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Open Space Implications in Urban Development: Reflections in Recent Urban Planning Practices in Nepal

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ABSTRACT

Open space has various implications in urban development planning and has been integrated into recent urban planning approaches and practices in Nepal. The open spaces are not only important for (re)shaping the urban form but are also important for enhancing urban social life and disaster risk management, particularly for dense cities. As most of the cities in Nepal have been growing haphazardly, the cities lack sufficient open space. However, the value of open space in dense cities like Kathmandu has been recognized more after the Gorkha Earthquake in 2015 as the open space were extensively used for risk relief, treatment, recovery, and rehabilitation during and after the earthquake. With this background, this paper presents the major planning initiatives in Nepal and discusses how recent urban plans have provisioned and initiated open spaces development by reviewing concurrent urban planning practices, particularly reviewing Periodic Plans, Integrated Urban Development Plans, Smart City Plans, and Land Development Plan. The development of open areas has not been given much attention in the earlier urban planning practice but recent urban development planning has emphasized with a special focus which is very important for sustainable and safer city development and is expected to address the current bulging urban issues of spatiality and sociability. Therefore, it is very important for integrating open space implications in city planning and such open space should be conceptualized according to the city's geography, landscape as well as socio-cultural contexts.

1. Background

Open space planning for cities has been a growing concern among planners, development activists, and academicians worldwide. The open space is considered as the lungs of city life by which people discover the

value and benefits of public life activities^[1-3]. The term “open space” in this article denotes those spaces that are available to urban residents without any restrictions for social, economic, cultural, environmental, and political uses, and these are contributing environmental benefits and shaping the urban physical form^[4]. These spaces

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are shared resources, which are not closed or blocked up and provide access for people and express conditions of public life, civic culture, and everyday activities^[5]. Therefore, open space for the cities underpins many social, ecological, environmental, political, and economic activities that are essential to the healthy functioning of urban life and the city environment. Thus, urban open spaces are the agent of shaping urban morphology and are contributing to the social, economic, environmental life of urban people. Different urban planning practices address open spaces to make the city livable, live, and functional even though the details and depth intensity of open spaces implications may be contextual and varies according to physiography, landscape, social and cultural settings, etc. Planners, urban authorities, and development activists working in urbanism, therefore, have been giving attention to integrating open space provisions in city planning practices.

Cities, countries, and organizations in the world have different criteria and practices for provisioning open spaces in city planning. Cities such as New York, Hongkong, Johannesburg, etc. use per capita; cities like London, Singapore, Sidney, Vancouver, and Stockholm use distance from the household residence to open space. Similarly, organizations like WHO use per capita whereas ECI (European Common Indicators), US EPA (US Environment Protection Agency) use distance to open spaces and Un-Habitat uses both per capita and distance to open spaces^[4]. Table 1 reveals the major provisions and practices by world cities/towns and agencies to make open space functional and efficient.

Table 1. Open Space Provisions in the Major Cities

Cities/Agencies	% of Open Space	Open Space Per Capita	Distance to Open Space
Bogota		10 m ²	
Hongkong		2 m ²	
Johannesburg		24 m ²	
London			400 m
New York		10 m ²	
Singapore			400 m
Sidney			400 m
Stockholm			200 m
Vancouver			5 min walk
Mumbai		2 m ²	
Kathmandu	5% of the metro city area	2.05 m ²	
UN-Habitat	15% of the city area		400 m
WHO		9 m ²	300 m
ECI			300 m
US EPA			500 m

Source: UN-Habitat, 2018; MoUD, 2015

The data reveal that Johannesburg seems the highest per capita open space then followed by New York. However, cities in developing countries like Mumbai and Kathmandu have the least open space available for public use. Mumbai has below 2 m² per capita open spaces whereas KMC (Kathmandu Metropolitan City) has 2.05 m² per capita^[6,4,20]. It implies that open spaces are important for urban life as many developed countries are giving high attention to making the cities efficient, life, and functional with spacious open space provisions. However, our position is very poor in terms of open space availability and access of it to the urban people. So, we are in danger of running out of open space in the cities^[7]. Sufficient green space, recreational spaces, public plazas, squares, rest places, etc. are the heart of such cities which would provide a good place for public life activities. Open space contributes to societal well-being and provides a safe place for disaster risk management. Evidence shows that there were thousands of people on the street and open spaces in Kathmandu during the earthquake in 2015 living outside their “home”^[8]. Although the open space in city planning needs to be a central focus, there is less discussion on how urban planning practices have embedded open space planning in practice. In light of this background, this paper will explore how recent urban planning practices have conceptualized open space planning for city planning and development in Nepal.

2. Chronological Planning Practices in Nepal

It is pertinent to discuss here briefly the historiography of the urban planning initiatives in Nepal. The first urban planning was started in Nepal in 1944 as the “Rajbiraj Plan” which was initiated to develop a grid road plan with the skeleton physical urban forms of the administrative town of Rajbiraj. Similarly, the first physical development planning was started as “The Physical Development Plan for the Kathmandu valley” in 1969^[9]. Thereafter, several planning practices have been executed for town/municipal development in Nepal. Master Planning, Structure Planning, Physical Development Planning, Integrated Action Planning, and Periodic Planning were the major planning practices that were used in town/municipal planning. Recently, the government has introduced Integrated Urban Development Planning (IUDP) and Smart City Planning for the sectoral integration of urban development efforts which is yet to be implemented^[10]. The historiographic development planning initiatives in Nepal have been presented in chronological order as follows (Table 2).

