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Implementing the Proposed Outer Ring Road in the Kathmandu Valley: Creation of new sets of urban problems or opportunity for the planned development?

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Abstract
The proposed Outer Ring Road [ORR] project has a vision of developing the Kathmandu Valley as National Capital Region. This project proposed 72 km long outer ring road including the construction of 50 m wide connecting roads and about 250 m stretch of land development on either side. All these were conceived to be implemented through land pooling technique. Beside the transport development, it also aims in managing the population growth in the next 15-20 years through planned urban development. This ambitious project covers about forty Village Development Committees, three Municipalities and one Metropolitan City. It is a complex program of three interrelated components: (i) construction of highways divided in four lanes,(ii) land pooling schemes, (iii) coordinated infrastructure provision and (iv) building construction. The government of Nepal is for the first time implementing such a mega project. However, the Kathmandu Valley has not yet completed any Master Plan for Planning Standards and Urban Design Guidelines. It clearly demonstrates inadequate legislations which fail to regulate the haphazard urban growth and land pooling projects as well as the building construction. Only the intervention of existing Master Plan is limited to the formation of regular plots with vehicular access devoid of integrating with mixed land uses ,It's function is only to regulate the building constructions including implementation of some isolated small scaled infrastructure projects. All these indicate not only poor technical and managerial capabilities of the concerned public agencies but also exhibit their lack of coordination and cooperation. So, while implementing the ORR project under such circumstances it may repeat the present form of haphazard growth in the surrounding areas directing to an uncontrolled development in the land pooled areas.. As a result, population migration in the Valley will further increase and most of them may be working in the existing urban centres. Such tremendous population exodus, thereby, may create new sets of urban problems like environmental degradation and ecological imbalance, inadequate water supply and electricity and reduction of agricultural land and open spaces and other socio-emergency amenities. Such a failure to regulate the influence of new development will destroy the rural character of traditional settlements such as Bungamati, Khokana, Changunarayan and so on. It shows that numerous stated objectives of the proposed ORR project, such as decentralisation of business activities to the peripheral new areas through development of new 'business centres' with mixed land use and coordinated infrastructure development at different nodal points, can not be fulfilled unless the existing land pooling technique is replaced by urban design approach with participation of the concerned public agencies besides the local land owners. Therefore, the Urban Design guidelines for preparation of a comprehensive Master Plan as well as rules for building construction are needs to be recommended. While incentives in different forms such as tax cut, floor area bonus and so on can be used to achieve the desirable built form during implementation.

Key Words: Outer Ring Road of Kathmandu Valley, Land Polling, Legislation and Institutional Arrangement, Urban Design & Planning Guidelines, Incentives.

1.0 Outer Ring Road Project of Kathmandu Valley - An Overview and Study Objectives

The combination of 'pull factor' in the urban areas like expansion of industry and business including flow of information particularly after 1991[1] the 'push factor' in the rural areas like the low socio-economic development, natural disaster causing loss of lives and properties marked differences in development of Kathmandu. Moreover, the recent past political disturbances including adaptation of centralised policy by the past successive governments are responsible for

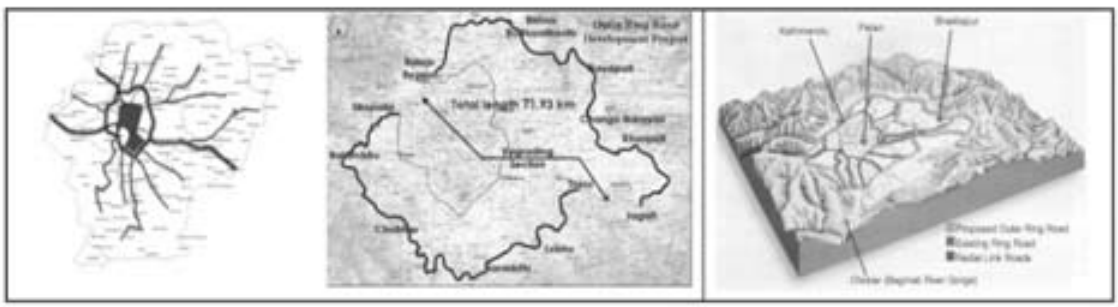
[1] In the year 1991 multiparty system was restored in Nepal which has achieved remarkable changes in development strategies.

