Agricultural land use changes and the remaining/ emerging peri-urban farmers in Kathmandu Valley of Nepal

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Abstract

Peri-urban agriculture (PUA) is the agriculture practices in urban/ peri-urban areas, working dynamically to provide food at short supply chain, empowering farmers, ensuring a reliable vegetable supply, and creating job opportunities. This paper identified the key reasons behind the permanence of PUA in Kathmandu Valley. The paper looks into the peri-urban farmers in the Kathmandu Valley; using different strategies to cope with the changing urban context. This case study investigated the transitions of the peri-urban farmers of the Kathmandu Valley in contemporary bounded scenarios. One hundred twenty-six peri-urban farmers of the Kathmandu Valley were interviewed with open-ended questionnaires and categorized into groups based on their agricultural practices and the subsistence level or surplus they achieved. It is found that preserving PUA practices and fostering resilience in the Kathmandu Valley amid increasing imports requires synchronized studying of the both, changing land use patterns and emerging peri-urban farmers to know the actual status of farmers in the Kathmandu Valley. This study identified an interesting transition of PUA practices from traditional to business farmers and increased interest in urban household leisure agriculture.

Keywords: peri-urban agriculture (PUA), perishable vegetables, peri-urban farmer, changing land use, transition

1. Introduction

The problems related to achieving food security especially in the developing and underdeveloped countries without much dependency on the imports remain a significant concern with the growing population, changing climate, and depleting resources (Hazell & Wood, 2008; Orsini et al., 2013; Vermeulen et al., 2012). Unorganized and strategy-less transformation is observed in the peri-urban agricultural land near the cities (Duzi et al., 2017; Turner et al., 2017), which causes problems in food accessibility. The multifunctional benefits of peri-urban agriculture (PUA) are less recognized (Cocklin et al., 2006; Dahal et al., 2020; Rana et al., 2017; Specht et al., 2013). The spatial changes are guided by people's instant needs where environmental priorities are barely considered (Blay-Palmer et al., 2018; Sullivan, 1994). The agricultural plots of the peri-urban areas of the Kathmandu Valley are transforming in an unorganized manner inconsiderate of the growing food-related issues (Karki, 2004; Rana et al., 2017; Thapa & Murayama, 2012). Agricultural lands are converted to residences, industries, brick factories, and spaces for the storage of construction materials. Such transitions offer a high return rate in a short time but losing fertility and agricultural yield (DeFries et al., 2004). The consequences of reckless urbanization are not only the fragmentation of agricultural land into smaller plots but also in the changing crop varieties and harvest where the traditional low-value crops are replaced by high-value cash crops[1] such as perishable vegetables[2] (Shrestha, 2007; Turner et al., 2017). The agricultural land potential near cities is never accounted for its diversity, fertility, and easy accessibility by the land use plan and policy and this holds in the case of the peri-urban areas of the Kathmandu Valley (Allen, 2003; Rana & Marwasta, 2015).

Peri-urban areas are the transitional zone between urban and rural areas, mainly pictured as the areas with sprouting-built environments amidst agricultural land or forest (Duzi et al., 2017). The peri-urban characteristics are similar to the case of Kathmandu Valley in Nepal as shown in figure 1. The habitat of a diverse group of people, heterogeneous land use, morphological conditions and densities of the built-up areas, the complex functional relations, and the changing social structure are some of the characteristics of the peri-urban area (Adell, 1999; Allen, 2003; Nadal et al., 2018; Tacoli, 2001; Thapa & Murayama, 2008). The land-use changes in many cases of transformation have improved the livelihood and living standards of the farmers (Östberg et al., 2018; Turner et al., 2017) amid the increasing population, their demand, and diversity in the agricultural produced (Artmann & Sartisonn, 2018; Nadal et al., 2018). This research paper examined how the practices of peri-urban farmers in the Kathmandu Valley have changed in response to shifts in land use. The study is significant because it fills a gap in existing research on peri-urban farmers and their evolving composition and interests. It aims to provide insights into the unique dynamics of agriculture in the Kathmandu Valley.

2. PUA in Nepal

Peri-urban agriculture in the Kathmandu Valley of Nepal hasn't received much attention from researchers in the past. But considering the pressing food security challenges, it's incredibly important to delve into the study of both the farmers and PUA in that specific context. In the course of the field observation in the Kathmandu Valley, the evidence of the PUA practices found the adaptive characteristics of the existing peri-urban farmers, which are different from the native traditional farmers. Simultaneously, the changing political structure, unstable relationship with the immediate neighbors (India and China), increasing demand for the perishable vegetable goods, and fondness for the locally produced are riveting parts of the paper. Studies showed the agriculture investment in Nepal is less compared to other SAARC and ASEAN regions with the least assertion in the urban development agendas (Dahal et al., 2020; Paudel, 2016). Rapid urbanization either replaces the agricultural land or changes the cropping system from low-value crops to high-value crops (Shrestha, 2007).