Table 2. Chronological Planning Practice in Nepal

Timeline	Major Urban Planning Initiatives in Nepal
1944	Rajbiraj Plan (the first planned administrative town plan)
1956	National level periodic planning started
1962	Kathmandu Beautification Program: Visual Beautification of Kathmandu Valley (Occasion of Royal visit of Elizabeth under UN Technical Assistance)
1963	Town Development Committee Act, 1963
1965	Third National Plan (1965-1970) (Divided the country into 3 watersheds namely Koshi, Gandaki, and Karnali River)
1969	Physical Development Plan of Kathmandu Valley prepared under technical assistance from UNDP, led by Karl Pusha
1973	Revised PDP of Kathmandu Valley 1969 (Revised by national professionals and land use plan of Kathmandu Valley)
1975	Construction of Ring Road in Kathmandu Valley
1974-1984	Bhaktapur Development Project (successfully implemented) with German assistance
1976	The Revised Comprehensive General Plan for Kathmandu 1969/1973
1987-1988	Structural plan for major urban centers including greater Kathmandu (20 years plan) in support of GTZ/MSUD
1990	Integrated Action Plan (IAP)
1991	Kathmandu Valley Urban Development Plans and Programs – Hal Crow Fox/ DHUD/ ADB
1993	Study of Kathmandu Valley Urban Road Development – JICA
1999	Kathmandu Valley Mapping Program (KVMP)
2002	Long Term Vision for Kathmandu Valley Development (Vision 2020)
2005-2015	Periodic Planning (Various municipalities)
2015	Vision 2035 and Beyond: 20 years Strategic Development Plan (2015-2035)
2016 onwards	Integrated Urban Development Planning (IUDP)
2018 onwards	Smart City Planning (three piloting municipalities in the first phase and 10 other municipalities in the second phase)

Source: NTPCO, 2019a, 2019b and DUDBC, 2020a and 2020b

The periodic planning approach was largely adopted for town/municipal planning in Nepal for a long-time before the IUDP and is still in practice in municipal planning. However, most municipalities now prefer integrated planning to integrate different sectors in the urban development which is supposed to integrate various development sectors identifying the leading development sector(s) for the municipality.

The implications of open space in urban planning are diverse. Open space contributes not only to enhancing the urban forms of the town but also helps to enable social and physical well-being^[7] of urban communities. Moreover, open spaces will contribute as a place for disaster risk management in dense cities like KMC as most open spaces were extensively used in disaster risk relief, treatment, recovery, and rehabilitation^[8,11] during the 2015 earthquake. Planning practices such as Physical Development Planning, Periodic Planning, Integrated Urban Development Planning, and Smart City Planning have embedded some slots of open space development in city planning. Although it was not highlighted much about open space development in periodic planning except for identifying the potential sites for land development projects and open space allocations in the plan which is a good initiation for open space development for the towns.

3. Methods and Materials

The methodology of this paper is based on constructive criticism of various urban plans prepared by the Department

of Urban Development and Building Construction (DUDBC), New Town Project Coordination Office (NTPCO), and Municipalities. The propositions of open space development within the plans were reviewed and discussed how these plans have focused to contain open space in the city planning and practices. Depth review of Periodic Plans, Integrated Urban Development Plans, Smart City Plans, and Land Development projects/Plans was the basis for identifying open space implications in the planning practices. Maps have been prepared by using the data acquired from DUDBC, NTPCO, and the Municipalities and further overlay in google earth images. The overall methodology of preparing this paper has been presented below (Figure 1).

As far as data is available, DUDBC has prepared 58 municipalities’ periodic plans, 186 municipalities’ IUDPs, 13 municipalities’ smart city plans, and about 27 block land development plans^[15-17,20-23]. To make representatives for reviewing the different planning practices, 11 municipalities for periodic planning, 34 municipalities for integrated urban development planning, 4 smart city planning, 4 land development plans were selected randomly by listing out all the municipalities in different thematic columns e.g., periodic planning, integrated urban development planning, smart city planning, and land development planning. The reviewed plans are; 11 municipalities’ periodic plans namely *Bidur, Dhangadhi, Ghorahi, Birjung, Rajbiraj, Siraha, Baglung, Kathmandu, Attariya* (renamed now as *Godabari*), *Jharipipaladi* (renamed now as *Shuklaphanta*), *Ilam*; 34 municipalities

