in widening roads with no strategic plans formulated at present. Subsequently, road expansion has become the prioritized intervention of recent governments seeking to improve the transportation system of Kathmandu Valley. Hundreds of houses were demolished to make space for vehicles in 2011 and 2012. Prime Minster Bhattarai termed the bulldozing and demolition of houses for widening the roads as 'creative destruction.' Road widening was said to follow the standards set by Town Development Implementation Act formulated in 1977 for Kathmandu Valley. The legal grounds established nearly 40 years ago during the Panchayat era are often contested being obsolete or contentious basis for road expansion in post panchayat era. Although the Bhattarai government publicly announced that they were demolishing structures that were encroaching public lands, yet most tenants could show legal rights over the buildings demolished by the government. These rash decisions to demolishing houses created chaos as well as public protests, and delay in the payment of compensation for structural demolition further hindered the plan. The government paid billions of rupees, as compensation but there remains huge outcry about delayed and inadequate compensation (Kharel 2014).

According to the Development Commissioner of KVDA, nearly 330 kilometers of roads have been widened in the Kathmandu Valley since the road expansion drive in late 2011, however only 100 kilometers of them are blacktopped by the end of fiscal year 2015/16 (Kathmandu Valley Town Development Committee 2016). These roads were expanded based on the standards set by KVTDC in 2007 in which the Right of Way (ROW) of Ring Road, highway, arterial road, sub-arterial or connect road and feeder road was set at 62 meters, 50 meters, 22 meters, 14 meters and 11 meters respectively. Plans are afoot to further expand sections of the 9-km Jorpati-Sankhu road and the 12-kilometer Tripureshwor-Kalanki-Nagdhunga road (Thapa 2016). After the road expansion drive started in late 2011, the key roads that have been expanded are Lazimpat-Maharajgunj, Thirbum road (Dillibazar-Baluwatar), Tinkune-Baneshwar-Maitighar (section of Arnico highway), Kalimati-Kuleshwor-Balkhu, Kamalpokhari-Ratopul-Gaushala, Maharajgunj-Budhanilkantha, Naxal-Mitrapark as well as residential and small connecting roads throughout the city. However no traffic improvement has been seen with these efforts, based on our observation. The government is further upgrading the existing two-lane Ring Road to eight lanes along a ten-kilometer section of the Kalanki-Satodobato-Koteshwar passage, including an underpass in Kalanki Chowk, with the financial and technical assistance from Chinese government. Flyovers are being planned by Department of Roads in fiver major intersections: Old Baneshwar Chowk, New Baneshwar Chowk, Thapathali Chowk, Tripureshwar Chowk and Kalimati Chowk, supposedly for improving congestion in the intersections. This plan has been supported by JICA (Japan International Cooperation Agency), which has also provided technical and financial support to conduct feasibility study of Tripureshwar-Maitighar flyover. Thus, it appears that the government efforts and priorities to alleviate traffic congestion are still following conventional ways by widening or expanding roads, which are already proven unsuccessful (Litman 2017), than to focus on integrated and sustainable urban transport planning.

Consequences of Car-Centric Transport Development in the Valley

By July 2015, former Prime Minister Bhattarai, architect of the road expansion drive, expressed on social media that despite the road expansion, traffic congestion remained a problem and that Prime Minister Khadak Prasad Oli should focus on improving public transport system. Widening roads did not solve the traffic congestion as claimed but rather aggravated it because it expanded the capacity for motor traffic at the expense of other forms of mobility, thus largely benefiting a small fraction of wealth urban population who can afford to ride in private vehicles. However, road widening continues as the government priority for alleviating urban congestion, and has become the single-most important factor in changing physical landscapes and the environment of the city.

Increasing Motorization, Congestion and Unsafe Roads

The growth of private vehicles has reached an unprecedented level. The sitting Director General of Department of Transport Management (DoTM) and General Secretary of Nepal Automobile Dealers Association (NADA) acknowledged road expansion as one of the major reasons for the continuous rise in registration of new private vehicles, specifically cars (Post Report 2014). It is evident from the cities around the world that road widening and building urban highways will invite and encourage more people to drive, which is termed as 'induced demand' (Litman 2007). According to data from the Department of Transport Management, the annual average growth of vehicle

ownership in the Kathmandu Valley has been more than 12 percent for the last ten years. Following the road expansion campaign, the annual growth rate of registered cars in the last few years has nearly tripled, from 7.5 percent in fiscal year 2011/12 to 21 percent in fiscal year 2015/16. About 92 percent of total vehicles registered in Kathmandu Valley until fiscal year 2015/16 were private vehicles, largely motorbikes (78 percent). The ratio of cars to the total number of vehicles is likely to increase significantly, which will further worsen the traffic situation and has the potential to gridlock urban core areas in a few years if no car-restraints measures are adopted. According to a JICA and MoPIT report, the percentage of trips using private vehicles (cars and motorbikes) in Kathmandu Valley in 2010 was about 30 percent, but it likely even greater now owing to increasing traffic and urban expansion (2012). Other than the induced demand, increase in private motor vehicle use has been facilitated by factors such as easy auto loans/financing, increase in purchasing capacity of the growing middle class population, and intangible value (social status) in owning cars.