In Kathmandu Valley of Nepal, there is no any concrete evidence that directly connects the changing situations of farmers with the potential of peri-urban agriculture land and its existing diversity (Dahal et al., 2020). Urbanization and development not prioritizing agriculture (Ives & Kendal, 2013) approach have resulted decreasing fertile agricultural land around the valley as well (Dahal et al., 2020). Furthermore, the multifunctionality of PUA still lacks recognition in the urban planning approaches and development strategies (Cocklin et al., 2006; Phuong & Nguyen, 2018; Rana & Marwasta, 2015; Rana et al., 2017). The role of PUA and its farmers in sustainable urban development (Artmann & Sartison, 2018; Blay-Palmer et al., 2018; Duzi et al., 2017; Specht et al., 2013) is still a big dilemma when trying to compete with other non-agricultural activities and similar in Kathmandu Valley (Thapa & Murayama, 2012). The peri-urban farmers in the valley include both the native and the innovative ones. However their preferences and values (Ives &

Kendal, 2013) to choose PUA are never reckoned. In the Kathmandu Valley and its three districts, farmers can be categorized into two groups. The first group consists of those who cultivate traditional low-value crops. The second are those growing perishable high-value cash crops, such as perishable vegetables that are an essential part of the Nepalese diet. The literature available here primarily focuses on the latter group of farmers.
Based on the existing research, it is crucial to implement smart development and management approaches that go beyond just exploiting the remaining resources. By taking into account the various aspects of peri-urban agriculture (PUA) and learning from others experiences, transcending the urban food challanges (Duzi et al., 2017).

3. Objectives and Case Study Research Method

The study investigated the PUA practices of the Kathmandu Valley based on the transitioning peri-urban farmers. Through Key Informant Interview KII, it explored the transitioning peri-urban farmers amid the changing land use, political structure, urbanization and market inflation.

The case-study research method (Yin, 2009) had been adopted to investigate the scenario and find solution for the contemporary problem of unaccounted PUA practices in Kathmandu Valley. The case-study research method (Yin, 2009; Ridder, 2017) as the methodological tool investigated the transitions of the peri-urban farmers of the Kathmandu Valley within the current limited context. The research adopts the bottom-up evaluation approach (Greenawalt, 2016), using established and commercial peri-urban farmers as the KII from the three districts. Then, farmers engaged in both surplus production and subsistence were considered as the main sources of information.

Peri-urban farmers of the Kathmandu Valley were interviewed with open-ended questionnaires based on the sustainable livelihood framework designed by Scoones (2009). Each interview with peri-urban farmers as the KII of the study had been further classified. Like Kaplan (1984), the qualitative analysis focused on examining the responses and expressions of peri-urban farmers of the study areas. This approach allowed to capture their perspectives (Sullivan, 1994), highlighting both the similarities and differences among them. To maintain the precision of the informants' responses, only PUA practitioners for the perishable vegetable production were taken of different scales, districts, socio-economic background (Ridder, 2017). Consequently, the findings had been further organized creating multiple peri-urban farmers groups' cases and later compared with the peri-urban farmers practicing conventional methods of agriculture and only growing low-value crops such as rice, wheat, maize, etc. to distinguish the livelihood and land occupancy patterns along with their sustaibability. This paper has incorporated various qualitative steps in translating and analyzing the data of peri- urban farmers of the three districts if the valley. These steps encompass transcribing interviews or recordings, organizing the data into meaningful units of analysis (Yin, 2009).

These analyses conducted help gain a comprehensive understanding of the PUA. Analyzing within-case analyses of different groups of peri-urban farmers allowed to explore the unique characteristics and practices. Between case analyses, such as examining business farmers of different scales and market reach, helped to identify variations and similarities across different types of peri-urban farmers.

4. Study Area: Kathmandu Valley

Kathmandu Valley lies in Bagmati Province of the newly restructured the Federal Democratic Republic of Nepal, composed of seven federal provinces established by the current constitution of Nepal. This province houses all the three districts selected i.e., 1) Kathmandu; 2) Lalitpur; 3) Bhaktapur as shown in Figure 1. The selected peri-urban agricultural land is almost a flat floor of the valley along the mid-hills is at an average elevation of 1,300 m and the sides of the valley at an elevation of 2,000 m (International Centre for Integrated Mountain Development [ICIMOD], 2016). It includes all the three landscapes of urban, peri-urban, and rural as mentioned in Table 1. The selection of these three districts provides interesting cross-case analysis with the case study research method where the Kathmandu Valley incorporates 81% of the Kathmandu district; 32% of Lalitpur and whole of the Bhaktapur district (ibid).

The annual population growth in the municipalities of the peri-urban areas is significantly higher resulting in the land-use change (Allen, 2003; Central Bureau of Statistics [CBS], 2011; Ishtiaque et al., 2017; Karki, 2004) as shown in Figure 2. The PUA practices are performed mostly on the leased land and very few buy the land. The transition process has brought positive impacts to the livelihoods of the emerging peri-urban farmers compared to the native farmers following traditional farming approaches. These farmers are oriented to grow surplus focusing market's perishable vegetable demand and terms the urban growth with major roads in a concentric pattern as the advantage.