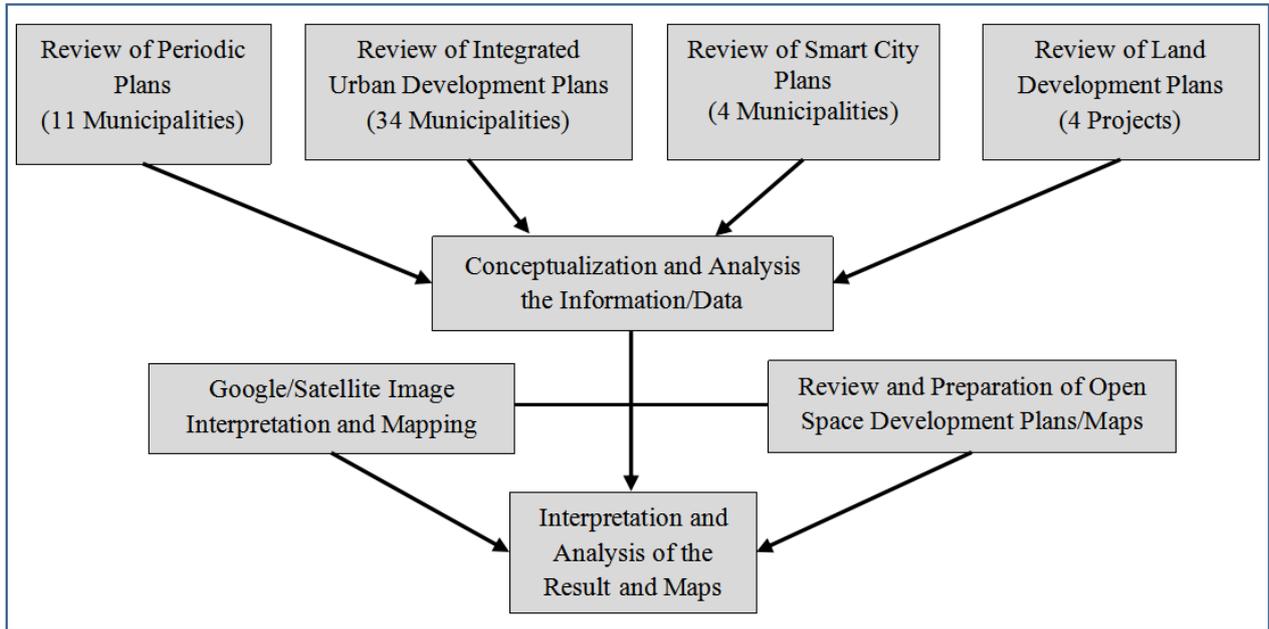
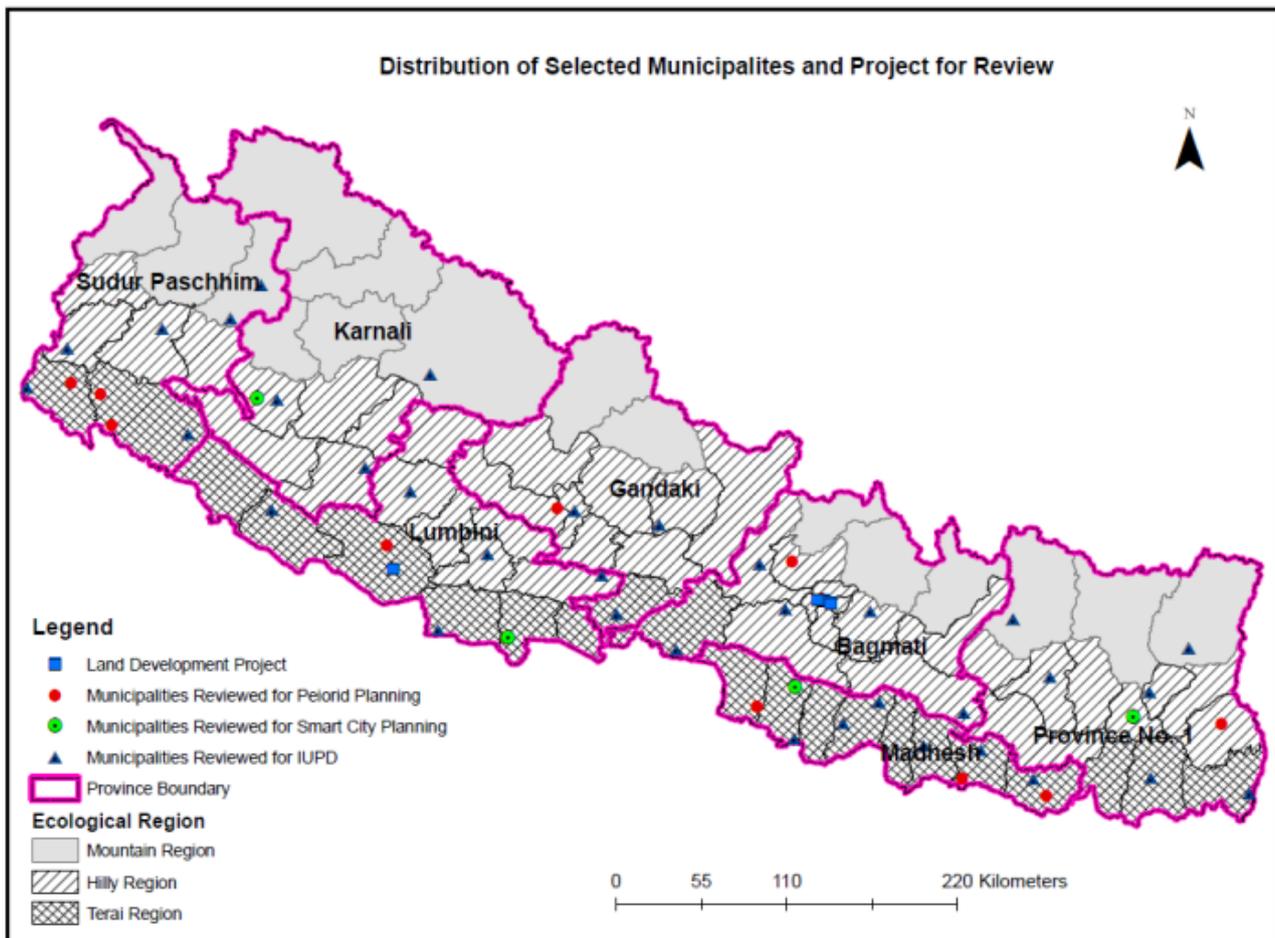


Figure 1. Process and Methods



Map 1. Distribution of selected Municipalities and Land Development Projects for review

integrated urban development plans namely *Phungling, Bhadrapur, Belbari, Laligurans, Solududkunda, Rupakot Majuwagadhi, Shambhunath, Golbazar, Chhireswornath, Barahathawa, Lalbandi, Dudhauli, Panchkhal, Neelakantha, Thaha, Simraungadh, Madi, Myadhyanepal, Kushma, Rampur, Krishnanagar, Sandhikharka, Bagchaur, Kohalpur, Narayan, Tripurasundari, Budhinanda, Tribeni, Dipayalsilgadhi, Punarbas, Mahakali, Parashuram, Madhyabindu, Rolpa*; 4 municipalities' smart city plans namely *Nijgadh, Lumbini, Dullu, and Chandrapur* and 4 Land Development Plans namely *Pepsicola Town Planning, Nayabazar Khusibu Town Planning* of Kathmandu District, *Divyaswari Planning* of Bhaktapur District and *Lamahi Town Planning*, Dang District. Details of plans prepared by DUDBC and No. of reviewed are presented in Table 3. The selected municipalities for review are from different provinces, and ecological zones as presented in the map below (Map 1).

Table 3. No of Plans (municipalities) Selected for Review

S. No	Plans	Plans Prepared by DUDBC	Selected Municipalities for review
1	Periodic Plans	58	11
2	Integrated Urban Development Plans (IUDP)	186	34
3	Smart City Plans	13	4
4	Land Development Projects/Plans	27	4

4. Results and Discussions

Open Spaces in the Municipal Periodic Planning

In 1999 the Local Self Governance Act (LSGA) was enacted with subsequent LSG (Local Self Governance) regulations in 2000 which empowered periodic planning for urban development to the municipalities^[12]. The Tenth Plan 2002-2007 also prioritized the preparation of periodic plans of the municipalities and in 2002 the Guideline was prepared by the Ministry of Local Development^[13]. The periodic plan was expected to be efficient to integrate different sectors to achieve short-term, mid-term, and long-term planning goals and avoid duplication of sectoral plans and programmes by the government line agencies and others that serve as planning, implementing, and project executions in the municipalities. The plan would require a municipal profile, sectoral integration plan with Logical Framework Analysis (LFA)-based participatory planning for municipalities.

