**Managing Urbanization in Nepal: Challenges and Choices**

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**Abstract:**

Urbanization in Nepal is happening at a fast rate. Recently, the Government of Nepal declared 293 local government units as municipalities among 753 such units. Considering the municipalities as urban areas, the urban population has reached more than 60 percent of Nepal’s total population.

The major issues for urban management in Nepal include the maintenance of sufficient open and green spaces and the preservation of agricultural production.

The causes of rapid urbanization in Nepal are the high rural to urban migration and the creation of municipalities by merging a number of rural areas by the government. One of the successful urban development tools used in Nepal is the Land Pooling Project. Some Integrated Urban Development Projects have been implemented for emerging municipalities. Eighteen cities are planned to develop under a One City-One Identity concept that brands cities based on their socio-economic activities. Recently, a large number of municipalities have been preparing their Integrated Urban Development Plans. One of the chief consequences of urbanization is the loss of productive lands resulting in a decrease in food self-sufficiency and green spaces in the cities. To tackle this urban issue, the ongoing Fourteen National Development plan has emphasized the concept of Food Green City (FGC) for integrating urban agriculture with urban planning. Research findings have revealed that there are huge opportunities for applying hydroponic technology on roof-tops.

This paper recommends an approach to managing some urbanization issues in Nepal through the concept of Food Green City using the hydroponic technology for producing food and providing green spaces on roof-tops in urban areas.

**Key Words:** Nepal, Urbanization, Food Green City, Urban Agriculture, Hydroponics

1. **Background**

Nepal is small but beautiful country surrounded by land in between two huge countries, India in three directions (East, West and South) and China in the North ( Shrestha, 2017). The population of Nepal is ~ 26.5 Million (National Census, CBS, 2011) and population density 180.01 persons per square kilometer. Its population growth rate is just 1.35% (CBS, 2015). The area of Nepal is 147181 sq. km, which is approximately 0.03% of world's total area and 0.3% of Asia (CBS, 2015). A naturally and culturally rich country Nepal is also famous globally as the country of Mount Everest and the Birthplace of Lord Buddha. Its length is 885 km from East to West and its width is 193 km from North to South. It has become the Federal Democratic Republic of Nepal since 2008 with seven provinces. Now it has Seventy-Seven Districts and 753 local units (293 Municipalities and 460 Rural Municipalities). Nepal has adopted a new Constitution that protects the democratic and fundamental rights of its people. The country has been emphasizing the empowerment of the people and ensuring higher, sustainable and equitable growth. Nepal is a least developed country (LDC) with characteristics of slow economic growth and low level of human development. The country has put the goal of graduating from LDC status to developing country by 2022 and achieving middle income country status by 2030 ( NPC, 2016).

Rapid urbanization happening in Nepal is due to the high rural to urban migration and declaration by the government giving the status of municipalities to units created by merging a number of rural areas. As the country continues to urbanize, it has become a great challenge for sustainable development, particularly in the urban areas where the pace of urbanization is fastest. Therefore, Nepal has started to respond to the issue of urbanization with the planning and development of Kathmandu Valley. A comprehensive Kathmandu Valley Development Plan was prepared in 1969. After that Nepal has taken many actions in the form of policies, strategies and projects to address the urbanization issues.

1. **Urbanization in Nepal**

 Nepal was politically integrated around the 18th century. The Hill roads were developed east to west and north to south, which was taken as the basis for urbanization in the past. After eradication of Malaria in the Terai in the late fifties and early sixties, people got fascinated to dwell in Terai, migrating from hills and mountains because of fertile lands and closeness to the India. As shown in Table 1, the urban population increased from 2.9% in 1954 to 13.9% in 2001. The number of municipalities increased from 10 to 58 in 2001. Only 17.1% of the total population was found to be residing in the total of 58 municipalities as per the census 2011.The level of urbanization in Nepal was low but the pace of urbanization was rapid. The key “Push” factors for urbanization through migration from rural areas to urban areas were: insecurity, lack of job opportunity, lack of basic infrastructure including educational institutions and health facilities, etc in rural areas. On the other hand, the important “Pull” factors for migration to urban areas are relatively more secure place for improved living and better job opportunities in urban areas compared to rural areas.