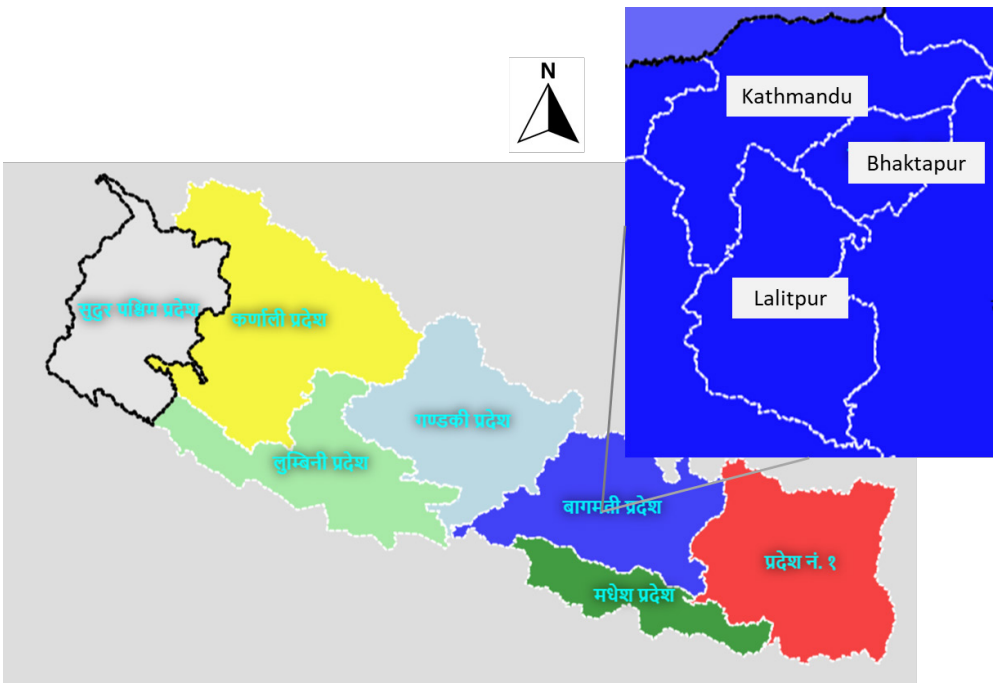

Figure 1. Location of the study area 'Kathmandu Valley' in the map of Nepal (Source: MoFAGA, 2020) AUTHOR MODIFIED

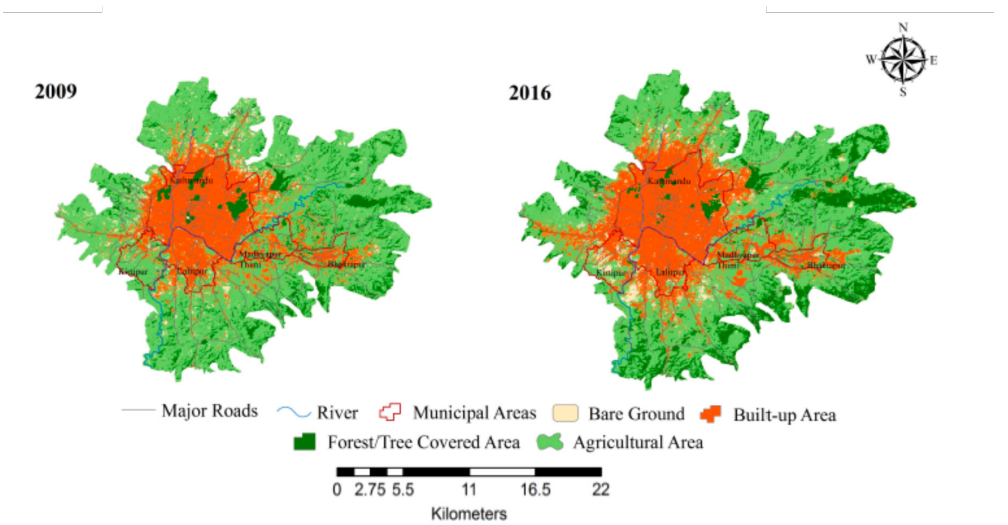

Figure 2. Land-use change in the Kathmandu Valley (Source: Ishtiaque et al., 2017)

Table 1. The agricultural area around the urban and the peri-urban area of the three districts of the Kathmandu Valley

District	Urban Area	Peri-urban area
Kathmandu	Gongabu Nayabazar Shova Bhagwati Kalimati Syambu Teku Tahachak Kalanki	Sankhu Baneshwor Dhapasi Sundarujal Pharping Balambu Sitapaila
Lalitpur	Sanepa Balkumari Sankhamul	Lele Sisneri Imadole Bungamati Godavari Thacho Chapagaun Thaiba Champi
Bhaktapur	Thimi Sano Thimi Kamal Binayak Bode Kasaultar Jagati Nagadesh Byasi Lokanthali	Bageshwori Balkot Sipadole Gamacha Chunadevi Balkot Sipadole Gamacha Chunadevi

Table 1 shows the area of study where the peri-urban farmers were interviewed. The individuals interviewed included traditional local farmers, farmers who migrated to the area, farmers who cultivated crops on their own land, and larger agricultural cooperatives.

The informants in Bhaktapur district were mostly the native farmers producing perishable vegetables on the large scale compared to the other two districts. Lalitpur district had the highest number of agricultural cooperatives operating and creating job opportunities for the locals while Kathmandu District mostly had migrant farmers doing agribusiness.

The land use of the valley shows (refer to Figure 2) the PUA practices are moving farther from the city center in the case of Kathmandu district bringing peripheral land of the district in agriculture use. The perishable vegetable supply of the capital in the valley depends dominantly on these three districts; followed by the neighboring districts i.e., Kavre, Sindhupalchok, Nuwakot, etc.; Terai regions, and the neighboring countries i.e., India and China. There is a need to improve the awareness among the local government, peri-urban landowners including farmers to improve the existing PUA practices and retain the peri-urban farmers to meet the perishable vegetable demands.