The periodic plan is a long-term, comprehensive parti-

cipatory, and inclusive plan prepared for 5 years action plan with a long-term vision, goal, and objectives for municipal development. A rational and participatory planning method would be applied as bottom-up planning methods. Ward-level projects and municipal-level projects would be prepared with the integration of different thematic plans such as social, economic, environmental, physical, financial, and institutional plans. This plan would ensure that the concerned stakeholders in the respective district authorities get due support in the overall periodic planning process to translate the legal provision into action^[12]. Sectoral integration would be based on the nature of the program, resource availability, and the performance indicators as a tool for monitoring the plan implementation. Although the integration of sectoral plans, the physical development plan was the main goal of regulating spatial city forms and development for the municipality. This plan would foster municipalities to initiate and direct future city expansion, development, and regulation for urban development where the potential expansion is inevitable.

The method includes profile-based planning based on the primary and secondary data, physical investigations, a participatory approach for a long-term development vision, developing the sectoral goals, identification of lead development sectors, output indicators using Logical Framework Approach (LFA), program identification at municipal and ward levels and preparation of implementation plan with the role and responsibilities of possible line agencies. Although the plan would be beneficial in many aspects of municipal development because of its integrated nature of physical, social, and institutional planning, it has some limitations. The lengthy planning process, absence of municipal data, elites' participation and free riding their voices, collection of a list of scanty projects, insufficient budget for implementations, less effort on depth fieldwork and analysis may mislead to drive the municipality to the targeted direction and, of course, lack of proper implementation mechanisms in the municipality are some of the major limitations. Hence, municipal authorities started to see the periodic plan as just to fulfill their Minimum Criteria Performance Measure (MCPM) requirement for the government's evaluation process to receive a regular grant. So, the municipal periodic plan was not successfully implemented on the ground.

Although the periodic plans were to contribute to spatial development planning having a focus on a physical development plan, they could not address and regulate the physical forms of the town/city effectively. Allocation of open spaces within the physical plan could be one of

the guiding principles for spatial planning that was not well initiated in this plan. Planning and building by-laws and their effective implementation would be the best tool for the implementation of spatial regulation which was not embedded in the plan. Therefore, the periodic plan could not effectively guide spatial development directions to the municipalities as it had poorly embedded planning and construction by-laws in the plans. The open spaces provisions were just spoken in the plan as Right of Way (RoW), which was not proposed strongly in most of the periodic planning. It means periodic plans do not adequately address open space planning for the municipalities but address the local and municipal level needs assessment and direct municipalities to integrate the different sectors as a whole to meet the intended long-term vision of the city/town.

Open Spaces in the Integrated Urban Development Planning (IUDP)

Integrated Urban Development Planning (IUDP) is the integration of all development sectors involved in urban/city development. IUDP was started in 2017 by DUDBC initiating for preparation of 185 municipalities' plans. It was one of the remarkable planning activities initiated by DUDBC. IUDP comprises a system of interlinked actions, which seeks to bring about a lasting improvement in the economic, physical, social, and environmental conditions of a city or an area within the city^[14]. The integration process involves sectoral integrations in the plan and process integration from the bottom-up to top-down strategic planning. The main scopes of IUDP are i) to coordinate the work of local and other spheres of government in a coherent plan to improve the quality of life for all the people living in an area considering the existing conditions and problems and balance allocation of resources available for development, and ii) to ensure equal opportunity for different sub-areas and different social and age groups in urban society which includes gender-mainstreaming planning, ensure balanced development planning with growing social and spatial inequalities, and it aims to help preserve social harmony with equity and equality^[15].

The procedural steps of IUPD would start with reviewing the existing plan documents and conceptualizing the sectoral integration for municipal/town development. Induction workshops that are supposed to disseminate the planning process and outcomes at the municipality would be conducted at the municipality to start the IUDP. It is then followed by tole/community level problems and issues identification to which ward/cluster of wards level workshops and discussions would be conducted. Such community-level issues would guide the planning team

to prepare sectoral strategic plans and project formulation at the municipal level. In the second stage, municipal level workshops for vision setting, participatory SWOT (Strength, Weakness, Opportunities, and Threats) analysis, and municipal sectoral planning issues identification would be conducted to establish municipal sectoral goals and objectives. The municipal scenario would be presented among the broad stakeholders' participants and feedback would be collected through brainstorming among the stakeholders. The participatory process of vision setting, development of sectoral goals, and strategies would foster rationality of planning and lead municipal development in which leading sector(s) and the projects that the IUDP should intervene for the municipality would be identified and proposed in the plans.

Besides the sectoral integrations, the strengths of IUDP are base maps and planning and building bye-laws for the municipality. Previous plans were less focused on base maps although some thematic maps were prepared in periodic and physical development plans. The IUDP has mainly focused on preparing base maps with 1:2500 and 1:5000 scales for core and other urban areas of the entire municipal area respectively. On the one hand, planning and building by-laws would be a guiding tool for regulating spatial development directions. On the other hand, the base map would be prepared by using the latest archive satellite imagery. All the sectoral analysis would perform on the base map rationally. Right of Way (RoW), Floor Area Ratio (FAR), land use zones, development controls regulation would be prepared and proposed by the planning by-laws to regulate growth control. The by-laws would control and regulate urban growth as spacious urban development regulating ground coverage, building heights, RoW (right of way), and provisions of open spaces in the city development. The by-laws thus would be an effective tool for guiding spatial planning especially for enforcing to regulation of city morphology and open space provisioning for the city. For the first time, with a separate planning and building by-laws volume for the municipality development regulation, the IUDP has addressed open space planning for shaping the city in the future.