**Table 1: Urbanization Trend in Nepal**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***S. No.*** | ***Census Year*** | ***Number of municipalities*** | ***Urban Population*** ***(in millions)*** | ***Percentage of Urban Population*** | ***Constant annual growth rate in %*** |
| *1* | *1954* | *10* | *0.238* | *2.9* | *-* |
| *2* | *1961* | *16* | *0.336* | *3.6* | *5.9* |
| *3* | *1971* | *16* | *0.462* | *4.1* | *3.6* |
| *4* | *1981* | *23* | *0.957* | *6.3* | *8.4* |
| *5* | *1991* | *33* | *1.696* | *9.2* | *6.6* |
| *6* | *2001* | *58* | *3.28* | *13.9* | *7.4* |
| *7* | *2011* | *58* | *4.53* | *17.1* | *3.8* |

**Source:** CBS 2011

The government had started to declare new municipalities since 2014. Seventy- two new municipalities were announced on May 8, 2014, after which the number of municipalities had reached 130 from 58. Again, the government declared 61 settlements in 37 districts out of the then 75 districts as new municipalities through its cabinet decision on December 2, 2014.

 Then, the number of municipalities reached 191. The government has given 293 local units the status of municipalities in the process of federal structuring in 2015. Since then, there are 293 municipalities in Nepal among which 6 are metropolitan cities, 11 are sub-metropolitan cities and 276 are municipalities. Now, considering the population of municipalities as urban population, the urban population has reached to 63.35% out of the total population of the country. The average family size in a household in urban areas is 4.76. But the number of municipalities and the urban population distribution in the country are unmatched and urbanization is unbalanced which can be clearly seen through statistics showing province-wide distribution of municipalities as given below in Table 2.

**Table 2: Municipalities Status at Province level**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Provinces** | **Capital** | **No. of Metropolitan cities** | **No. of Sub Metropolitan cities** | **No. of Municipalities** | **No. of Rural Municipality** | **Area****(km2)** | **Population ( 2011)** | **Density****( people/ km2)** | **No. of Districts** |
| Province 1 | Biratnagar | 1 | 2 | 46 | 88 | 25,905 | 45,34,943 | 175 | 14 |
| Province 2 | Janakpur | 1 | 3 | 73 | 59 | 9,661 | 54,04,145 | 559 | 18 |
| Province 3 | Hetauda | 3 | 1 | 41 | 74 | 20,300 | 55,29,452 | 272 | 13 |
| Province 4(Gandaki) | Pokahara | 1 |  | 26 | 58 | 21,504 | 34,13,907 | 112 | 11 |
| Province 5 | Butwal |  | 4 | 32 | 73 | 22,288 | 48,91,025 | 219 | 12 |
| Province 6(Karnali) | Surkhet |  |  | 25 | 54 | 27,984 | 11,68,515 | 41 | 10 |
| Province 7(Sudur Pachhim) | Dhangadi |  | 1 | 33 | 54 | 19,539 | 25,52,517 | 130 | 9 |
| Nepal | Kathmandu | 6 | 11 | 276 | 460 | 14,7181 | 26,494,504 | 180 | 77 |

**Source of Population:** CBS, 2011

This portrays the unequal distribution of the municipalities with unbalanced urban development of Nepal. Karnali Pradesh (Province No. 6) is weak in urbanization while Province No. 3 has comparatively high urbanization status with 3 Metropolitan cities and 1 Sub-metropolitan city and the total number of municipalities is 74. The Human Development Index HDI values for the Provinces 1, 3, 4 and 5 are relatively higher than the national average and that for Province 6 is least followed by Province 2 and Province 7 (Dhungel, 2018). In other words, the urbanization level at different provinces is also an indicator for the overall province-wise development of the country.