Today, traffic congestion has become a daily ordeal for people living in the capital and it is now common even in non-peak hours on widened roads. The investment of billions of rupees in public funding to make more space for vehicles did not go hand in hand with investments in safer infrastructures for pedestrians and bicycle users, and improving public transportation systems. Pedestrians and bicycle users are more unsafe on the roads than ever before, and the plight of public transport users has remained the same. Widened roads and increasing number of vehicles have thus made urban roads more unsafe for both motorized and non-motorized users. Pedestrians are the most negatively effected by road expansion due to the lack of proper sidewalks, crossings and pedestrian facilities. According to Metropolitan Traffic Police Division, 40 percent of those killed in road accidents in fiscal year 2015/16 were pedestrians (Republica 2016). The total road fatalities in the Kathmandu Valley for the FY 2015/16 were 166, which is the highest in the last five years.

The six-lane Koteshwar-Suryabinayak highway, built in 2011 with the support from Japanese government is an example of vehicle-centric road design. Although the Ministry of Physical Infrastructure and Transport hailed the highway as world class, it lacks sidewalks, proper crossings and cycle lanes, and is exclusively designed for vehicular speed. This highway connecting Kathmandu Metropolitan City and Bhaktapur Municipality runs through dense urban settlements causing division of communities as well as making them unsafe. Around two dozen people have been killed each year since its inception, mainly pedestrians. In September 2013, an elderly woman and her twelve year-old grandson killed by a speeding motorbike while crossing the highway made news headlines, which criticized the unsafe design of the highway (Lamichane 2013). Who is responsible? The driver for speeding the vehicle? The elderly woman crossing the road without care? Or is it the government's fault for building a highway through dense settlements thereby encouraging high speed motor traffic without establishing parallel provisions for proper pedestrian crossings? Often the blame falls on road users rather than the infrastructural challenges presented by poorly designed urban road development, and institutional incompetency in designing safer roads for all road users.

Changing Urban Landscape and Heritages

Road expansion has also threatened traditional Newari settlements. These few holistically planned settlements in the Valley, were mapped out much before the invention of motor vehicles. Local Newars, along with heritage conservationists, have shown concern about the government's plan to widen the roads in Sunakothi and Handigaon, which are traditional Newari settlements consisting of heritage sites that date back to the past century and some archeological monuments and structures that date back to the Licchavi (5th-8th C) and Malla (13-18th C) eras. The removal of the Sorhakhutte *patti* (communal space built for resting) during the expansion of the Lainchour-Balaju road generated uproar within the heritage conservation communities. Rather than accounting for the conservation of these heritage sites, the roads were to be expanded to cater to the mobility demands of new housing and settlement expansion that are haphazardly built in the urban fringes of Kathmandu. On 4th Jan 2017, a group named Kathmandu Valley Road Expansion Affected Struggle Committee organized general strike (*bandh*) in the Kathmandu Valley protesting unplanned expansion of roads and demolition of houses despite the Supreme Courts' stay order, and demanding compensation for those affected by the road expansion drive.

As motorization continuously grows at an unprecedented rate, parking is another challenge faced by Kathmandu. The public spaces and temple courtyards that were used as communal space are now seen completely occupied by car and motorbike parking. It is not uncommon to see people parking on sidewalks; little has been done to enforce the illegality of such actions. In an attempt to supposedly solve the parking woes, the Kathmandu Metropolitan City is planning to build underground and multistory parking in a few open public spaces available in urban core areas.

Figure 1. Concrete embankments and roads built along the Bagmati River.

(Khanal, 2017)

Rather than regulating existing parking (currently free for on-street parking) through an effective pricing system, providing better public transportation system, or investing in sustainable mobility solutions, the decision to provide more parking will only encourage more motorization and inefficient use of scarce urban spaces. Parking is often perceived as a 'right' of motorists, as if it should be provided on every site. When there are no accessible places for children to play and a reduction in shared community space, investing public funds in providing more parking for cars and turning scarce public spaces into parking lots is inequitable.