Similarly, the strategic plans in the form of proposed development plans would be prepared on the base map that would guide rationally for municipal development in many respects. Existing physical, social, and environmental conditions would be assessed through the maps and potential development could be monitored on the maps as the base maps would guide where the suitable area is located for what purposes through suitability analysis. Thus, one of the greatest achievements of IUDP is that

it integrates sectoral development and is backed up by a rational planning process with reference to updated base maps. Planning of recreational space, green spaces, land use zoning with delineation of risk-sensitive areas where development growth needs to be restricted were identified and proposed in the maps. Such sectoral analysis would provide the basis for the municipality for spacious planning to preserve sufficient open spaces, green space, and prohibit settlement development in risk-sensitive areas.

Planning of open space in the IUDP has been proposed within broad land use zones and sub-zones (e.g., green area, open space, cultivation, residential, commercial, industrial, institutional, water body, etc.). Based on the suitability analysis, the development zones as residential, mixed-use, commercial, forest, waterbody, conservation, and green area development zones were proposed for the municipality (Figures 2 and 3). Conservation and green area development zone including open space development zones would enhance the city's form and spatiality. The zones and open spaces development in the municipalities

have been proposed considering the potential urban development areas and future growth trend prospects. The proposed open space development plans would be proposed considering settlement growth trends, settlement hierarchy, connectivity, and regional positioning and networks of the towns. However, the scale and size of open space in the plans vary according to their growth potentiality, existing physiography, landscape, settlement forms and patterns, and socio-cultural contexts. It means open space planning for the Terai municipalities may differ from the hilly municipalities as these municipalities pose different physiographic characteristics and different social-cultural settings. Similarly, open space within a city may vary as open space in the core area of KMC is found more culturally driven and bounded^[2] whereas open space in the outer areas is community-driven^[7]. But all the open spaces whether they are cultural, religious, institutional or public; all of these are valued in terms of the city's landscaping, enhancing the environment, and contributing

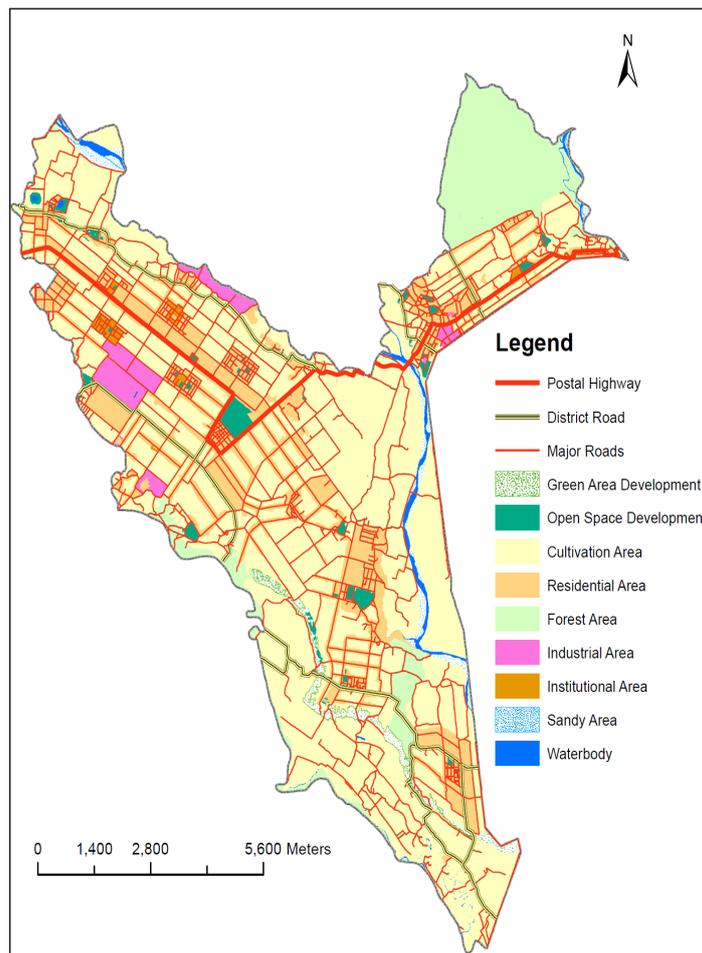


Figure 2. IUDP Land Use Zoning with Open Space Development Plan, Punarbas Municipality, Kanchanpur District

Source: DUDBC, 2020

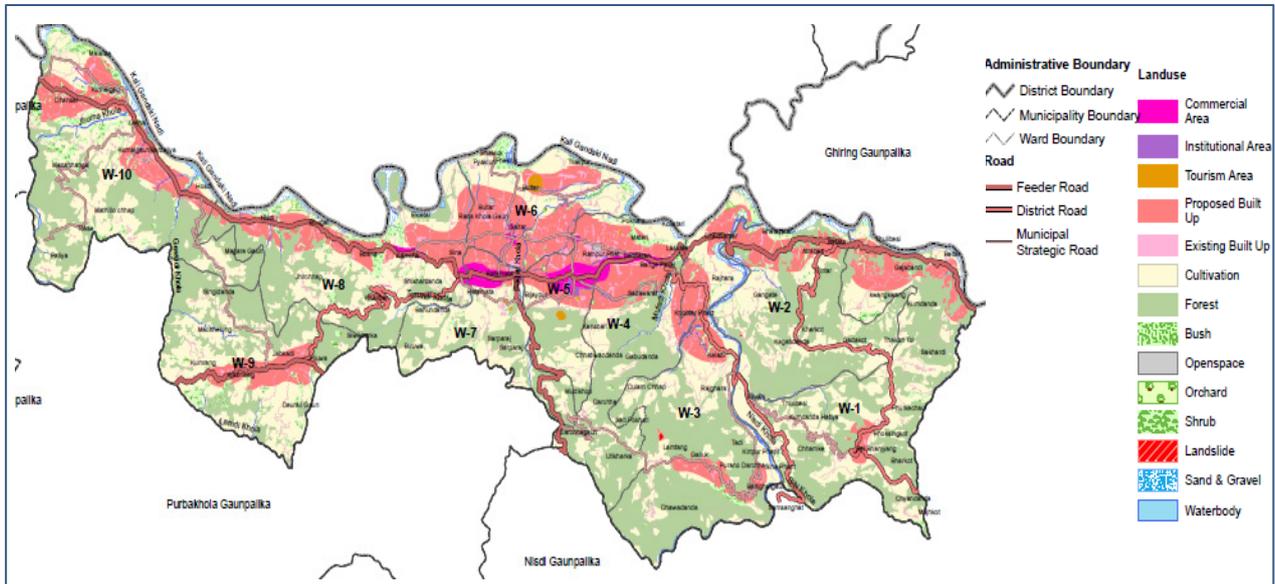


Figure 3. IUDP Land Use Zoning with Open Space Development Plan, Rampur Municipality, Palpa District