1. **Urban Issues and Challenges**

Providing access to housing and other basic infrastructure and services to its entire population is the big issue for Nepal. There is a need of heavy investment for higher order urban infrastructure for city dwellers. It is estimated that the investment needed to fulfill the existing infrastructure deficit in 58 municipalities (municipalities during census in 2011) is about US $ 4.425 billion (@ 1 US $=NPR. 84) over 15 years. The investment need had been considered for the infrastructure shortage based on existing and desirable state of infrastructure of the municipalities (TDF, 2015). The human resources and institutional set up are not found efficient and effective enough to meet the urban development needs of the country. At present, there is insufficient investment for urban development so the urban infrastructure and services are poor. The rapid urbanization has raised serious environmental problems creating an imbalanced urban ecosystem. The cities have developed as centers for the secondary (industry) and tertiary (service oriented) economic activities without proper care for primary (basically agriculture) economic activities. The rapid conversion of fertile agricultural land into residential buildings, commercial complexes, industrial blocks and many urban infrastructures has greatly influenced the built-up to open space ratio affecting the urban ecosystem badly. The agriculture area in the Kathmandu valley is reported to have declined from 58.4% to 47.4% between 1990 to 2012, i.e. an average loss of 0.5% or 400ha in terms of area of the valley annually( Genesis,2013 adopted from NUDS, 2015). Today’s cities have difficulty in finding open spaces for healthy breathing and emergency spaces during disasters like earthquakes and fires. 'In Kathmandu and Lalitpur 0.48% and 0.06% of municipal area can be categorized as open space. World Health Organization (WHO) and Food and Agriculture Organization (FAO) suggested a minimum accessibility of 9m2 per person of green open space for the city residents. Based on the periodic plan of municipalities, the availability of area in Kathmandu is 0.25m2 per person and 4.34 m2 per person in Dharan' (NUDS, 2015). Air quality and living environments are greatly polluted, impacting negatively on quality of life. According to WHO standards, the level of Total Suspension Particulate (TSP) and Particulate matters less than 10 micrometer (PM10) for ambient air quality is up to 230$μg/m$3 and 70$ μg/m$3 ,respectively. 'However, statistics show that level of TSP in Nepalgunj is 2222.5$ μg/m$3 followed by Janakpur with 2019$ μg/m$3. Similarly, the level of PM10 for Janakpur, Biratnagar, and Pokhara are 1820.9$ μg/m$3, 961.4$ μg/m$3, and 90.2$ μg/m$3, respectively' (NUDS, 2015). Most of the surfaces of urban areas are generally covered with concrete and asphalt. This process of surface sealing has greatly influenced the ground water table and it will have serious consequences in long run. The sharp decrease of food sufficiency rate of the city year by year has created a situation of increasing rate of food imports to meet the food demand of city dwellers. It is supposed that the average transport distance from farm to dining table of people is hundreds of kilometers. The high energy involved in importing food for the city dwellers from distant places will consequently increase the cost. This is also becoming an emerging issue of affordability, particularly for the urban poor. The expanding urbanized society is continuously consuming more and more resources and use the rural lands and rivers as its waste sinks. Cities are thus responsible for environmental degradation including climate change with more than two-thirds of global energy use and greenhouse gas emissions although they cover just about 2% of the earth's surface. In a context of limited resources, a concept was formulated that looks towards a green approach for functional as well as aesthetic purposes, shifting green to productive green (green with food) and integrating the number of planning norms to decrease mobility and increasing the utilization of limited resources that we have, which is designated as Food Green Concept ( Shrestha, 2011).

1. **What is Food Green City?**

A Food Green City (FGC) is a kind of Eco-city that enables its residents to have a good quality of life with minimum consumption of resources, in harmony with nature, culture and the future. It is also a process of “restructuring the cities” and its ultimate goal is to establish spatial equity, low mobility and perfection in the urban ecosystem for sustainable development with coexistence of man in a natural system. The following are the eight guiding PLEASURE principles of FGC.