huge population migration into the Kathmandu Valley for better income opportunity, education, health, safety and other services. The annual urban growth in the capital city of Kathmandu is 6% against the national average of 2.1% and it accommodates about 30.9% of the total urban population of Nepal [Shrestha, 2007]. In response to the high demands of land, housing and other services the government of Nepal has not only formulated different legislations[2] for development control but it also established new ministries such as Ministry of Housing and Physical Planning in 1988, Ministry of Population and Environment in 1995 . Moreover, it has been implementing different types of projects since 1970s, such as site and services [e.g., Kuleswore housing project], guided land development, land pooling projects and other infrastructure improvement projects for the planned development of the Kathmandu Valley with varying degree of success. In continuation to this effort, the government of Nepal in the fiscal year 2004-05 had decided to launch the Outer Ring Road [ORR] project. It is an enormous and complex project comprising of arterial road construction, land pooling schemes including development of new business centres as a major program with redevelopment of numerous road junctions and modification of road segments as complementary schemes. Different study carried out in the past such as NEPECON [Nepal Engineering Consultancy Services Centre Limited] in 2000, JICA [Japan International Cooperation Agency] in 1993 which had focused on the transportation aspect rather analysing from the urban development perspective. In fact, the Environmental Impact Assessment and the Social Impact Assessment reports of ORR project are still under preparation. So, people are divided regarding the prospects and problems of this ambitious project. Some have strongly advocated the immediate implementation of this project whereas others are concerned about the negative impacts of it. Land brokers see this scheme as an opportunity for their investments; villagers residing in different locations hope to get benefits from the construction of the road; again others are lobbying to bring the road alignment near to their settlements. Against such background, this paper aims to assess the negative consequences as well as the benefits of implementing the project in the Kathmandu Valley with fourfold objective. First, it elaborates the contextual study of the proposed project and then establishes a study methodology based on the nature of the program. Second, it analyses the existing legal and institutional framework of urban development based on the past implemented projects as well as present situation of the Kathmandu Valley. Third, it identifies numerous negative consequences of implementing the program under the existing situation. It also recognises many benefits of this project if the project is executed after fulfilling some of the pre-requisite conditions. Finally, it draws a conclusion and proposes some strategic recommendations for the successful implementation of the project in future.

2.0 Contextual Study and Its Methodological Account

The proposed Outer Ring Road [ORR] project comprises of two broad components: Construction of the main road having 50m of Right of Way and development of 250 m of land on either side of the road through land pooling mechanism. Altogether it comprises of 550 m belt of land development for the ORR project [DUDBC, 2008]. According to the government of Nepal, this ambitious project is necessary not only to contain the population growth through planned development in the next 15-20 years but also to create a new bypass road for Kathmandu Metropolitan area. Moreover, it aims to delineate rural urban boundary and to create integrated infrastructure development corridor - water, electricity, telephone, sewerage and so on. The proposed alignment of the road is based on the 'Rural Urban boundary' of Kathmandu Valley Plan 2020 [KVTDC, 2000] and recommendations suggested by JICA [JICA, 1993] and NEPECON in their feasibility study of ORR in 2000. Moreover, considerations of geology, topography and drainage patterns of the land are taken into account avoiding the fertile agriculture land, environmentally sensitive areas such as dense forest and protected areas as well as the location of security zones. The ORR will connect numerous isolated nodal points of the three principal cities of the Kathmandu Valley [Figure 1] by merging the existing Ring Road, which was constructed 30 years ago from 'Sitapaila to Balaju Bypass', and the existing portion of 'Araniko' Highway from 'Jagati to Thimi.' The ORR has also proposed to join 'Banepa - Bardibas' Highway and Kathmandu - Hetauda Expressway [Araniko Highway] and 'Tribhuvan' Highway.

2 Legislations like the Town Development Act 1998, Municipality Act 1992, Joint Apartment Act 1997, Local Self Governance Act 1999 and so on.



[a] Existing road patterns [b] Alignment of proposed ORR [c] ORR connecting all radial roads

Fig. 01. Proposed Outer Ring Road linking different nodal points of the Kathmandu Valley [Source: DUDBC, 2008]

This Outer Ring Road will have separate lanes for vehicles, such as two lanes for high speed with desirable speed of 60-80 kmph and another two lanes for service with desirable speed of 30-50 kmph in both directions. It will also include lanes for low speed bicycle in the same road section. Moreover, it will include the off street parking. Such road with provisions of highway, service road, bicycle lanes, parking space including greenery belt and pedestrian path will be first of this type in Nepal [Table 1 & Figure 2].

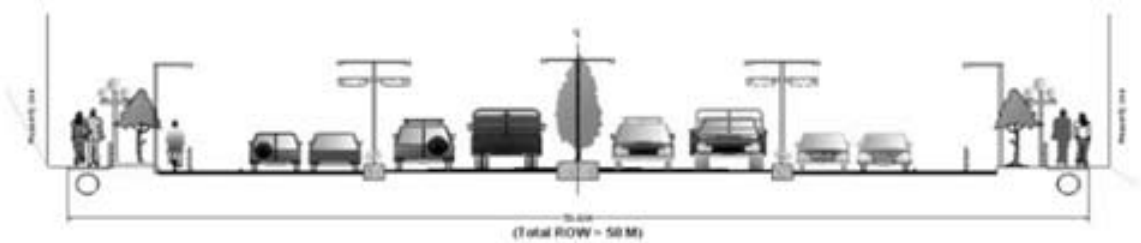


Fig. 02. Typical road section with detailing of the proposed Outer Ring Road project [ORR] [Source: DUDBC, 2008]

Table 1. Technical detailing and typical cross section of the Proposed Outer Ring Road project [ORR]