Source: DUDBC, 2020

to social well-being. Figures 2 and 3 are presented from some of the municipal IUDP to show how the open has been envisioned in the IUDP taking cases of *Punarbans Municipality* located in the Terai Region of Kanchanpur District and *Rampur Municipality*, located in Hilly Region of Palpa District^[15].

Open Spaces in the Smart City Planning

Smart city development is a recent urban development planning practice across the world. Nepal government has also initiated Smart City Planning intending to integrate the benefits of Information Communication Technology (ICT) in urban development and growth management. The smart city concept especially focuses on the increasing efficiency of land use, infrastructure, and urban service delivery through the use of ICT. A smart city is defined as a city that is sustainable and innovative, where high-quality urban services are provided to all citizens effectively and efficiently through the optimum use of technologies including ICT as a tool to improve the quality of urban life, the efficiency of urban services, and competitiveness^[9,10]. Thus, smart city planning is a combination of sectoral development and ICT integrations envisioning the future urban development strategy to plan smartly.

The government of Nepal has prepared 13 municipal smart city plans for implementing ICT embedded plans for municipal development. Three municipalities namely *Nijgadh* (Bara District), *Lumbini* (Rupandehi District), and *Palungar* (Gorkha-Tanahu Districts) were planned as piloting for smart city development, then followed by other 10 municipalities in different provinces of Nepal. The main objective of preparing smart city plans

are: a) contained population growth management and regulate urban development through the uses of ICT in the municipality, b) promote green, spacious, and sustainable city development through land-use zoning and regulation and environment-friendly development initiatives, c) integrate the application and benefit of ICT in the functionality of the city, especially for mobility, community development, service delivery, governance and infrastructure development in the city^[9,10,16,17]. It indicates that ICT development is essential for smart city planning integrating it with other physical infrastructure and sectoral development for the city.

The crux of smart city planning is indicator-based strategic planning by which targeted outcomes would be achieved through the intended action plans. Therefore, the fundamental basis of smart city planning is to target some level of achievement set out in the indicators. The indicators include four broad pillars a) Smart People, b) Smart Governance, c) Smart Infrastructures, and d) Smart Economy. Within the four broad smart city indicators, 31 components and 117 indicators were defined^[9,10]. The smartness of a city would be measured based on the targeted level of achievement on the defined indicators.

The process of formulating a smart city plan is also the participatory method by which the local needs would be addressed in the plan. Induction workshops, local/community level consultations/workshops for need/gap identifications, vision setting, lead sector identification, participatory SWOT analysis, strategic sectoral planning through municipal level workshops are the process of plan formulation. Besides, indicator-based analysis and planning have been proposed for the

development of different sectors such as the physical, social, environmental aspects of the city. But one of the innovative ideas of smart city planning is the integration of ICT components which is not addressed in any other planning approach of Nepal. So, sectoral plans would be strongly tied up with ICT-based planning in smart city planning. Thus, smart city planning also advocates for participatory planning that would address the local needs effectively.

Open space planning has been highlighted more in the smart city plans targeting 40% of municipal ground coverages by an open/green space (Smart City Indicators-C.3.1) as supporting indicators for urban planning and land use components under the smart environmental infrastructure of Smart City Indicators. The proposed ground coverage includes green development areas, open spaces, ecological conservation areas, etc. which could be available for the use of municipal residents as open areas in terms of recreational space, public space, or green space. Including the planning and building by-laws, this plan has strongly proposed the allocation of sufficient open spaces in the city. Land-use zoning and regulation, RoW, FAR, building heights and services spaces, setback, density control, road access, etc. have been proposed to regulate urban development with spacious spatial planning. This has opened an opportunity to preserve green areas and open spaces for the city which could initiate to development of sufficient open spaces/ areas in the city for the future. Delineation of conservation areas with keeping intact forest coverage and agricultural zones for the city would guide growth control for the city.

In Smart City Planning, open space has been proposed as an ecological corridor, greenfield development, and pond site green development zone in the case of Lumbini Sanskritik municipality whereas a population density-based plan would control urban growth and regulate open area for the city in case of Nijgadh municipality. The proposed areas have supposed to be preserved for open space/green area development for the municipality which could serve as sufficient open space in the future. Various zones have been proposed to regulate land use for future development control (Figures 4 and 5). ICT development at community and city levels is intended to ease urban life so as to smooth service delivery and governance. Proposed infrastructure development would always be developed in favor of spacious planning based on the proposed by-laws. Board land-use zoning and allocation of potential sites for settlement development, green area/ open area development, and other potential zones were proposed for spacious urban development in the smart city.