5. Basis of Peri-uban Farmer's Grouping

The KII had been done with the peri-urban farmers producing perishable vegetables in the three districts of the valley. The purpose of the KII was to accumulate evidences of the PUA practice from a wide range of peri-urban farmers i.e. native farmers; business farmers; migrant farmers and household farmers as named based on the specific practicies and roles they perform. Most of the informants were native farmers, witnessing the advancing demand for the valley's land. The years-long practiced earned experiences, helped to gather evidence offering intuition on the agriculture-related problems with recommendations. Also, grouping the diverse farmers ensured to gather unbiased evidence for the research based on their specific practices and roles they perform. The peri-urban farmers' interview had a varied range of social and economic backgrounds offering different thoughts and strategies for the underlying issues in the transitioning. The transitioning is found to cope with; food prices, fertilizer-induced food, food growing open spaces, food near the living, daily exercises to grow own, etc., and many more (Blay-Palmer et al., 2018).

As explained above in the study area and excerpt of Table 2, the findings from the in-depth interviews have been segregated into the different units of peri-urban farmers. Table 2 has also enhanced the level of heterogeneity which is one of the advantages of using the case study research method. Multiple units of analysis of the case study research method designed by Yin (2009) have been used to classify, interpret, validate, and triangulate the information from the heterogeneous units of peri-urban farmers.

S.NO.	HETEROGENEOUS UNITS (NOS.)	CHARACTERISTICS
1.	Native peri-urban farmers (36)	• Prior existences with a long history; • Mostly from the newars[3] community; • Transitioned in the agricultural tool and technology; • Old market linkage; • Landowner; • Helped slow the agricultural land use changes mostly in the Bhaktapur district; and • Landholdings more than a *ropani*[4]
2.	Emerging business peri-urban farmers (30)	• Includes both individual and cooperative group of farmers; • Modern agriculture approaches and practices; • Good market linkage; • Land on the lease; • Found only in Kathmandu and Lalitpur districts; • Very few PUA practices along with the urban centers; • Mostly emerging in the new areas with the road infrastructures; and • Landholdings more than a ropani
3.	Migrant peri-urban farmers (15)	• Migrants from the periphery districts of the valley; • Mostly individual and those returned from foreign labor; • Good market linkage; • Land on the lease; • Found only in Kathmandu and Lalitpur districts; and • All the cases in the new areas with the road infrastructures; and • Landholdings more than a ropani
4.	Household peri-urban farmers (45)	• All individuals; • No business motive; • Practiced both on land and roof; • Guided by the daily benefits in the health and dealing with the market uncertainty (both price and availability) • Landowners; • Found only in Kathmandu and Lalitpur districts; • Existing both in the urban centers and the newly emerging areas; • Not mapped in the land use; and • Mixed land holdings (Mostly above 4 aana)

Table 2. Different groups of peri-urban farmers in the Kathmandu Valley

The characteristics of the multiple units of peri-urban farmers (Table 2) clearly state the diverse composition of the peri-urban farmers. It had been classified as: i) Native peri-urban farmers (36), ii) Emerging business peri-urban farmers (30), iii) Migrant peri-urban farmers (15), and iv) Household peri-urban farmers (45) making a total of 126 KII under different units of analysis. The practice as guided by Yin (2009) is very accurate in terms of effectiveness in getting the unique individual unit case and amalgamated under the criteria (Rachmawati et al., 2015). The pattern matching and variability among the interviewed peri-urban farmers presented data validity among themselves. Pattern matching from the case study research method (Almutairi et al., 2013; Yin, 2009) is used to categorize the sequential triangulation of the interviewed peri-urban farmers in the three districts of the valley. The validity had been an eminent part of the data qualitative data analysis using semi-structured questionnaires for all three districts. The studied diverse group of farmers were evaluated based on their satisfaction regarding land availability, irrigation water, market access, and policy support. These factors are important because they directly impact the farmers' ability to cultivate their land, access necessary resources like water for irrigation, find markets for their produce, and receive support from policies that can help enhance their agricultural activities (Kassem et al., 2021).

Table 3. Factors influencing peri-urban farmers' decisions.

Important parameters	HETEROGENEOUS UNITS (NOS.)			
	Native peri-urban farmers	Emerging business peri-urban farmers	Migrant peri-urban farmers	Household peri-urban farmers
	(36)	(30)	(15)	(45)
Market reach	G	G	C	NA
Land availability	G	C	C	G
Supporting policies	S	S	S	S

** Good (G); Competent (C); Struggling (S); and not applicable (NA)

The table summarizes the important factors for peri-urban farmers, including market reach, land availability, and supporting policies. Native peri-urban farmers have a strong market reach and ample land for farming, but they face challenges with supporting policies. Business peri-urban farmers also have a good market reach and access to suitable land, but they encounter difficulties with policies as well. Migrant peri-urban farmers have a competent market reach and sufficient land through leasing, but they also face obstacles due to unsupportive policies. Lastly, household peri-urban farmers engage in leisure farming using small spaces like terraces and yards. Despite the lack of supportive policies, they're not concerned as their focus is on leisure farming.