Technical detailing		Typical cross section of the Proposed project ORR	
Design speed [highway] Design speed [service road]	60 - 80 kmph 30 - 50 kmph	Right-of-Way (ROW)	50 m
Maximum gradient	8%	Highway width	8.5 m x 2 [2 lanes]
Average gradient	4 - 5%	Service Road width	6.0 m x 2 [2 lanes]
Minimum gradient	0.5%	Shoulder/Parking Lane	2.5 m x 2
Desirable horizontal radius	185 m - 230 m	Cycle Lane	1.5 m x 2
Minimum vertical curve	40 m - 50 m	Median Expressway	2.0 m
Camber slope	2.5 - 3%	Divider	1m x 2
Shoulder slope	3%	Green Belt	2.5 m x 2
Minimum super elevation	2.5% - 3%	Footpath / Utilities	2.0 m x 2

For the planning purpose, the lands on the both side of the Outer Ring Road is conceptually categorised into three different Sectors at district level: Kathmandu, Lalitpur and Bhaktapur. [Welink, 2005]. They are further scaled down into Sub-Sectors with many neighbourhoods. Each neighbourhood measuring 1.6 km long and 543 m wide is composed of six Blocks of different size. Three blocks on either side of the road and each block comprises of more than 15 clusters, [Figure 3]. The Central Block, which is separated by 8 m wide road, comprise of an area of 335 Ropani. It will have bigger space compared to the Side Blocks of 210 Ropani land.

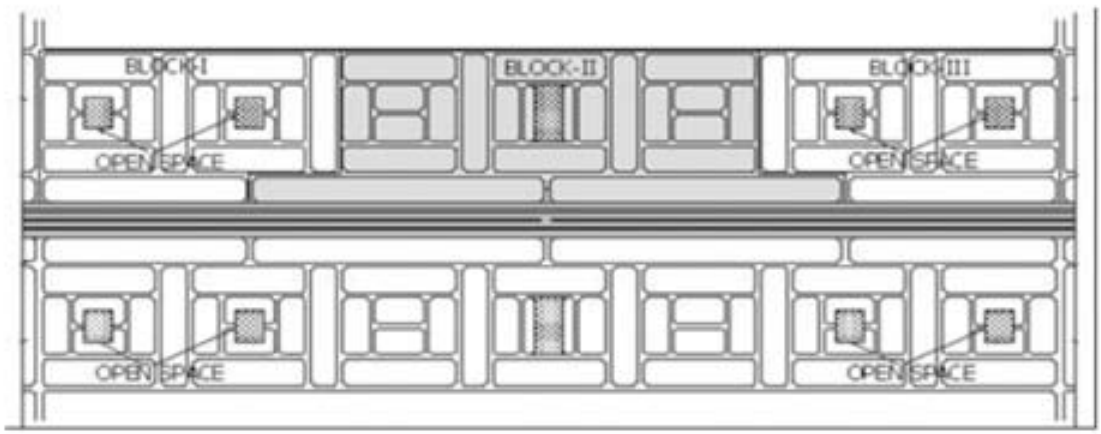


Fig. 03. Conceptual layout of neighbourhood and block in the proposed Outer Ring Road project [Source: Welink, 2005]

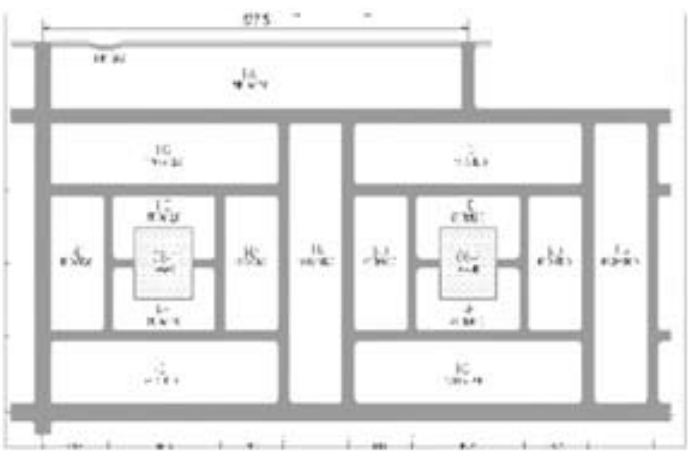


Fig. 04 Layout detail of Block II with cluster, open space and internal streets [Source: Welink, 2005]

According to the government, integration of rural settlements to urban centres and linkages between the southern and eastern parts of the Valley will be better through Outer Ring Road. Land needed for numerous public utilities and services such as administrative sub centre, commercial sub centres, and inter-city bus terminus and so on in the capital metropolitan city will also be easily available through extension of the present settlements towards the Outer Ring Road through planned development. Thus, this road is expected to become backbone of the urban growth in future. Though financial assistance from the government of China is expected for the construction of major highway, Department of Urban Development and Building Construction [DUDBC] under the Ministry of Physical Planning and Works is conducting initial phase of study. So far, study of fixation of alignment, road intersection improvement, impact of ORR on traditional settlement including detail planning reports from Harisiddhi to Lubhu segment including model land readjust plan and the proposed conceptual townscape has been carried out by various qualified private consulting firms under the supervision of the department. (Fig: 5) The land required for the proposed road having Right of Way 50 m is about 350 ha., which is 7,000 Ropanis approximately, and costing about NRs 5 billions. As the government of Nepal simply can not afford this amount for the land acquisition and the past experience clarifies the complications, controversies and time consumption in the implementation of such a mega project. Therefore, it has been decided to acquire the land through land pooling techniques on 250 m each side of the highway.