Another major landscape change in the Kathmandu Valley is the building of concrete embankments and exclusive motor roads along the river corridors. All the major rivers corridors (Bagmati, Bishnumati, and Dhobikhola) have been changed in the last few years.

The construction of these river corridors is ongoing and one of the key strategic plans to build more road networks. The construction of roads on both sides of the Dhobikhola was started almost five years ago, but the roads are yet to be paved. The government is further planning to build an inner Ring Road along these river corridors. Poorly designed road infrastructure, poor drainage and construction of narrow, concrete embankments along the river have resulted in the flooding of settlements during the monsoon almost every year. This is also aggravated by increasing population density in the Valley and black topping roads without considering the need for seepage of rainwater and proper drainage systems. If no corrective measures are taken to make river corridors and new infrastructure and settlements resilient to such weather events, harmful incidents are likely to cause more damage, including fatalities. These riverbanks also have religious and cultural significance to people living in the Kathmandu Valley, with many monuments situated along the corridors. Building exclusive motor roads along the river corridor will disturb the relationship people share with religious and cultural sites, and will likely affect the plans and efforts to curb river pollution. However, officials who were responsible for designing and planning the corridors haven't taken consideration of the impact associated with the construction of these roads.

Despite the major flaws of Kathmandu Valley's road expansion drive, proper research on the consequences of road expansion on urban land use has yet to be carried out. One can generally observe that there has been a rapid expansion of urban and suburban spaces within the Kathmandu Valley, and road expansion has likely accelerated this horizontal expansion of urban spaces impacting agricultural lands and watersheds. This expansion can also be attributed to real estate costs, increasing air pollution, lack of open green spaces, and decreasing livability in central urban areas. Areas where there was open space and agricultural lands five years ago are now nearly covered with poorly planned settlements without access to proper transport networks. Increasing ownership of private vehicles has accelerated the urban expansion, but without proper public transportation services, there has been an increase in ownership of private vehicles, creating a vicious cycle of motor use and urban sprawl. Altogether, the government's inability to regulate land-use and road expansion has immensely contributed to Kathmandu's current urban sprawl. The rapid unplanned urbanization of the Kathmandu Valley caused by the informal process of settlement planning

has brought several physical, social, and environmental problems in the Kathmandu Valley. The fragile Kathmandu Valley eco-system is severely affected by rapidly expanding urban development and unsuitable economic activities (Japan International Cooperation Agency and Ministry of Physical Planning 2012).

Choking on Air Pollution

One of the major environmental consequences of increasing numbers of motor vehicles and road construction has been the deteriorating air quality in the Valley. The pertinent of air hazardous pollution level can also be seen from significant recent media coverage. Motor vehicles, fugitive soil dust, brick kilns, and biomass/garbage burning have been identified as the primary sources of particulate carbon in the Kathmandu Valley (Kim et al. 2015). The Valley's bowl-like topography, low wind speeds limiting air pollution dispersion, and frequent thermal inversions also factor into the high levels of pollution. The Valley has become a dust bowl leading to high exposure to air pollution for residents. Traffic police who spend long hours on the road were observed to have a mean on-road exposure ranging from 34 to 193μg/m3 and 12 to 28μgC/m3 for particles with aerodynamic diameter less than or equal to two-and-a-half micrometers (PM2.5) and black carbon (BC) respectively. This exposure is associated with an acute decline in lung function (Shakya et al. 2016).

According to the World Health Organization (WHO), air pollution is now the world's largest single environmental health risk. Air pollution has been linked to a range of human health problems ranging from eye irritation to mortality. In South Asia, household air pollution from the burning of solid fuels was determined to be the leading mortality risk in 2010, with ambient particulate matter pollution ranked as the sixth highest contributor to mortality (Lim et al. 2012). Despite the high pollution levels present and potential for serious human health consequences in the Kathmandu Valley, there is very limited understanding of air pollution in the city. The few existing studies showcase the high pollution level and suggest large human health impact (Gurung and Bell 2013).