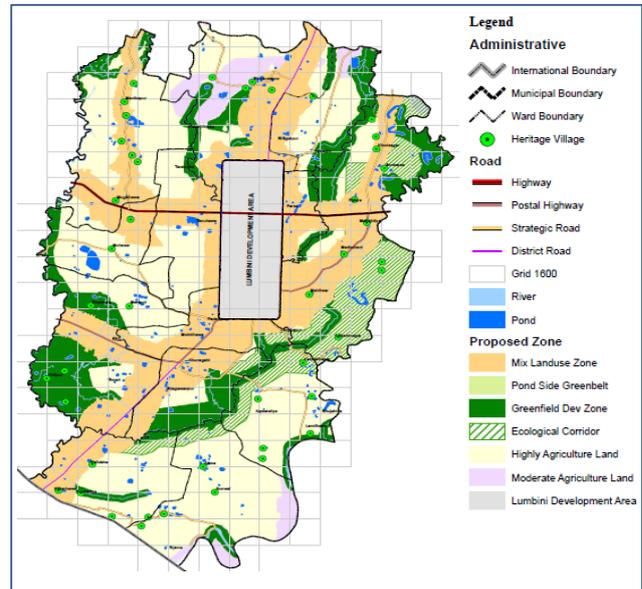


Figure 4. Land Use Zone with Open Space Development in Lumbini Sanskritik Municipality, Rupandehi District

Source: NTPCO, 2019b

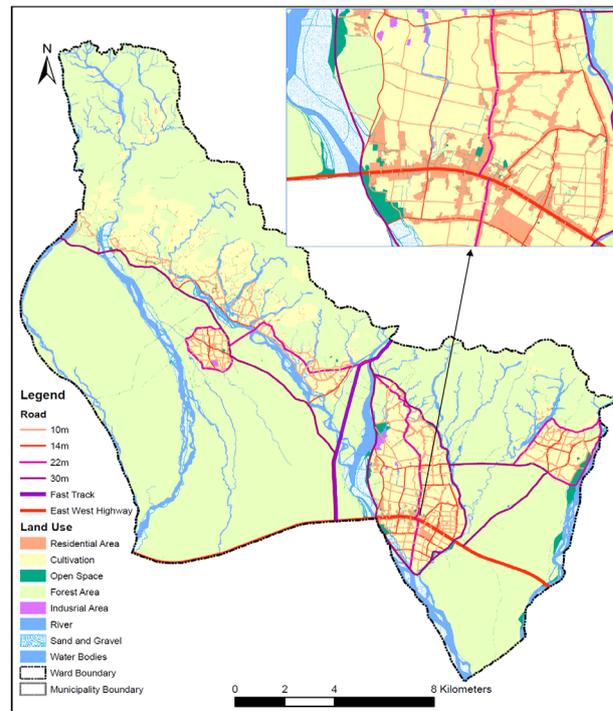


Figure 5. Land Use Zone with Open Space Development in Nijgadh Municipality, Bara District

Source: NTPCO, 2019a

Plans in Action: Open Space in Land Development Plan

Land development plans are action plans with small area development as a part/component of the city. It is an implementation of the physical plan of the city/town. While

planning small area development, land development (also called land pooling) is a popular method of implementing the plans. Land pooling could be a process of planned urban islands to city transformation ^[18]. Globally it shows that land pooling can transform entire cities in a planned form which means land pooling can transform a city into a planned development area. The concept of land pooling is that a portion of the urban area is pooled for residential development with provisions of urban infrastructures, open spaces, and other basic services and distributed proportionately among the landowners. The landowners contribute the land proportionately for site and services development within the area. The landowners agree to contribute land for infrastructure development by which their land value would be increased to compensate for their contributed land. Some examples of land development areas are presented below (Figures 6 and 7). The main strength of such land development is that it allocates open spaces with adequate road networks and connectedness between settlements/households. In a properly planned land development area, road connectivity, basic urban infrastructure, sufficient open space and even building structures will be regulated so that the chaotic development of a city could be discouraged. Since the land pooling could be possible in a small site, whole city development takes time but expansions of such a developed island could transform the city into a planned city form ^[18,24,25,27]. Such plans are also important to develop sustainable cities and spacious urban development that could foster spatiality and sociability ^[7,26-29].

The action plans in the form of a land development plan reflect a spacious development plan that addresses planned settlement development in an area or a city. There are many land development projects completed in Nepal which have a good provision of open space. 25 land pooling projects in Kathmandu Valley and 17 projects outside Kathmandu Valley have been developed as land development/land pooling projects by different government institutions of Nepal and the Kathmandu Valley alone holds 6,684 Ropani of land with 15,160 developed plots ^[19]. Among these, 27 projects were designed by DUDBC which is successfully implemented with good provision of open spaces.

Provisions of open space in land development project sites regulate urban development patterns, provide spacious urban landscapes, and preserve open space for the city. Land development sites of some projects in different parts of Nepal are presented in Figures 6 and 7 above in which *Pepsicola town planning-Kathmandu (A)*, *Khusibu town planning-Kathmandu (B)*, *Divyaswari town planning-Bhaktapur (C)*, and *Lamahi town planning-Dang (D)* reveal that open space development in the planned area is well developed with good road networks. Therefore, such land development with a good provision of open space could be a successful strategy of open space planning for a town/city. Such plans will integrate good road connectivity, preserve urban form, regulate urban growth, and provide urban people with spacious space for residential development. Examples of some land development plans are presented in Figures 6 and 7.

