

EXPLORING PERI-URBAN AGRICULTURE AND EXISTING FARMERS IN THE KATHMANDU VALLEY

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ABSTRACT – In the recent years, the problems of food security are found more in the urban areas of the developing countries where agricultural land is at the faster rate of conversion with high population influx. Peri-urban agriculture is one of the urban activities providing a short food supply chain to the urbanites and creating jobs among the locals. However, lack of recognition of the peri-urban agriculture has led to generalize it as a rural activity despite being close to the urban centre and the consumers. This paper presents the case study approach used for peri-urban farmers producing perishable vegetables in the Kathmandu Valley and the impact on their livelihood. The individual cases of peri-urban farmers are classified into five different units of analysis under the case study research method. The ‘why’ and ‘how’ questions of the case study in this paper are answered using the qualitative tools such as observation and in-depth interviews among the focused groups of farmers. Further analyses are comparison of cases of farmers under case study method amongst the measure of sustainable livelihood. The paper discusses about the livelihood peri-urban agriculture has generated to the local farmers for centuries and also recognizes the agricultural community that has long been known in the Kathmandu Valley’s literature on agriculture. Now, with the changing settings, it is important to classify the current peri-urban farmers and their socioeconomic conditions. The local farmers along the peri-urban areas of the valley, idyllically termed as ‘traditional farmers’, are now converting to other types of farmers such as ‘business farmers’. Therefore, this study demonstrates different types of peri-urban farmers and their livelihood. Simultaneously, it also highlights the problems faced by farmers and their prospective future. It also emphasizes the need of a new paradigm incorporating agriculture potential, research as a good strategic linkage between urban land use policy and agriculture to march towards the path of sustainable development.

Keywords: urbanization, peri-urban agriculture, perishable vegetables, peri-urban farmer, livelihood

INTRODUCTION

With growing population, changing climate, and depleting resources, there are still unanswered questions for the food security especially in the developing countries with increasing population (Hazell and Wood, 2008; Vermeulen et al., 2012). The peri-urban agricultural land near the cities is haphazardly converting without accounting the potential of the agricultural land. It is factual that people always interpret environment prior to their needs (Sullivan, 1994) and change the surroundings likewise. The study here demonstrates the similar conversion which is inconsiderate of the agricultural production and fertility land. Peri-urban agricultural land of the Kathmandu Valley is under rapid transformation under chaotic urbanization (Thapa and Murayama, 2012). Transformations are in the form of agricultural land replaced with residence, brick factory and construction materials

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depot as shown in figures 1 and 2. The effect of urbanization is not only the fragmentation of agricultural land but also a change in the crop varieties, where the traditional low value crops are replaced by high value cash crops⁴ such as perishable vegetables⁵ (Shrestha, 2007). The peri-urban agricultural land has undergone fragmentation, where some are still used for agricultural purposes only, but with different crops compared to the previously grown. The agricultural land values near cities are never accounted for its fertility by the current land-use plan and policy (Rana and Marwasta, 2015). According to Vermeulen et al. (2012), the positive characteristics of peri-urban agriculture include reducing carbon footprint without reducing the food production and considering agriculture in the planning and development agenda. This paper thus investigates the existing peri-urban agricultural land and several farmer groups that now grow perishable vegetables.

Peri-urban zones are considered as a transitional zone between urban and rural areas. The habitat of a diversity of populations, the heterogeneity of land uses, the 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 (Thapa and Murayama, 2008; Adell, 1999; Allen, 2003; Tacoli, 2001).