6. Results and Discussion

The key discoveries from the various groups of peri-urban farmers clearly indicated a significant shift that is unnoticed in both urban studies and the changing land use patterns in the Kathmandu Valley. The known aspect of this transition is the reduction of agricultural land, as farming becomes less of a primary income source. However, it's important to acknowledge that there's also a new perspective emerging. i.e. migrants are leasing large agricultural lands and engaging in agriculture as a business. It's an exciting and dynamic shift that showcases the changing landscape of agriculture in the region. Again, enhancing these positive transitions with multiple benefits to the local food security (Cocklin et al., 2006) needs recognition from the government agenda at different levels by recognizing these different groups of PUA practitioners.

The comparison of the evidence from different groups of peri-urban farmers showed Bhaktapur district is occupied only with the native groups of peri-urban farmers. These groups of farmers used to be the sole vegetable suppliers about 25 years back when the valley had less population (CBS, 2011; Shrestha, 2007). In Bhaktapur district, the farmers were growing both grains and vegetables. The interviews showed how the division of agricultural land affected grain growers, leading them to transition into vegetable production. Despite the land fragmentation, the overall use of agricultural land remains largely unchanged, except for shifts in crop patterns. The interviews with peri-urban farmers in Bhaktapur highlighted the significant influence of community knowledge, preferences, and values in sustaining peri-urban agriculture practices. The strategies implemented by peri-urban farmers have greatly established Bhaktapur district as a major source of vegetables in the valley. However, it is important to strengthen the farmers' market connections without relying heavily on intermediaries or commission agents. In the case of peri-urban farmers in Kathmandu and Lalitpur districts, they were either the traders or the wholesalers themselves, directly involved in the market. On the other hand, despite the agricultural land fragmentation in Bhaktapur district, the peri-urban farmers there did not experience the same direct benefits as those in the other two districts.

Likewise, in the case of the Kathmandu and Lalitpur districts, most farmers were migrants taking agricultural land on lease. From the KII, the peri-urban farmers found PUA as a prospective opportunity for business with profit. Some of the interviewed peri-urban farmers had even extended their agriculture plots beyond the Kathmandu district's boundary due to the increased vegetable demand. Such an extension was possible due to the low land price and well-connected road infrastructure because of which they can reach the market. In the Kathmandu district, there are a growing number of peri-urban farmers that returned from working abroad as laborers. These rural immigrants utilized their acquired skills, newfound creativity, and proximity to markets as opportunities to practice peri-urban agriculture in the Kathmandu and Lalitpur districts. The business-oriented groups of peri-urban farmers saw urbanization and their presence in peri-urban areas as incentives. However, they remained concerned about the availability of land for an extended period, unless the government intervened. The highest number of migrant peri-urban farmers was in the Kathmandu district, followed by Lalitpur district, with none in the Bhaktapur district. This absence indicates that migration and commercialization had minimal effects in the Bhaktapur district compared to the other two districts. However, in all the units of analysis the number of interviewed peri-urban farmers does not quantify the actual number of farmers ("how much"); but represents the participation and interest as qualities ("where, who, and why"). The household-level peri-urban farmers comprise farmers growing perishable vegetables for self-consumption. The spaces for PUA practices by the household peri-urban farmers used terraces and utilized non-biodegradable household waste such as plastic sacks, thermo bins, plastic cans, etc. showcasing the multifunctionality of PUA.

The evidence shows the subsistence agriculture practices in the valley are transitioning (Blay-Palmer et al., 2018; Dahal et al., 2020) to business agriculture due to the increasing market demand of the reliable perishable vegetable produced like the case of Southern Bolivia (Turner et al., 2017). Likewise, according to Kaplan (1984), spatial and natural settings tend to be highly favored for decision making by urban farmers, also in the case of the Kathmandu Valley the natural settings with the vegetable market demand play a vital role in the transitioning of the peri-urban farmers. The business-oriented group of peri-urban farmers were more satisfied compared to the native farmers in the evidence gathered for the transition. However, sustaining the peri-urban farmers in the valley first needs preserving fertile agricultural land which is diminishing haphazardly. The control of the haphazard conversion can be done if the local government could intervene by identifying the potential agricultural land using land inventories like that in Portland and Vancouver (Mendes et al., 2008). The foreign labor returnee as peri-urban farmers and investors in PUA practices in the Lalitpur district said the availability of potential land for PUA practices, market and incentives, and support from the government could help escalate job opportunities not only in the valley but the surrounding districts as well.

A survey was conducted at the Kalimati Fruits and Vegetables Market Development Board (KFVMDB), in addition to data triangulation within multiple units of farmers from three districts. The board approved the transition that is taking place in the Valley's vegetable supply which is unnoticed by the government. Also, added the existing urban development plan policy encourages the agricultural land conversion and more dependency on the import which might be very harmful for a nation with an unstable government and its structuring. One of which was already experienced during the Indian border blockade after the 2015 earthquake in Nepal. The KFVMDB report (2014), showed Kathmandu, Lalitpur, and Bhaktapur districts provide about 70% of the total vegetables consumed depending on the favorable season, 15% by Terai region of Nepal, and 15% through import from the neighboring country India. The peri-urban farmers irrespective of the district said- PUA could be made capable to compete with other urban jobs if practiced commercially and receive support from all the tiers of government as mentioned by the cases of Lancelotti et al. (2016). When examining the 'farmers' satisfaction and awareness' findings in a descriptive way, it became evident that Native peri-urban farmers (36) and Emerging business peri-urban farmers (30) were familiar with the supportive policies. However, the transition to federalism and the new constitution 2072 has created a dilemma for the Native farmers than the business group. Among the four farmer groups, it appears that Migrant peri-urban farmers (15) faced the most challenges. The agricultural policies in urban areas differ from those in rural areas, causing difficulties for these farmers. On the other hand, in Nepal there have been challenges with the effectiveness of agricultural policies, there are agricultural policies in place, but their implementation and impact can vary. Factors such as limited resources, inadequate infrastructure, and bureaucratic hurdles can hinder the effectiveness of these policies. The agricultural policies in Nepal mainly focus on supporting farmers in rural areas. Their main goals are to increase productivity, ensure food security, and promote sustainable farming practices.