Some practical issues like the complex nature of the project, government's inexperience in implementing such program in the past including the absence of detail feasibility study from multi-disciplinary approach, especially from urban development perspective - all these complicate the implementation phase. The analysis of the consequences of the project implementation under the two scenario - one based on the existing legal and institutional framework and

another assuming the improvement in different legal and institutional set up - needs careful design of theoretical framework and study methodology. The study methodology is based on the three interrelated components. First, it carefully studies the contextual background of the project and its various components especially related to road construction and urban development aspect. Second, it examines different legislations and public agencies related to road and urban development to review their effectiveness in the projects that were implemented before. Third, it identifies the major activities in project implementation and relates them to the existing legal and institutional framework to find out the various negative consequences. Moreover, it also acknowledges the usefulness of this project and proposes the major modification needed in the legal part and organisational set up to realise the opportunities offered by the project. Finally, it draws a conclusion and suggests some strategic recommendations based on both scenarios. The whole study focuses on the process. Sample survey and detail site analysis of the road alignment and land pooling area is beyond the scope of this paper, as the government is still working towards it on incremental basis through different private consulting firms.

3.0 Existing Legal and Institutional Framework

The inadequacy and ineffectiveness of the existing legal and institutional framework for urban development in the Kathmandu Valley has already been confirmed by the failure to regulate rapid urbanisation and haphazard growth of settlement and building transformation in the historic core and peripheral areas. It also have proved their weaker control on different kinds of projects ranging from housing construction, land pooling and other infrastructure projects under public private partnership in the past. First, five tiers of government organisations namely Ministry of Physical Planning and Works [MPPW] at central level, Department of Urban Development and Building Construction [DUDBC] and Kathmandu Valley Town Development Committees [KVTDC] at valley level, Local Municipalities at city context and local Ward Office and Village Development Committee [VDC] at local scale are yet to prepare the Detailed Master Plan for the Kathmandu Valley. The earlier five master plans proposed in 1963, 1969, 1976, 1984 and 1991 were never implemented. There is neither an urbanisation policy at national level nor any clear guideline of land development and infrastructure provision in the urban areas. Though the Town Development Act 1988 empowers the KVTDC to prepare planning standards and design guidelines, it has failed to fulfil its duty even after twenty years. Due to absence of such regulations, almost all the planned settlements both in the housing and land pooling projects implemented by public agency in the past had become case specific and were the product of trade off between the local land owners and the project staffs [Shrestha, 2006a]. The resultant built environment is sterile and mono-functional with many individual good buildings but without fitting them into the surrounding landscape. The gross density in these planned areas is also too low [e.g. 159 person per hectare at 'Kuleswore housing project' and 143 person per hectare at 'Gongabu land pooling project'] compared to the recommended minimum gross density of 300 person per hectare in the proposed Development Plan 2020 of the Kathmandu Valley. Despite having comparable project area in 'Liwali' and 'Sinamangal' residential developments, open space allocation varies, like 2.8% in 'Liwali' and 5.3% in 'Sinamangal.' Haphazard division of lands with unscientific street layout and without provision of open spaces and social amenities in the areas developed by private sectors and individual land brokers has continuously unabated. The local real estate companies neither register their company with the government nor do they get approval of their land development schemes from the Town Development Agency. Thus, the private sectors have taken profit from land development creating problem to the government for the provision of infrastructures and other amenities. In terms of building component, any semi-skill person whose who are not architect or building engineer and who has obtained only diploma on building construction [or in architecture] is qualified for design and supervision of building construction, which are less than three storeys and of 1000 sq. ft ground coverage. Once the building permit is received from the metropolitan office, the owner himself with the help of local masons erects the building on the site. Construction detailing and other changes are carried out based on masons past experience and owner's requirement. It is believed that as high as 90% of private construction in Kathmandu and Lalitpur are not supervised by engineers. They remained unmonitored and those illegal home constructions are as high as 27% [CBS 1997].

Second, the existing building bylaws based on the land use of map of 1976 is the only legal tool to regulate urban growth. As it is applicable for only new construction, it can not address the activities like vertical division and haphazard renovation of traditional building stocks in the historic core areas (Fig: 7), occupancy [building use] change in the buildings [conversion of residential houses for school, nursing home, etc.] and so on. Moreover, permissions from the education authority and health authority are enough to run the private schools or nursing homes irrespective of the seismic specification of the buildings and other safety measures. [Fig: 6] Similarly, the recently enacted 'Joint Apartment Ownership Act - 1997' focuses on permission to construct housing, its sale, ownership transfer, etc. rather than on income mix, social and emergency amenities including construction and safety requirements. In many cases, the bylaws are conflicting with the existing other legislations such as 'Ancient Monument Protection Act 1976, and

recently enacted 'Local Self-Governance Act 1999' particularly in punishing defaulters. For instance, the Ancient Monument Preservation Act 1956` empowers the Chief District Officer after getting request from Department of Archaeology, to give order for the destruction of the houses or part of it that are constructed against the prevailing law whereas the newly enacted `Local Self-Governance Act-1999` gives power to the Mayor to punish defaulter either by imposing fine [upto NRs. 100,000] or by demolishing the building or part of it. Also, the city can not take any action unless it is informed by the affected party. Similarly, the Traffic Transport Management Act 1992 empowers Department of Transport Management to mange transport and traffic including controls of vehicular emission and condition and road accident [MOLJ 1992] whereas the Local Self Governance Act 1999 strengthens local government's role in planning and development works with little power on urban road sector [MOLJ 1999].