Figures 1 and 2. Conversion of fertile agricultural land of the Kathmandu Valley; now it hubs brick factory (left) and construction materials depot (right) as the alternative peri-urban land use to agriculture

Photographs by Shreema Rana, 2015

The actions and the reactions in making change in the livelihood of farmers and their activities have always been ignored (Vermeulen et al., 2012). This very case is prominently witnessed in the case of the Kathmandu Valley by ignoring the potential of agriculture and the growing of new farmers along with the native farmers. On the other hand, the food insecurity among the relatively poor that spend most of their income on food is never taken into consideration. Non-agricultural job opportunities may not always be the solution to purchase food, sustainable and short food supply chain should be considered as well. This is especially the case of a land-locked developing nation like Nepal, which is now going through fuel crisis due to the 'border blockade' from India. Similar incidents may take place for 'food security' if we continue to ignore our potential agricultural land and believe in 'food import' as the best option for food security. It should not be ignored that attaining food security is not the ultimate goal. It is how sustainable the environment is that plays an important role. In the case of the Kathmandu Valley, there is no account about the existing peri-urban farmer's livelihood, preferences and underlying values for the enhancement of the potential peri-urban agricultural land of the valley. There are no empirical evidences directly relating to the potential of peri-urban agricultural

⁴ Agricultural crops grown for sale having high return profit throughout the year. It also includes perishable vegetables that are to be consumed fresh.

⁵ Perishable vegetables are those likely to spoil, decay or become unsafe to consume if not kept refrigerated at 40 F° (4.4 °C) or below, or frozen at 0 F° (-17.8 °C) or below.

land based on the contemporary farmers, changing livelihood and its diversity. This might be due to the difficulties in delineating the peri-urban land and to being the easiest spot for urban sprawl (Ives and Kendal, 2013).

On the other hand, the multifunctionality of peri-urban agriculture still needs recognition and be implemented in the sustainable development concept (Rana and Marwasta, 2015). The role of peri-urban agriculture in sustainable urban development and peri-urban farmer's role is still a big dilemma when trying to compete with other non-agricultural activities (Thapa and Murayama, 2012). The peri-urban farmers in the valley include both the native and the new ones whose underlying values to choose agriculture are never accounted. They are composed of those who grow traditional crops, which are low value, as well as high value cash crops such as perishable vegetables, part of daily diets in Nepalese context. According to Raj Man Shrestha (2007), the rapid urbanization has encouraged farmers to change the cropping system from low value crops to high value crops with the land fragmentation. The Kathmandu Valley, with rich agriculture bio-diversity, has the potential to transform the urban food system by reconfiguring the food chain, markets access and other sustainable aspects (Rana and Marwasta, 2015). Peri-urban agriculture of daily used high value crops can provide an immediate source of perishable vegetables in the urban market. It also contributes to the sustainable development of the Kathmandu Valley by being one of the parameter of eco-city development especially in areas with agriculture potential (DUDBC, 2013). Therefore, there is a need of smart development and management that leapfrogs the path of exploiting remaining resources by enhancing peri-urban agriculture activity. Its main requirement is to incorporate peri-urban farmers, which is only superficially studied and inconsiderate in planning.



Figure 3. *Perishable vegetables production replacing the low value traditional cropping system*



Figure 4. *Large scale perishable vegetable production in the Kathmandu Valley*

Photographs by Shreema Rana, 2015

With the negative impact seen on people's living conditions and health, it is important to value the efficient inputs and environmental cost of the intensification of sustainable agriculture like peri-urban agriculture. According to Vermeulen et al. (2012), incentives to encourage the short food supply chain and sustainable agriculture forms should start from the high potential agriculture areas with more numbers of existing farmers. In this paper, also the peri-urban areas with more perishable vegetable agricultural activities are chosen based on the selection criteria as defined later in the methodology section. The peri-urban areas growing perishable vegetables shown in figures 3 and 4 are the remaining peri-urban agriculture areas where traditional crops are replaced with cash-crop agriculture.

The peri-urban farmers of the Kathmandu Valley were interviewed with open-ended questionnaires based on the sustainable livelihoods framework. Each interview with peri-urban farmers as the key informants of the study were later classified in different units of analysis, thereby enhancing their livelihoods and preferences. Different scenarios have been explored with the analysis of the values of livelihoods checklists as designed by Scoones (2009). The result of this case study

paper shows the dynamic composition of the peri-urban farmers, which leads to the need of the requirement and justification of ‘agriculture not being the rural activity’ and ‘farmers not being the weaker section of the society’. Peri-urban farmers are composed of the new emergent farmers who have adopted new crops, ‘high value perishable vegetables’, as their primary source of livelihood by generating employment opportunities in the peri-urban areas. Therefore, in the case of the Kathmandu Valley in Nepal, the conventional principle determining urban elements has changed, like in Cuba, which has adopted urban agriculture as a source of competitive income with other urban activities (Zasada, 2011). The case study research method and the study area are explained in the research method section of the paper. Consequently, results are drawn, discussed, and concluded in the later section.