Several steps can be taken to minimize air pollution. Dust pollution can be minimized by taking simple steps like spraying water in construction and demolition sites, paving roads to reduce dust clouds, and enforcing use of screens for buildings under construction. Movement of vehicles over demolition material and unpaved roads contribute to road dust, thus choking the residents living in surrounding areas. But no environmental management plans, specifically air pollution reduction measures, have been adopted during the road expansion and demolition process. With only 30 percent of the expanded roads being paved, there are several cases in which the demolished roads will likely remain unpaved for several years, subjecting communities nearby to high levels of dust pollution. A recent example can be seen on the Ring Road and Tripureshwar-Kalanki-Nagdhunga road expansion drive. The expansion work of the Ring Road that started in 2012 is still unfinished with construction likely to take a few more years. However the biggest concern for residents may be the more toxic emissions in coming days from rapidly increasing private vehicle numbers induced by widening roads, more than the existing dust pollution and nuisances. Motor vehicle emissions need to be minimized by development of better public transport infrastructure, improvement in fuel quality, compliance with standards, and establishment of emission check points. The government should take on a significant role in improving air quality, with clear definition of responsibilities and collaborative work among various agencies for effective air quality management. The importance of public awareness needs to be emphasized. Only with consciousness of the rising vehicular pollution and the resulting effects can lead to compliance with standards and new regulations by the public. Overall innovative solutions, cost-effective interventions, efforts to put policies into practice, and good governance are needed to deal with the deteriorating air quality.

Continued Car-centric Development and Transport Policy

The road expansion drive initiated by former Prime Minister Bhattarai is still ongoing and has continued to be the most prioritized agenda in the transportation sector. Bhattarai started off on the wrong foot when he directed and gave responsibility to Metropolitan Traffic Police Division for the road expansion, which had neither the jurisdiction, nor the capacity for designing urban roads. After the initial plan received criticism from concerned governmental institutions and public, the task was later handed to the Department of Roads and the Kathmandu Valley Development Authority (then the Kathmandu Valley Town Development Committee). It was then decided that the roads were to be expanded using the 'complete streets' concept, but it was never implemented. Complete Streets is a transportation policy and design approach that requires streets to be planned, designed, operated, and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation (Laplante and McCann 2008). In many cases roads were expanded at the expense of the sidewalks, and in many places sidewalks are less than minimum width of 1.5 meters prescribed in the Nepal Road Standard (2013). The six-lane roads were designed to handle two-way traffic

but the necessity for bicycle lanes for the safety of cyclists was never considered during planning and designing. The Department of Roads, which was charged with preparing road designs, made plans that reflected complete streets principle, however such designs never made it past their paper idealization. In practice, the urban transport policies and plans of the government prioritize mobility of vehicles over the mobility of people.

In mid-2011 the Department of Roads started cutting down decades-old trees to make way for widening the two-lane Kalanki-Satdobato-Koteshwar Ring Road to eight-lanes. When the Chief of the Lalitpur Road Division Office was questioned about the need for an eight-lane road, he said that the government should have planned to build sixteen-lane roads to account for the future growth of motor vehicles. The current chief of KVDA thinks that the government needs to plan flyovers and underpasses along with further widening of roads to reduce traffic congestion. These are just typical examples how conventional policy makers and planners see the urban mobility issue and the solutions through the perspective of car-centric mobility. Moreover, wide roads and flyovers are perceived as symbols of development and prosperity. Pictures and illustrations of wide roads and flyovers full of cars often are published in newspapers depicting development. The growing car culture among the elites and middle class urban society has established the notion that owning a car is a sign of social status. Riding public transport, walking, and cycling are generally looked down upon. The great earthquakes in April 2015 further strengthened this notion of the necessity of wider roads throughout the city supposedly for the access of ambulances and other emergency vehicles. The building standard formulated in response to the earthquake states that the minimum width of new public roads shall not be less than eight meters. Even though it may be formulated with good intentions, this requirement will have repercussions through encouraging more motorization and making streets unsafe for people to walk.

As a technical support to Government of Nepal, the Japanese International Cooperation Agency (JICA) is preparing a Transport Master Plan for Kathmandu Valley (Japan International Cooperation Agency 2015). Although the initial plan (2015) include some provisions on improving public transportation, it is largely based on widening roads and strengthening road infrastructures. In its initial plan, the JICA team has proposed the government of Nepal build more roads, including the expansion of the existing Ring Road, construction of inner and outer Ring Road, and development of satellite cities that will be connected by four-lane roads. The development of satellite cities at the fringes of the Kathmandu Valley and of more new roads, instead of prioritizing urban development infill and an efficient mass transit system, will likely fuel urban sprawl and motorization in unprecedented scale. In its draft plan presented to the stakeholders, it has proposed only couple of corridors of mass transit and no plans for a cycle track networks in the existing road. At one of the stakeholder consultation events on the Plan, the JICA consultant team proposed to build six-lanes of inner Ring Road above the Dhobikhola river which the then secretary of the Ministry of Physical Infrastructure and Transport criticized, using Seoul's Cheonggyecheon River Restoration Project as a counter-example. This project by the Seoul city government demolished an elevated freeway, thus uncovering a section of the historic Cheonggyecheon and creating both ecological and recreational opportunities along a 3.6-mile corridor in the center of Seoul.