Third, both the local government and KVTDC are ineffective in even enforcing simple clauses of the byelaws such as building height restriction, floor projection, ground coverage or set back requirement through building permit system and monitoring the construction sites. Lack of three different agencies namely local government [issuing building permit], KVTDC [monitoring the construction site] and Chief District Office [punishing defaulters] is clearly visible. Fourth, even in some of the local government participated projects such as redevelopment of 'Dharahara - Sundhara Public Plaza,' [Shrestha and Shrestha, 2006] 'Construction of Overhead Pedestrian Bridges,' [Shrestha, 2006b] and so on, the private sectors were successful to commodity the community spaces in different ways whereas the public sector was even failure to retain the earlier free access to those places let alone forget the protection of intangible aspects of cultural values and people's sentimental attachment with those places. Other local government involved projects include the conversion of different types of cultural spaces of Kathmandu - 'Te-Bahal' [one of the biggest Buddhist Monasteries of Kathmandu], 'Bhugol Park' [Earthquake Memorial Park] and 'Tundikhel' [the biggest open space of Kathmandu] - into the parking lot for short-term economic benefit. All these public sectors activities - planning task, regulating urban growth and private sector initiated development including the government involved numerous projects - clearly demonstrate the limitations of legislation and capabilities in implementing complex project like Outer Ring Road.

4. Implementation of the ORR Project - Creation of New Sets of Urban Problems

It can be easily presumed that while implementing the proposed ORR project under the existing legal and institutional framework it will create a new set of urban problems. The reasons are numerous. First, the construction wide arterial road together with land development on each side will convert about 3961 ha. of agricultural land into the built spaces in the Kathmandu Valley. Moreover, the trickle down effect of such development will go beyond the planned areas thereby causing further reduction in farmlands, forests, wetlands and open spaces. Land fragmentation and its conversion into built form will not only deteriorate natural environment, affecting the habitat of many species but also reduce the agricultural product. Continuing this trend, even without ORR project, will convert all agricultural land of the Valley except in the hill [15%] into haphazard growth area by 2020 [Table 2]. Open space and recreation areas are gradually decreasing in Kathmandu and Lalitpur: from 255 hac. [4.1%] in 1971 to 245 hac. [3.9%] in 1981 and further to 143 hac. [2.2%] in 1991 [Halcrow Fox Associates et. al, 1991]. The per capita total open space in Kathmandu is about 4.6 sq. m. and the per capita organised open space is much lower at 0.97 sq. m. [Maneesh, 2003] whereas the total garden parks cover an area of 3.06 sq. km. only.

Table 2. Reduction of agricultural land but intensification of haphazard urban growth in the Kathmandu Valley

Year	1984	1991**	1994	2000*	2010*	2020*
Urban Area (% of total Valley area)	4.8	11.0	13.1	18.0	26.0	34.3
Agricultural Area (% of total Valley area)	64.0	56.0	49.6	42.2	28.3	14.5

Source: [MOPE, 1999] Note: ** Projected by Halcrow Fox, * projected by linear regression analysis

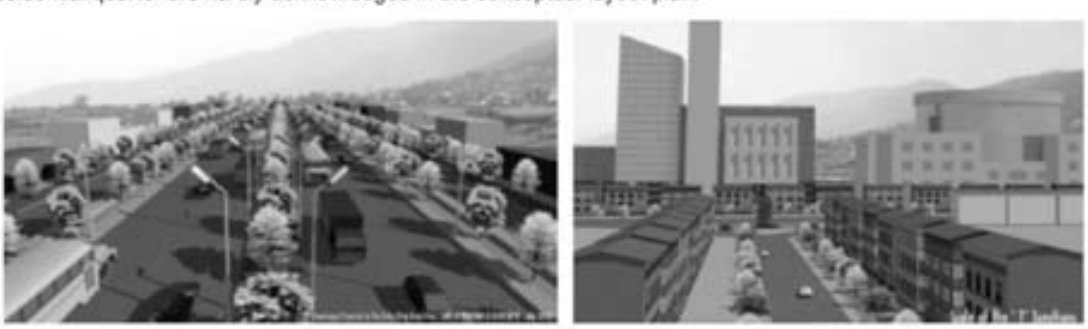
Second, this proposed new development, both the planned in the prescribed area and the unplanned in the surrounding areas, will attract more people from the surrounding districts in the Kathmandu Valley for better employment opportunity, education, health services and other facilities. One of the reasons of rapid urbanisation of the Valley is due to concentration of non-farm employment opportunities in the urban centre with negligence of farm-oriented economy in the rural areas. Construction of huge departmental store, commercial complexes and housing estate along with rapid increase in slums and squatter settlements demonstrates the big gap between rich and poor. The further influx of population due to the construction of ORR can not be easily accommodated in the land pooled area which is the private property. The present form of unsustainable development will further increase. Again, those influx populations will also share the existing capacity of water supply and electricity thereby aggravating the present

state of crisis. The limited natural resources and carrying capacity of the Valley can not simply afford the present trend of urban growth, which does not allow the integration of economic development and environmental sustainability.