RESEARCH OBJECTIVE

The brief explanation in the section above shows the need to include peri-urban farmers and their benefits in the urban development strategies of the Kathmandu Valley, considering the existing context. It is important to take into account the sustainability of agriculture based on the existing peri-urban farmers, whose livelihood, preferences, and values should be recognized and accounted. There have been studies from Africa where the farmers’ livelihood transition is documented (Vermeulen et al., 2012). They determine the future threats or prospects, the impact on the consumers, and emphasize some issues related to the food security of the regions.

Similarly, the motive of this research is to assess the existing peri-urban farmers of the Kathmandu Valley along with their practice and livelihood, to know how they perceive the current urbanization and development changes. Then, the assessment would help to draw measures to tap the current dynamics of the peri-urban farmers by improving their livelihood and, ultimately, by making agriculture a sustainable urban activity where there is fertile land.

This research is a bottom-up assessment, using case study research method to bring forward the farmers’ priorities in their involvement in policy formulation and sustainable development. Peri-urban farmer’s role is very eminent to improve the ongoing peri-urban agriculture trends and techniques in the Kathmandu Valley, Nepal. Therefore, the research carried out explores the peri-urban agriculture activities for the perishable vegetable production only. Subsequently, it will also compare the preferences and benefits of perishable vegetable agribusiness around the peri-urban areas of the valley over the traditional agriculture of growing rice, wheat, maize etc.

METHODOLOGY

The study uses the case study research method and is composed of several sub-sections. The aim of this section is to investigate the ways to collect, analyze, and interpret data to meet the research objectives. This section explicitly describes the study area and how research is conducted to answer research questions along with the steps to be carried out to reach the final conclusion. Case studies are ideal for exploring new processes or behaviours that are little understood, followed by questions (Yin, 2009). The case study research method is considered to be the most suitable method and design tool for research, with investigations required to answer the ‘how’ and ‘why’ questions and which have to examine contemporary events (Yin, 2009).

In order to ensure effective findings, the study carries out ‘the assessment for the livelihood of the peri-urban farmers in the Kathmandu Valley producing perishable vegetables’. The assessment considers the physical, social, and economic factors for the preference of peri-urban agriculture activities. According to Kaplan (1984), human preferences can be looked at as an expression of the process of adaptation. In this study, the peri-urban farmers’ preferences are also looked upon using different case study research tools and expressed qualitatively.

Study area

The study area is the Kathmandu Valley of Nepal (Figure 5), located in the central region of Nepal. The valley comprises three districts: 1) Kathmandu; 2) Lalitpur; 3) Bhaktapur (Table. 1). The generally 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. According to the Central Bureau of Statistics 2011, the

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population of the area is about 3 million and the urban centres of the valley consist of Kathmandu Metropolitan City, Lalitpur Sub-Metropolitan City and Bhaktapur Municipality, surrounded by a ring road constructed in the 1970s. The surrounding towns and villages with Village Development Committees (VDCs) are primarily known as the peri-urban areas. Those surrounding traditional towns/villages which have their own spatial characteristics and which have more vacant agricultural land are gradually being affected by the urban expansion both spatially and non-spatially. Due to this haphazard conversion and lack of urban plans and policy (Karki, 2004), a key assumption is made by taking the area outside the existing ring road and inside the proposed ring road as the study focus (Figure 6). Table 1 below shows the names of the towns and villages under research.