* **P**lenty of Food Green Space ( Urban Productive Greening)
* **L**iving and Working Together
* **E**nsuring minimum consumption of resources
* **A**ttaining sustainable neighborhood
* **S**ystem of 3 Bs ( Boot, Bike, and Bus)
* **U**se of energy efficiency and eco-friendly technologies
* **R**estructuring the cities through Community Participation
* **E**fforts for Zero Waste Emission

The logic behind FGC is gaining *“Something from nothing"* by harnessing light energy (free of cost) for converting it to food energy by means of plants in the city.

 *Chlorophyll*

6CO2 + 6H2O+Light Energy C6H12O6 +6O2

 (Carbon dioxide) (Carbohydrate)

Thus, this concept helps in converting *Carbon dioxide city* to *Carbohydrate city*. (Shrestha, 2011)



**Fig1:** Food Green.

The importance of productive green (Food Green) can be realized from the illustration of Fig 1.

The roles of Urban Agriculture in Food Green city are: rebuilding the city to provide food and greenery to the city dwellers utilizing unused and vacant lands; providing affordable food to the city dwellers in an energy efficient manner; providing green jobs to unskilled people and jobless people as well; rehabilitating the physical, social and ecological condition of the city and improving the quality of urban life; revitalizing the culture and community; utilizing organic waste produced in the city by converting it into compost thus supporting waste management and soil nutrient recycling; reinforcing the relationship between Man and Nature; increasing O2 and reducing CO2 accumulation; improving microclimate; and helping to decrease air pollution, maintaining ground water table and keeping bio-diversity. FGC has successful answers to the three questions: Where to do? , How to do? and Who will do?. The answers are: FGC can be executed in Private space, Community space or in Vacant Land, etc., it can be done by Middle Natural Farming, and City dwellers can do privately at their leisure whereas Private sector organizations can be involved through the Public- Private Partnership (PPP) modality and community people can do collaboratively. (Shrestha, 2011)

1. **Choices for managing Urban Development**

Nepal has prepared various plans at different times for sustainable development starting from Kathmandu Valley with the use of resources from the Government of Nepal or with grants and technical assistance from donor agencies. Some of them are: Physical Development Plan of Kathmandu Valley (1969), Kathmandu Valley Physical Development Plan (1972), Land Use Plan of Kathmandu Valley (1976), Kathmandu Valley Physical Development Concept (1984), Kathmandu Valley Urban Land Policy Study(1986), Urban Development and Conservation Scheme (1988), Kathmandu Valley Urban Development Plan and Program(1991), Bagmati Basin Water Management and Investment Program (1994), Study on Regularization of Urbanization Kathmandu Valley (1995), Environmental Plan and Management of Kathmandu Valley(1999). Local Self Governance Act (LSGA) 1999, Town Development Act(1988), Kathmandu Development Authority Act(1988), National Urban Policy (2007), National Land Use Policy (2012), Long Term Development Plan of Kathmandu Valley (2000) (KVDA, 2016). National Shelter Policy, 2012, National Urban Development Strategy(2015), Municipal Finance Frame Work for the National Urban Development Strategy (NUDS) of Nepal ( 2015) are some documents produced to manage the urban development of Nepal.

Urban expansion in Nepal has mostly been unplanned and uncoordinated. It has become a common practice to erect buildings even where basic urban infrastructure is absent or severely inadequate (Habitat III Report, MoUD, 2016). As an urban land management tool, Land Pooling has been popular in Nepal. Land pooling technique produces residential plots of proper shape and size prepared with essential infrastructure such as roads, piped water supply and sewerage systems, electricity, open spaces and green spaces. The concept of Land Pooling was introduced in Nepal in 1975 with the initiation of Chipledhunga Land Pooling Project with 13.5 Hectares of Land in Pokhara and successfully implemented in various places within and outside the Kathamandu Valley. It took a decade to complete the official country's first land pooling project- Gongabu Land Pooling Project with 14.3 Hectares of land that was initiated in 1988 as a pilot project. So far 12 land pooling projects (total area: 260 hectares, housing plots- 12160) have been implemented within Kathmandu Valley and 11 Projects (total area: 405 hectares; housing plots 10,000) are coming up (Habitat III Report, MoUD, 2016) .