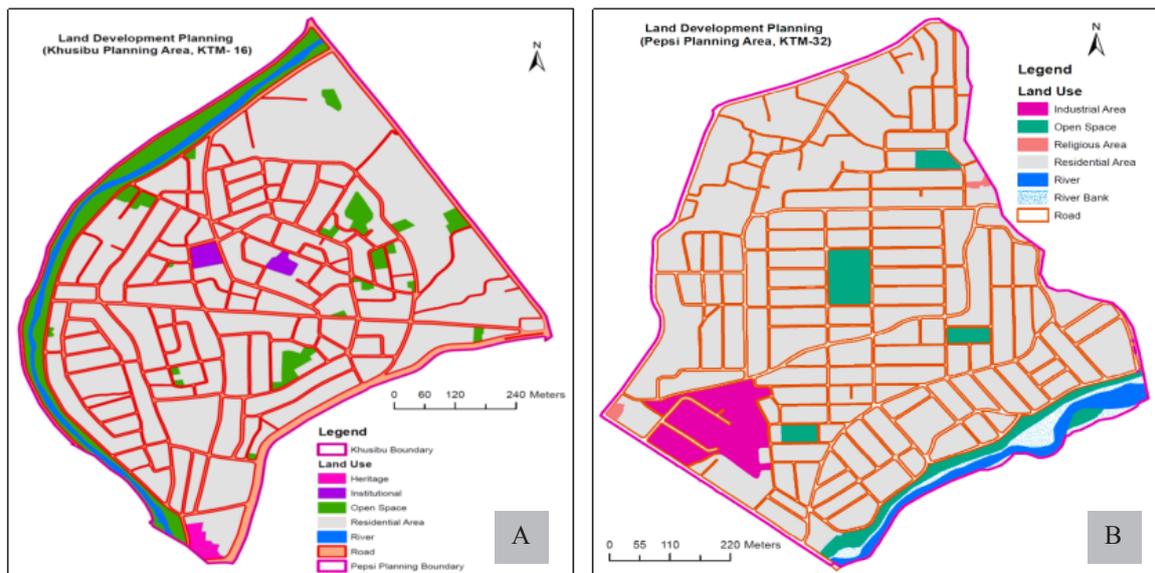


Figure 6. Land Development with Provisions of Open Space (A-Khusibu and B-Pepsicola land development area, Kathmandu Metropolitan City)

Source: Periodic Plan of KMC, 2011, and Google Map, 2021.

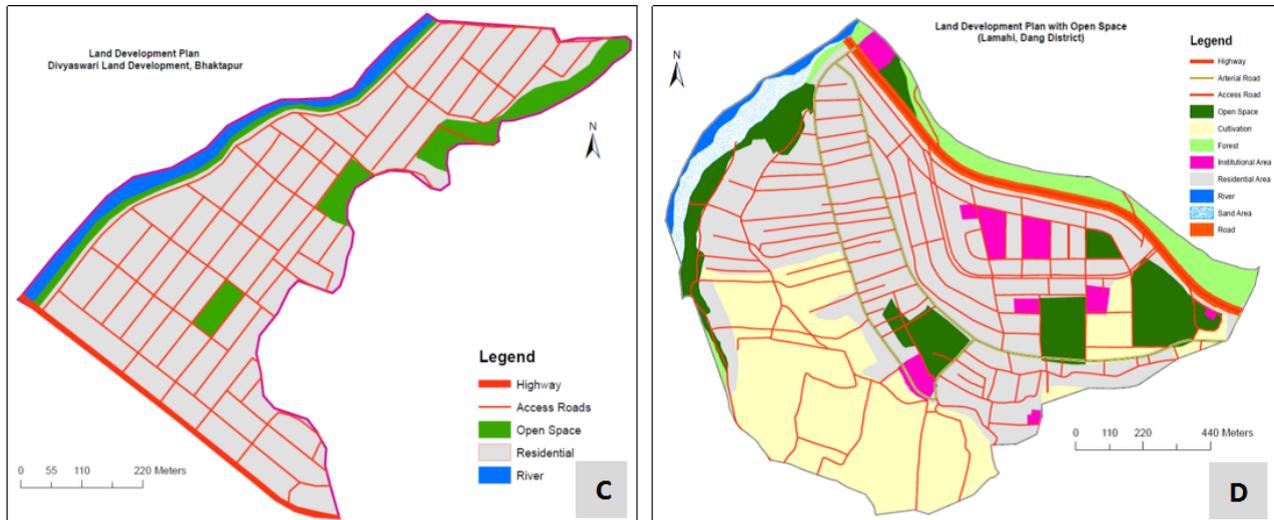


Figure 7. Land Development with Provisions of Open Space (C-Divyashwori, Bhaktapur District and D-Lamhi Dang District)

Source: Google Image-Based Data, 2020 and DUDBC, 2015

However, there are many land development sites flourishing in the major cities by the private sectors in Nepal which have been planned without proper provisioning of basic services and facilities (e.g. lack of public open space, improper infrastructures and facilities, unsuitable locations, and poor physical conditions, etc.). The sites are developed by the private sector with their own interests and the government institutions have not been able to scrutinize/monitor them effectively. Hence, government institutions should govern and regulate such private sectors for adequate and proper physical infrastructures and services while developing private housing/land pooling projects.

5. Conclusions

This paper aimed to look at the implications of open space in urban planning with reference to recent planning practices such as Periodic Planning, IUDP, Smart City Planning, and Land Development Planning of Nepal. This paper is prepared by reviewing 11 periodic plans, 34 IUDPs, 4 smart city plans, and 4 land development plans which were selected randomly among the list of prepared plans/projects. The concept of open space development in the plans before periodic planning was very limited. Recent planning practices have been giving attention to sectoral integration with open space development for spacious planning. Periodic planning, IUDP, and smart city planning are the concurrent practices that have addressed open space for resilient cities. The periodic plan integration of sectoral plans focuses on physical development plans in which open space development was initiated within the physical development plan. IUDP

has highlighted the open space development for the city specifying it in the planning and building by-laws as a tool to regulate sufficient open space and proposing broad zoning of land use plan. Such a land-use plan addresses open space development within the networks and different hierarchies of settlements of a town. Similarly, the smart city plan has more focused on open space development in the city with indicators-based planning. For the first time, it has established 40% open/green space coverage as an indicator for a smart city. Therefore, the latest planning practices are more rational in open space provisions in city planning in Nepal. However, the scale of an open space development proposal in the plans varies according to the geographic as well as socio-economic characteristics of the municipalities as the municipalities of the Terai and the Hilly region pose different natures of physiography and social, cultural settings and have different propositions of open space development in the plans.

A land development plan as an action plan presents how a land pooling project is designed for spacious planning preserving open space within a small area of a city/town. Land pooling projects are successful land planning in various towns and cities in Nepal. Such plans could be a tool for implementing Periodic Plans, IUDP, and Smart City Plans to provide accessible and sufficient open space to the residents. Such plans will regulate urban development with a proper provision of open space including basic urban services. However, the witness of a growing private sector's land development planning in major cities of Nepal which needs effective regulation and monitoring by the government institutions. The importance of open space provisions in urban planning

has now been well acknowledged by the urban authorities for disaster risk management as urban people extensively used open spaces during the Gorkha Earthquake in 2015. It has been well conceptualized that the recent planning practices including land development planning are well recognized by city designers, residents, and authorities for spacious open space provisions to make a resilient and sustainable city.

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Conflict of Interest

There is no conflict of interest.

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