Third, the ribbon type development of 250 m land on either sides of the 8 lanes arterial road is proposed to be implemented based on the existing land pooling practice. As the development cost has to be cash out from the local land owners only by selling extra plots rather than from the central and local government's financial support, the land pooling mechanism in the ORR will also face similar problems of little contribution for open space, road network and other socio-cultural and emergency amenities by landowners. The government can neither impose the land use regulation in the land pooled areas nor can control the conversion of residential houses into schools, health centre or other public oriented uses under the existing legal framework. Allocation of land and housing units for urban poor is also difficult. As a result, these new development will be converted into dormitory section of the Kathmandu Valley with little social benefit for the public at large. The only beneficiaries are the local landowners, whose land values increase by many folds.

In such case, the objectives of ORR to plan as new business centre with commercial and other social and recreational facilities in the land pooled area can not be achieved. Despite close proximity of road junction between the radiating roads from the centre to the existing Ring Road, they could not develop as a new business centre to decentralise the socio-economic activities of the existing urban core areas. Same fate will be there in the new road junction, which is far away from the urban centres, if the proposed ORR is implemented in the existing form. As the land contribution from the private land owners will be consumed in the arterial road construction, the government does not have any legal tool and mechanism at present to develop commercial and other activities in the private lands.

Fourth, residential neighbourhood adjacent to such arterial road is not suitable due to many reasons. Proposed conceptual layout of the neighbourhood community on the limited width of land in the same fashion - one open space at the centre, straight roads dividing the urban fabrics in opposite orientation and high rise structure along the arterial road - will form monotonous urban environment [Fig: 5]. Moreover, the transverse vehicular as well as pedestrian network among different blocks of the same neighbourhood is weak due to arterial road in between. As a result, community living on both sides will feel physically, visually and psychologically separated from the same community. As in the past cases, the issues of spatial location and linkages to the surrounding areas, energy conservation, children's safety and peaceful environment, socialization opportunity and sense of community formation, all required for a good residential quarter are hardly acknowledged in the conceptual layout plan.



[a] ORR separating the same neighbourhoods

[b] Residential neighbourhood and high rise construction [T junction]

Fig:05. Formation of similar type of residential neighbourhood due to constrains of arterial road and land width.

The proposed land use for a typical neighbourhood area clearly indicates the continuation of the past trend, developing only residential plots [Table 3]. Moreover, by proposing vehicular roads on both sides of the river [for instance at 'Chovar - Satungal' area] [Manandhar, 2008], it has lost the opportunities provided by water by creating open spaces and public amenities along the riverfront. Allocation of singular land use of housing without socio-religious functions combined with construction of individual buildings without coordination with the surrounding structures will definitely reduce the opportunity for interaction and socialisation among the residents in these planned areas too thereby not only minimising the mutual assistance but also deteriorating the sense of place and community [Shrestha, 2007]. Lack of urban design approach and involvement of architects or planners instead of urban designers have significantly limited the integration of two dimensional layouts into three dimensional built form. As the individual building

construction on the private land is regulated by the existing building bylaws, the quality of 'public realm' can not be achieved at all.

Table 3. Proposed land use allocation for a typical neighbourhood area in the land pooled area

Proposed land use of a typical neighbourhood area				*Contribution ratio*			
S. No. use	**Proposed land**	**%**	**Ropani**	**Plots located along**	**General plot [%]**	**Corner plot [%]**	**Open space [%]**
1	Outer Ring Road	11.0	188	Outer Ring Road	41.0	46.0	
2	Internal roads	15.6	265	11m wide road	36.0	41.0	
3	Open space	2.9	49	8m wide road	31.0	36.0	
4	Residential area	70.5	1,196	6m wide road	26.0	31.0	
4.1	Plots to be returned	63.9	1,084	Open space			32.0
4.2	Plots to be sold	6.6	112	***Note:*** **1 Ropani = 508 sq. m.**			
Total		**100**	**1,697**				

Source: Welink, 2005

Since the newly developed sites through land pooling system will not be self-sufficient in terms of mixed land use and infrastructure provisions such as water supply, electricity, and telephone line and so on, the extra population living in these areas will have to commute to the existing urban centres for work and have to rely on the existing facilities and amenities. Population growth along with increase in socio-economic activities will definitely create extra demand for urban services and infrastructure facilities and failure to supply in the same proportionate will make them costly, insufficient and unreliable and highly vulnerable. The extra trip generated by people living in the new development will create more traffic congestion particularly in the existing city centres and historical core areas thereby increasing air and noise pollution as well as community time with negative consequences on health, psychology, socialisation and economy. Environmental pollution has not only caused diseases such as dysentery and typhoid, high infant mortality, up to 101 per 1000 live births and various acute respiratory infectious diseases but also results in huge losses of NRs.680 million per annum [US$1=NRs.70.00] due to pollution, NRs.80 million due to contaminated diseases such as Jaundice in the Valley alone [The Independent, 2000], and NRs.10 billion per year [The People's Review, 2000] due to poor sanitation. The cost of morbidity resulting from PM10 was found to be NRs.180 million and total health damage to be NRs.210 million. It is estimated that NRs.0.5 billion per year in tourism revenue is lost due to air pollution in Kathmandu valley [World Bank, 1997]. In terms of water supply, though the daily demand is of 170 mld [million litres per day] in the Valley, the Nepal Water Supply Corporation is able to supply only 120 mld during the rainy season and just 80 mld during dry season. Intensive use of ground water for water supply has caused the dropped of groundwater level from 9 m to as low as 68 m over the last few years thereby drying off the traditional dug wells and stone spouts [Dhungedhara]. Addition of population in the already congested urban centres and the historical core will not only expose significant percentage of population under the seismic risk but also make rescue and relief operation difficult in case of a big earthquake. [Fig: 6]