The government provides subsidies, incentives, and extension services to help farmers adopt modern techniques and adapt to climate change. They are also working on improving market access and infrastructure. However, it's important to give equal attention and support to farmers in urban and peri-urban areas too. The existence of different groups of peri-urban farmers shows that there are diverse challenges and opportunities to address.

Despite their expertise in agricultural tools and techniques, including fertilizer usage, they are struggling in the urban and peri-urban areas of the valley. However, their produce is competing with that of business-oriented groups, where livelihood is not the primary objective but rather profit-driven. Household peri-urban farmers (45) didn't prioritize land use changes, resource access, market availability, or policy support as they focused on leisure agriculture without surplus production goals. Based on the study's analysis of farmers in the valley, it is expected that as agricultural land use decreases (Ishtiaque et al., 2017; Sarif et al., 2020; Thapa & Murayama, 2012), urban leisure agriculture will be significant (Gulyas & Edmondson 2021; Nie et al., 2021) in the case of Kathmandu Valley. It's worth noting that this trend is not limited to new peri-urban areas but is also becoming more common in the core of urban environments and addresses the decreasing availability of agriculture land sizes. The findings from all three districts suggest the benefits people derive from the PUA practices producing perishable vegetables could help maintain both the cultural and aesthetical values. PUA practices have values closer to people's health and the environment (Blay-Palmer et al., 2018). The government interventions in PUA practices in the valley can compete with the urban jobs providing ample benefits as mentioned. The changing landscape of agricultural land in the peri-urban areas from the low-value crops to all-year-round perishable vegetable produced shows a prospective future for Nepal which had been an agricultural nation. Apart from the farmers' preferences (Ives & Kendal, 2013) increasing food fuel price and health awareness and nutrition are value-adding to the steady transition.

7. Conclusion

In this paper, the evidence of transitioning PUA practices in Kathmandu Valley is descriptively discussed. Farmers' satisfaction and prosperity are closely tied to factors like the market, land availability, and supporting policies. However, upon closer examination within the diverse group of farmers, it becomes evident that farmers' satisfaction is closely linked to their awareness and accessibility. In the case of household peri-urban farmers, the market, land availability, and policies have little impact. As a result, the paper predicts that with changes in agricultural land use of Kathmandu Valley, there will be an increase in the number of urban leisure farmers that fulfill their daily vegetable needs in terms of preferences. The growing demand for urban and peri-urban agriculture is now acknowledged for ensuring food security, creating employment and income opportunities, and effectively utilizing unused resources (Nyapendi et al.,2010). According to the United Nations Development Program (UNDP), around 800 million people are involved in urban agriculture globally, with a significant concentration in Asian cities and approximately 200 million classified as market-oriented producers (ibid). The study here in the valley also supports the need to support the emerging farmer groups, it is crucial to raise local awareness and promote the use of locally grown vegetables. This will help replace the import of high-priced and chemically adulterated vegetables. the government of Nepal to prioritize policies that promote local farming and make agricultural resources easily accessible. Instead of relying on imported chemically treated vegetables from neighboring countries, the focus should be on enhancing the quality and quantity of locally produced vegetables. This positive transition can be achieved by taking inspiration from countries like Indonesia, which effectively promotes their coffee through advertisements to capture a larger market share and encourage the peri-urban coffee farmers (Djamaludin & Silmie, 2021). The effective promotion of PUA of KV with changing agriculture land use requires synchronized and coordinated attention for the peri-urban farmer's values and preferences, locals, urban land use developers, and policymakers. Further research is necessary on the market and consumption of perishable vegetables in the Kathmandu Valley to better understand the dynamics and provide valuable insights for policy recommendations promoting local production, agriculture infrastructure and storage facilities, and enhancing market linkages for farmers.

References

Adell, G. (1999). *Theories and models of the peri-urban interface: A changing conceptual landscape. Strategic Environmental Planning and Management for the Peri-Urban Interface* (Research Project Report). Development Planning Unit, University College London.

Allen, A. (2003). Environmental planning and management of the peri-urban Interface: Perspectives on an emerging field. *Environment and Urbanization, 15*(1), 135-148.