Nepal has a big issue regarding access to housing and other basic infrastructure and services in the population below the poverty line (about 17.5% of total population), especially in Dalit and Disadvantaged groups spread all over the country, mainly in Terai districts. The constitution of Nepal -2015, guarantees the right to housing to all citizens. In National Shelter Policy 2012, housing is regarded as a basic need and it emphasizes the concept of housing for all. In order to fulfill this objective, the Government of Nepal, through its Department of Urban Development and Building Construction (DUDBC), implemented the Janata Awas Karyakram (People’s Housing Program) from the Fiscal Year 2009/2010 in three districts of Terai viz. Siraha, Saptari and Kapilvastu, to provide housing by constructing cost- effective modern houses for deprived sections of people. Through this program 17,000 housing units have already been completed and 38 thousands housing units are under construction (NPC, 2019).

For developing cities in a planned way, government has been developing 27 New Towns, 13 Smart cities and 4 Mega Cities. Similarly, a study has been conducted for 18 cities to develop cities based on the concept of One City - One Identity for branding cities based on comparative economic advantages and potentiality of the city for growth ( Shrestha, 2011). Similarly, the on-going fourteenth plan has emphasized for development of Himali Sahar (Environment-friendly Cities at Himalayan areas or mountains), Food Green Cities and Smart Villages. Integrated Urban Development Master plan and DPR for implementation in 185 municipalities with investment of 370 billion USD have been initiated to prepare in 185 municipalities to enter into the project bank. National Planning Commission has prepared the concept of Smart City in 2016,the Directives and Working guidelines of Smart Village in 2017, and Food Green City in 2017. Consulting work for the preparation of 4 smart cities of Kathmandu Valley is going on.

A major infrastructure improvement project called Urban Environment Improvement Project (UEIP) in the urban sector supported by ADB was initiated in 2003 to address the deteriorating urban environment and institutional failures. The major objective of it was to improve the environments of the 8 towns located in the periphery of the Kathmandu Valley through the improvement of urban infrastructure. Kathmandu Sustainable Urban Transport Project (KSUTP), another ADB supported project was launched in Kathmandu to improve the overall quality of urban life in Kathmandu by improving the urban transportation system.

The World Bank- Global Partnership for Output Based Aid (GPOBA) assisted project, the ‘Output-Based Aid for Municipal Solid Waste Management in Nepal has been supporting its participating municipalities (Tansen, Lalitpur, Ghorahi, Dhankuta, and Lekhnath-Pokhara) to incentivize and enable gradual development of beneficiary charging to improve the financial viability and enable the expansion of solid waste management (SWM) services.

The urban governance and development program in Emerging Town Projects (UGDP-ETP), a World Bank supported project was introduced to support Nepal in its decentralization and urbanization transitions in 6 participating municipalities namely, Mechinagar, Dhankuta, Itahari, Tansen, Lekhnath and Baglung.

The Asian Development Bank (ADB) provided loan assistance for the Integrated Urban Development Project (IUDP) implemented in the areas of Water Supply, Solid Waste Management Improvement, Storm Water Drainage and Lane Road improvement Works in Nepalgunj, Siddarthanagar, Dharan and Janakpur municipalities.

Secondary Towns Integrated Urban Environment Improvement Program (STIUEIP) is an urban environment project being implemented by loan assistance from the Asian Development Bank (ADB). This project is aimed to provide basic utility infrastructure of municipalities to improve the quality of life of people and environmental improvement through drainage, sewers, waste water treatment, integrated solid waste management with affordable and sustainable operation and management (Annual Report of TDF, 2018).