The Ministry of Physical Infrastructure and Transport has recently formulated a Five-year Strategic Transport Plan (2016-2021). The cover page of the document includes a rendered image of wide multilane highways passing through dense urban settlements, which suggests that widening and expanding roads are some of the key elements of this strategic plan. It aims to expand 157 kilometers of roads in the Valley and complete the expansion of 81 kilometers of roads along with 27 kilometers of the Ring Road. It also aims to prepare a detailed project report and initiate construction of a 76 kilometer-long Outer Ring Road. The only plans in this document that supports sustainable urban mobility are restructuring of public transport routes and development of a Bus Rapid Transit (BRT) system in 16 kilometers Inner Ring Road that is yet to be built. However, just building a few kilometers of the BRT system in a single corridor and without planning a network of BRTs will not be sufficient to address the urban transport challenges faced by the city.

Conclusion and Policy Recommendations

Despite claims to the contrary, the road expansion drive has not solved the traffic congestion woes of the city but rather aggravated them including increasing air pollution. Simply widening the roads without giving heed to developing a sustainable urban transport system integrated with urban land-use will have great social, economic and environmental repercussions. It is high time the government of Nepal rethinks its car-centric urban transport policy, and adopts policy where mobility of people is prioritized over cars. Non-motorized transport and mass transit systems should be prioritized in its policies and plans. The Government needs to ensure that the principle of equitable alloca-

tion road space for all users is followed while planning and designing any roads, and creating a more equitable and inclusive city. The rapid urban population growth of the Kathmandu Valley can only be decelerated through decentralized urban development in the country by investing infrastructures and services in other cities.

The priorities and commitments of the government are reflected in its budget not its plans. A transformative approach would be to devise a mandatory budget code in which at least 50 percent of the urban transportation budget be allocated to sustainable transportation modes. A recent report by UNEP (United Nations Environment Programme) recommends national and city policy makers to allocate at least 20 percent of the total transport budget to fund NMT (non-motorized transport) to save lives, reduce pollution and gridlock (United Nations Environment Programme 2016). Improving surface transit through building electric Bus Rapid Transit (BRT) or surface Light Rail Transit (LRT) systems are cost-effective, sustainable and the quickest solutions to the public transport woes of the Kathmandu Valley, rather than planning for an expensive metro system. In addition, they would significantly contributing to road safety and improve the air quality of the city. Rather than developing river corridors as exclusive motor roads, the government should consider making them public green spaces, which will contribute towards sustainable mobility and make Kathmandu livable and climate resilient—including protecting urban settlements threatened by monsoon flooding.

Integrated urban land-use and transport planning are often overlooked when devising transportation policies. Transit Oriented Development (TOD), an approach to compact, higher density, mixed-use and walkable development that is centered around the high-quality mass transit, is absolutely necessary for the capital to correct itself from car-dependent transit-poor urban sprawl and move towards sustainable urban development approach (Institution for Trasnportation and Policy Development 2013). In order to discourage urban sprawl, planned city infill is very powerful lever for change, which, by 'filling up space gaps' achieves an urban structure that reduces transport and service delivery costs, optimizes land use and helps preserve and organize open spaces, as well as providing benefits in terms of improved street life, economic viability, proximity and walkability (United Nations Habitat 2016). Local authorities can implement urban infill projects at relatively low costs through a fresh look at the rules, regulations and ordinances affecting urban development in these areas, such as targeted code changes, land readjustment protocols, zoning bylaws that govern lot coverage, and the height and grade of buildings (United Nations Habitat 2016).

Transport is vital to the social and economic well being of the city. Considering all the socio-economic and environmental damages of a car-centric development model, it is time to stop spending public funds on building urban highways and widening urban roads. Public funds should be spent on infrastructure and services that benefit everyone, not just the fraction of the population with private vehicles. Urban transport should be planned in a way that it not only contributes to economic development, but also addresses issues such as inequality, accessibility, safety, climate risks and environmental health risks faced by the increasing urban population. What the Kathmandu Valley requires is a political will, inclusive-sustainable-integrated urban and transport policies, allocation of resources for sustainable plans and institutional reform of key government departments and agencies to transform the Kathmandu Valley into a livable city for everyone.

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