Almutairi, A. F., Gardner, G. E., & McCarthy, A. (2013). Practical guidance for the use of a pattern-matching technique in case-study research: A case presentation. *Nursing & Health Sciences, 16*(2), 239–244, https://doi.org/10.1111/nhs.12096

Artmann, M., & Sartison, K. (2018). The role of urban agriculture as a nature-based solution: A review for developing a systemic assessment framework. *Sustainability, 10*(6), 1937. https://doi.org/10.3390/su10061937

Blay-Palmer, A., Santini, G., Dubbeling, M., Renting, H., Taguchi, M., & Giordano, T. (2018). Validating the city region food system approach: Enacting inclusive, transformational city region food systems. *Sustainability, 10*(5), 1680. https://doi.org/10.3390/su10051680

Central Bureau of Statistics. (2011). G*overnment of Nepal, Kathmandu.* CBS. http://www.cbs.gov.np

Cocklin, C., Dibden, J., & Mautner, N. (2006). From market to multifunctionality? Land stewardship in Australia, *The Geographical Journal, 172*(3), 197–205. https://doi.org/10.1111/j.1475-4959.2006.00206.x

Dahal, H., Karki, M., Jackson, T., & Panday, D. (2020). New state structure and agriculture governance: A case of service delivery to local farmers in the eastern gangetic plains of Nepal. *Agronomy, 10*(12), 1874. https://doi.org/10.3390/agronomy10121874

DeFries, R. S., Foley, J. A., & Asner, G. P. (2004). Land-use choices: Balancing human needs and ecosystem function. *Frontiers in Ecology and the Environment, 2*(5), 249–257. https://doi.org/10.1890/1540-9295(2004)002[0249:lcbhna]2.0.co;2

Djamaludin, Moh. D., & Silmie, D. M. (2021). Analysis of lifestyle, advertising effectiveness, and instant coffee consumption among peri-urban farmers. *Journal of Consumer Sciences, 6*(2), 167–182. https://doi.org/10.29244/jcs.6.2.165-180

Duží, B., Frantál, B., & Simon Rojo, M. (2017). The geography of urban agriculture: New trends and challenges. *Moravian Geographical Reports, 25*(3), 130–138. https://doi.org/10.1515/mgr-2017-0012

Greenawalt, K. (2016). From the bottom up: Selected essay. Oxford Academic. https://doi.org/10.1093/acprof:oso/9780199756162.003.0013

Gulyas, B. Z., & Edmondson, J. L. (2021). Increasing city resilience through urban agriculture: Challenges and solutions in the global north. Sustainability, 13(3), 1465. https://doi.org/10.3390/su13031465

Hazell, P., & Wood, S. (2008). Drivers of change in global agriculture, philosophical transactions of the Royal Society B. *Biological Sciences, 363*(1491), 495–515. http://dx.doi.org/10.1098/rstb.2007.2166

International Centre for Integrated Mountain Development. (2016). *ICIMOD Annual Report 2016*. https://doi.org/10.53055/icimod.835

Ishtiaque, A., Shrestha, M., & Chhetri, N. (2017). Rapid urban growth in the Kathmandu Valley, Nepal: Monitoring land use land cover dynamics of a Himalayan City with landsat imageries. *Environments, 4*(4), 72. https://doi.org/10.3390/environments4040072

Ives, C.D., & Kendal, D. (2013). Values and attitudes of the urban public towards peri-urban agricultural land. *Land Use Policy, 34*, 80–90. http://dx.doi.org/10.1016/j.landusepol.2013.02.003

Kaplan, R. (1984), Impact of urban nature: A theoretical analysis. *Urban Ecology, 8*(3), 189–197. http://dx.doi.org/10.1016/0304-4009(84)90034-2

Karki, T. K. (2004). Challenges in managing a government town planning office in Nepal. *Environment and Urbanization, 16*(2), 223–233. http://dx.doi.org/10.1177/095624780401600213

Kassem, H. S., Alotaibi, B. A., Muddassir, M., & Herab, A. (2021). Factors influencing farmers' satisfaction with the quality of agricultural extension services. *Evaluation and Program Planning, 85*, 101912. https://doi.org/10.1016/j.evalprogplan.2021.101912

Lancelotti, C., Zurro, D., Whitehouse, N. J., Kramer, K. L., Madella, M., García-Granero, J. J., & Greaves, R. D. (2016). Resilience of small-scale societies' livelihoods: A framework for studying the transition from food gathering to food production. *Ecology and Society, 21*(4). https://doi.org/10.5751/es-08757-210408

Mendes, W., Balmer, K., Kaethler, T., & Rhoads, A. (2008). Using land inventories to plan for urban agriculture: Experiences from Portland and Vancouver. *Journal of the American Planning Association, 74*(4), 435–449. https://doi.org/10.1080/01944360802354923

Ministry of Federal Affairs and General Administration (MoFAGA). (2019). *Government of Nepal, Kathmandu.* http://mofaga.gov.np/

Nadal, A., Cerón-Palma, I., García-Gómez, C., Pérez-Sánchez, M., Rodríguez-Labajos, B., Cuerva, E., Josa, A., & Rieradevall, J. (2018). Social perception of urban agriculture in Latin-America. A case study in Mexican social housing. *Land Use Policy, 76*, 719–734. https://doi.org/10.1016/j.landusepol.2018.02.055

Nyapendi, R., Best, R., Ferris, S., & Jagwe, J. (2010). Identifying market opportunities for urban and peri-urban farmers in Kampala. In G. Prain, D. Lee-Smith & N. Karanja (Eds.), *African Urban Harvest*, (pp. 139–165). Springer. https://doi.org/10.1007/978-1-4419-6250-8_8

Nie, J., Kiminami, A., & Yagi, H. (2022). Exploring the sustainability of urban leisure agriculture in Shanghai. *Sustainability, 14*(8), 4813. https://doi.org/10.3390/su14084813