Nepal has a strong commitment to achieve Sustainable Development Goals (SDG) by 2030. ' SDG -11 is related to making cities and human settlements inclusive, safe, resilient and sustainable. The targets under this goal include, achieving by 2030 i) access for all to adequate, safe and affordable housing and basic services and upgrade slums, ii) access to safe affordable, accessible and sustainable transport systems for all, improving road safety and expanding public transport iii) inclusive and sustainable urbanization iv) safeguarding the world's cultural and natural heritage, v) significantly reducing the economic losses relative to GDP caused by disasters iv) providing universal access to safe, inclusive and accessible green and public spaces for all' ( NPC, 2017).

One of the chief consequences of urbanization is the loss of productive lands and the resulting decrease in food self-sufficiency and green spaces in the cities. To tackle this urban issue, ongoing Fourteen National Development plan has emphasized the concept of Food Green City for integrating urban agriculture with urban planning (NPC, 2016). With the advancement of technology, various techniques have been in practice to grow more food with less use of space and water. Hydroponic and Perma-culture methods have been practiced. These have made it easier to practice urban agriculture as proposed in FGC. In this context, the result of the study conducted on the topic " Roof Top Hydroponics: Opportunity for Urban Agriculture to realize the Concept of Food Green City (FGC)” reveals that there is huge opportunity for doing urban agriculture using roof top hydroponics. The opportunity scores calculated, based on a sample household survey carried out in Godavari Municipality Ward No. 14 taking eight parameters (Space available in their houses, Knowledge about urban agriculture / hydroponics, people's willingness to do, Time availability for doing this, Manpower availability, Financial capacity, Technology availability and Incentives from local and central government indirectly in terms of policy or directly in terms of subsidy), showed that 45 houses among 64 houses surveyed receives a pass score 5 or more out of total score 8 ( Shrestha, 2019).

1. **Conclusion**

Nepal has become one of the urbanized countries in the South Asia due to the political decision of designating a large number of settlements as municipalities. But the existing urban forms and functions do not have sufficient technical rationale in declaring municipal status. The declared municipalities when analyzed in depth have many urban issues and problems. Deficit of basic infrastructure and services, housing problems, unplanned physical growth, environmental concerns, unbalanced urban growth, weak financial and institutional capacity are some of the issues and problems existing in urban development program of Nepal. But the declaration of municipalities can be taken as an opportunity to develop in planned way. Master planning of municipalities, investment in urban infrastructure and services, building efficient institutional set ups and coordination for urban development, capacity development for human resources and commitment of policy makers and urban administrators are key components identified as being needed to grasp this opportunity to create inclusive, resilient and sustainable urban areas as envisioned in the SDG-11. The Government has taken decisions to manage rapid urbanization by formulating and implementing various policies, programs and projects. Land Pooling Project, Integrated urban development projects, People’s housing and various city development approaches have been practiced in Nepal as choices for planned way of urban development. Eighteen cities are planned to develop under One City -One Identity concept that helps for branding the city based on the comparative socio-economic activities. Recently a large number of municipalities have been preparing their Integrated Urban Development Plan to develop adopting the integrated development approach. One of the chief consequences of urbanization is the loss of productive lands and the resulting decrease in food self-sufficiency and green spaces in the cities. To tackle this urban issue, the ongoing Fourteenth National Development plan has emphasized the concept of Food Green City for integrating urban agriculture with urban planning. In this context, the research findings have revealed the fact that there are huge opportunities of applying emerging hydroponic technology suitable for the application of urban agriculture at roof top for contributing vacant spaces as productive green spaces, as advocated in Food Green City (FGC) could have ecological and economic benefits. Therefore, it recommends to take a choice for managing urbanization of Nepal by realizing concept of Food Green City using the hydroponics technology for producing food and providing green spaces on the rooftop of the urban areas.

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