[a] Vertical division of old house | [b] Haphazard creation of openings - windows/doors | [c] RCC addition on the existing old house | [d] Pedestrian path as a 'depth' trap

Fig 06: Intensification of earthquake vulnerability due to haphazard transformation of buildings in the core areas

Fifth, numerous radial roads [2-4 lanes] merging into the proposed ORR [8 lanes in total] will form 'bottle neck' at the road junctions and the smooth vehicular movement will be difficult unless the junctions are redesigned. Significant amount of extra budget will be required to improve those junctions which can be neither fulfilled from the land pooling mechanism nor from the internal source of the government. Sixth, numerous historical towns like Changunarayan, which is a World Heritage Site and Bungamati, and Khokana, which are potential to be included in the World Heritage Site, have preserved their cultural and religious significance up to now due to little influence from the haphazard urban growth. However, linking these traditional settlements with the Outer Ring Road and rapid urban development along both sides of the road will certainly pressurise these towns for modernisation and construction of modern Reinforced Cement Concrete [RCC] structures like other parts of the Valley. The scope of loosing their cultural identity is very high.

[a] High rise-high density urban structure in the core

[b] Haphazard urban growth and construction of buildings

[c] Urban sprawl in the city peripheral areas

Fig:07. Transformation of medieval cities of the Valley into high rise-high density and urban sprawl

5. Implementing the Proposed Outer Ring Road - Opportunity for the Planned Development

Planned development enhances economic development, allows optimum use of resources, and reduces disaster vulnerability. This ambitious ORR project acting as a planning tool can not only guide the future development of the Valley but also solve some of the existing urban problems, if it is designed and implemented under the new legal and institutional framework and some of the pre-requisite conditions are fulfilled. First, this project will regulate the vehicles coming to the Valley from outside providing alternative ways. Vehicles using 'Bardibas - Sindhuli' highway can easily flow north -south of the Valley through this ORR. Also, the present chaotic situation at 'Kalanki Chowk' can be solved. At present, compared to the increase in vehicular population from 54,776 to 2,49,282 between 1991 to 2003-'04, extension of road network from 713 km to 11,319 km in the same period [Niraula, 2004] has proved to be inadequate thereby creating traffic at various locations. However, construction of 72 km road network along with improvement of many road junctions will definitely improve the present chaotic traffic condition of the Valley. It will also facilitate the scope of public transportation linking different commercial and residential areas. Equally important is the restructuring of the road alignment and improvement at various road junctions meeting the radial road coming from the city centre to ORR for smooth transition of vehicles into different directions. Second, no family living in the project site needs to be displaced into other area due to land pooling system. Moreover, implementation of this project will create new employment opportunities in planning, design and construction as well as in housing, commercial and service sectors. Not only local people but also the professional working in different sectors will benefit from this project in terms of economy as well as work experience. The present state of haphazard and in most cases illegal settlement along the ring road can also be solved through planned development of housing and other land use activities.

Third, this ambitious project has a lot of potential not only to fulfil the housing deficit, shortage of qualitative infrastructure and other public amenities required for the metropolitan citizens but also to address the issues of urban poor, slums and squatter settlements. In fact, the vision of the Kathmandu Valley to develop as a National Capital can be realised through effective implementation of this project. Compared to the land development and housing projects implemented by both public and private sectors in the past, this proposed project is the biggest development so far the public agency has ever handled in terms of scale, size [3961 ha. of land development] and complexity due to the combination of arterial road with urban development. In the past, the government was able to develop just about 41.25 ha. of land from site and services and 240 ha. of land with 7184 number of housing and other plots benefiting 5980 landowners from land pooling techniques in the last two and half decades [1977 - 2003] whereas the local real estate companies and individual land brokers opened up more than 1,270 ha. of land for residential purpose in Kathmandu and Lalitpur municipalities between 1971 and 1981 [Shrestha, 2006a]. Similarly, the private sector brought out about 965 housing units on the 12.71 ha. of land in the last three years. There is a wide gap between the demand and supply of land and housing lots in the Kathmandu Valley. If the present trend is continued, then there will be only 127.76 ha. of

land and 3,832 units of housing available by 2011, which is far below the demand [Table 4]. Also, about 3.3% of the total population of the Valley [assume as 16, 45,091 at present] live below the absolute governmental poverty line of NRs. 11,056.80 per person per year [NPC, 2005]. However, single project of ORR, if planned properly, can fulfil the demand of housing units and land required by 2011.