Orsini, F., Kahane, R., Nono-Womdim, R., & Gianquinto, G. (2013). Urban agriculture in the developing world: A review. *Agronomy for Sustainable Development, 33*(4), 695–720. https://doi.org/10.1007/s13593-013-0143-z

Östberg, W., Howland, O., Mduma, J., & Brockington, D. (2018). Tracing improving livelihoods in rural Africa using local measures of wealth: A case study from central Tanzania, 1991–2016. *Land, 7*(2), 44. https://doi.org/10.3390/land7020044

Paudel, M. N. (2016). Prospects and limitations of agriculture industrialization in Nepal. *Agronomy Journal of Nepal, 4*, 38. https://doi.org/10.3126/ajn.v4i0.15515

Phuong Le, N., & Nguyen, M. D. (2018). Multifunctionality of peri-urban agriculture: A case study in Trau Quy Commune, Hanoi city. *International journal of Rural Development, Environment and Health Research. 2*. 8-19. https://doi.org/10.22161/ijreh.2.4.2

Rachmawati, R., Rijanta, R., & Djunaedi, A. (2015). Location decentralization due to the use of information and communication technology: Empirical evidence from Yogyakarta, Indonesia. *Human Geographies – Journal of Studies and Research in Human Geography, 9*(1), 5-15. http://dx.doi.org/10.5719/hgeo.2015.91.5

Rana, S., & Marwasta, D. (2015). Urbanisation trends in developing countries: Comparative study of Yogyakarta City and Kathmandu Valley. *Journal of Natural Resources and Development, 5*, 29- 36. https://journals.ub.uni-koeln.de/index.php/JNRD/article/view/719/746

Rana, S., Raden, R., & Rachmawati, R. (2015). Multifunctional peri-urban agriculture and local food access in the Kathmandu Valley, Nepal: A review. *Journal of Natural Resources and Development, 5*, 88-96. https://pdfs.semanticscholar.org/459e/de08b93d46daaff8fd952a2ef5929a5f3132.pdf

Rana, S., Raden, R., & Rachmawati, R. (2017). Exploring peri-urban agriculture and existing farmers in the Kathmandu Valley. *Romanian Review of Regional Studies, 13*(1), 59-70. https://www.researchgate.net/publication/330337845_EXPLORING_PERI-URBAN_AGRICULTURE_AND_EXISTING_FARMERS_IN_THE_KATHMANDU_VALLEY

Ridder, H.-G. (2017). The theory contribution of case study research designs. *Business Research, 10*(2), 281–305. https://doi.org/10.1007/s40685-017-0045-z

Sarif, Md. O., Rimal, B., & Stork, N. E. (2020). Assessment of changes in land use/land cover and land surface temperatures and their impact on surface urban heat island phenomena in the Kathmandu Valley (1988–2018). *ISPRS International Journal of Geo-Information, 9*(12), 726. https://doi.org/10.3390/ijgi9120726

Scoones, I. (2009). Livelihoods perspectives and rural development. *Journal of Peasant Studies, 36*(1), 171–196. http://dx.doi.org/10.1080/03066150902820503

Shrestha, R.M. (2007). Urbanization and changes in cropping patterns at Kathmandu Valley, Nepal. *Journal of Science and Technology, 7*, 113. http://dx.doiorg/10.3126/njst.v7i0.581

Specht, K., Siebert, R., Hartmann, I., Freisinger, U. B., Sawicka, M., Werner, A., Thomaier, S., Henckel, D., Walk, H., & Dierich, A. (2013). Urban agriculture of the future: An overview of sustainability aspects of food production in and on buildings. *Agriculture and Human Values, 31*(1), 33–51. https://doi.org/10.1007/s10460-013-9448-4

Sullivan, W.C. (1994). Perceptions of the rural-urban fringe: Citizen preferences for natural and developed settings. Landscape and Urban Planning, 29,(2-3), 85–101. http://dx.doi.org/10.1016/0169-2046(94)90020-5

Tacoli, C. (2001). Livelihoods impacts and strategies of the periurban poor. In Proceedings of the conference on rural-urban encounters: Managing the environment of the periurban interface.

Thapa, R.B., & Murayama, Y. (2012). Scenario based urban growth allocation in Kathmandu Valley, Nepal. *Landscape and Urban Planning, 105*(1-2), 140–148. http://dx.doi.org/10.1016/j.landurbplan.2011.12.007

Turner, K., Davidson-Hunt, I., & Desmarais, A. (2017). Agrobiodiversity, rural transformations and household experiences of globalised change: A case study from southern Bolivia. *Rural Landscapes: Society, Environment, History, 4*(1). https://doi.org/10.16993/rl.36

United Nations, Department of Economic and Social Affairs (UNDESA). (2015). *World Urbanization Prospects*. The 2014 Revision.

Vermeulen, S. J., Aggarwal, P.K., Ainslie, A., Angelone, C., Campbell, B.M., Challinor, A.J., Hansen, J.W., Ingram, J.S.I., Jarvis, A., Kristjanson, P., Lau, C., Nelson, G.C., Thornton, P.K., & Wollenberg, E. (2012). Options for support to agriculture and food security under climate change. *Environmental Science & Policy, 15*(1), 136–144. http://dx.doi.org/10.1016/j.envsci.2011.09.003

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed., Applied Social Research Methods Series). Sage Publication.