Table 4. Demand and supply of housing land and lots by 2011 in the Kathmandu Valley

Particulars	Demand [annually]	Supply [annually]	Needed by 2011	Continuing existing trend by 2011
Land	409.12 ha.	15.97 ha.	3,273 ha.	127.76 ha.
Housing lots	24,547 units	479 units	1,96,376 units	3,832 units
Outer ring road [land pooling]		3,961 ha. [total]		

Fourth, development of satellite towns at different nodal points as 'self sufficient' sub-centres with balance of living and working facilities will not only help to absorb some of the economic activities of the existing urban centres but will also create lively environment in the newly planned areas. Haphazard transformation of building structures in the city centres can be significantly reduced thereby mitigating the excessive pressure on the old infrastructures. The proposed satellite towns should be 'high rise-high density' at the nodal points with planning of 'low rise-high density' mixed housing and other community activities at the peripheral areas. Moreover, this project can be an opportunity to develop some of the public facility required for metropolitan city such as central bus terminals, administrative centre, sport complex and entertainment zone, etc. To realise such opportunities, some changes in the existing legal and institutional arrangement is essential. First, the present technique of land pooling needs to be modified in many ways especially in terms of master layout plan, land use distribution and in financing the projects. The project area should be designated as 'comprehensive development zone' and urban designers should be involved in preparing master layout plan and formulation of planning standards and urban design guidelines. New mandatory clauses and other suggestive flexible design guidelines should be developed with consensus among the involved parties before the execution of the project. Second, for comprehensive development, not only the concerned line agencies such as Department of Road and Traffic Management, Department of Water Supply, Electricity at the 'horizontal axis' but also the public agencies at central, valley and local levels in the 'vertical axis' needs cooperation and coordination from development of concept to completion of various parts of this project. Moreover, they need to share the development cost too. Then only, local communities will come to forefront in contributing larger percentage of lands for other amenities. In this way, the issues of housing provision for urban poor, higher density through mixed housing types including apartment and other social and emergency amenities can be incorporated in the residential neighbourhoods and commercial centres. Second, a central level coordinating mechanism should be developed to organize among many municipalities, Village Development Committees and city level line agencies. The present proposed mechanism of formulating 'Land Management Sub-Committees' in each three districts under the existing Town Development Act 1988 is inadequate. Finally, urban design techniques of incentives in different forms such as tax cut, floor area bonus and other similar provisions should be used in implementing the projects. Fifth, conservation oriented development plan and program for traditional settlements like Changunarayan, Bungamati and Khokana are essential so that the benefits of road construction could be realised in economic development and at the same time ensuring their traditional characters. Promotion of building materials, traditional arts and crafts are recommended. Maximum exploitation of cultural heritage will not only benefit the locals but also the conservation of the town.

6. Conclusions and Recommendations

Though this ambitious project posses both challenges as well as opportunities for the systematic growth of the Kathmandu Valley, serious discussion at national level and more critical analysis on local issues in implementing this scheme is required. The present haphazard urban growth of the Valley as well as lack of regulation on the private sector land and housing development and the numerous land developments, housing and infrastructure improvements by the public agencies have demonstrated that the existing legislation and institutional capabilities are inadequate and ineffective to implement such a complex project. As a result, implementation of this project will attract more population from the surrounding districts and promote 'low rise low density' individual houses with many vacant but developed plots in the land pooled areas but urban sprawl will continue in further extended areas like the dormitory pockets. Most of the people living in these areas will be not only working in the existing urban centres of the Kathmandu Valley but they will also share the existing infrastructure and social and emergency amenities. The situation will be worse than it is. To overturn this trend, changes in the present practice of land pooling and improvement in the existing legal and

institutional framework is essential. Then only, development of nodal points as a 'self sufficient' business centres supported by residential neighbourhoods is possible to achieve the balance growth of the Valley, and to reduce development pressure on the historical core areas and to promote new business centre equipped with high tech infrastructure as required for the 21st century. Nonetheless, after reviewing the public sector's performance in urban development and infrastructure projects in the past decades, present political situation in the country, people's expectation on result oriented development, such complex and national level project needs more public discussion and critical analysis on different aspects of urban development and public life. In fact, this project was justified based on engineering aspects focusing on the arterial road construction with little study on the socio-economic aspect. Hence, some strategic recommendations are suggested to address the existing urban problems and to enhance the capacity building of public sectors, which will help in successful implementation of ORR project in future.

[a] Develop planning standards and urban design guidelines to regulate the ongoing land development and large scale urban projects such as housing and apartment construction, commercial complexes and departmental stores, etc. as well as the haphazard transformation of buildings in the historical core including the urban sprawl in the city peripheral areas;

[b] Regulate the present chaotic condition of traffic situation in the Kathmandu Valley through multiple measures: regulating land use and transportation network, encouraging use of public vehicles but discouraging private one especially two wheelers, improving street network and road junctions, defining continuous pedestrian movement network, improving traffic management system, and so on;

[c] Use different urban design techniques such as tax incentives, flexible design guidelines, introduction of design review system and consensus building to promote desirable development [land use and building form] in new and redevelopment works.

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