Figure 5. Kathmandu Valley in Nepal

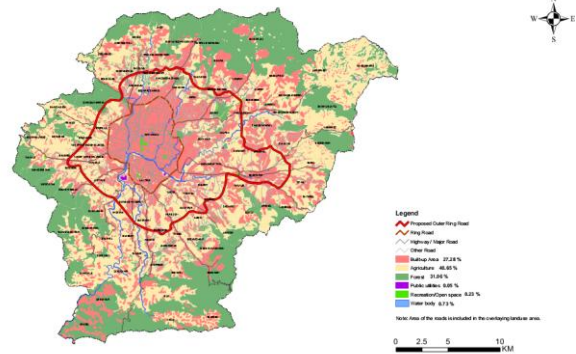


Figure 6. The research area inside the proposed ring road

Source: Ministry of Planning and Works, 2005

Over 70% of the consumed perishable vegetables in the Kathmandu Valley are grown within the peri-urban and the adjoining rural areas of the three districts of the valley. The political turmoil of the ‘90s and the rural-urban migration have resulted in haphazard conversion of these towns and villages producing perishable vegetables. There have been an increasing number of municipalities converting into peri-urban areas. The urban growth rate of the country is 1.35%, the Kathmandu Valley is 4.63% and the peri-urban area is 5.7%, which is the highest (CBS, 2011).

Table 1. Agricultural area around the urban and the peri-urban area of the Kathmandu Valley

District	Urban Area	Peri-urban area
Kathmandu	Gongabu Nayabazar Shova Bhagwati Kalimati Shyambu Teku Tahachal Kalanki	Sakhu Baneshwor Dhapasi Sundarijal Pharping Balambu Sitapaila
Lalitpur	Sanepa Balkumari Sankhamul	Lele Sisneri Imadole Bungamati Godavari Thecho Chapagaun Thaiba Champi

Bhaktapur	Thimi Sano Thimi Kamal Binayak Bode Kasaultar Jagati Nagadesh Byasi Lokanthali	Bageshwori Balkot Sipadole Gamacha Chunadevi
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The lack of comprehensive planning and the lack of adequate concerns about the fertile peri-agricultural land in the Kathmandu Valley are promoting unorganized urbanization. The urbanization takes place on ad hoc basis causing adverse effects on these peri-urban farmers and their livelihood. The current transformation might be negligible in the broader setting; however, one cannot deny the present chaotic scenario of the valley after the massive earthquake of April 2015 followed by the stressful import blockade along the Indian border, which supplied food and fuel to the country's capital city. With a decreasing food import and its impact on the people in the valley, the importance of growing their own food and of valuing the existing fertile agricultural land is increasing. With this growing food price and fuel shortage, there are many instances where people have started utilizing their barren agricultural land to grow their own vegetables and sell the surplus. Inspiration and encouragement can be taken as the few positive social changes among the existing peri-urban farmers to grow more vegetables near the urban consumers. However, the availability of perishable vegetables was valued during the time of disaster and import blockade from the neighbouring countries. The perishable vegetables supply of the Kathmandu Valley depends on the production from the three districts of the valley, from the neighbouring districts Kavre, Sindhupalchok, Nuwakot, etc., Terai regions of the country and the neighbouring countries, India and China. However, most of the fresh vegetable commodities are still served by the three districts of the valley and the peri-urban areas play a vital role.

Unlike the case of the sub-Saharan African countries with large population, widespread poverty and areas with low agricultural productivity (Vermeulen et al., 2012), the Kathmandu Valley is set apart with rich agricultural biodiversity despite its small land area. However, the potential is barely recognized regardless of degrading resources and climatic risks. Therefore, the recent earthquake and the economic blockade along the Indian border have increased the potential of the agricultural land in the study areas, which has long been ignored. Besides the abrupt event, uncertainties are increasing eventually with increasing population, depleting resources, climate change and many other social reasons. There is a pressing need to a paradigm shift towards making the food system of the valley more sustainable with integrated research, policy and implementation.

Key informants selection and units of analysis

Key informant interview approach was used as a qualitative in-depth interview for the existing peri-urban farmers of the Kathmandu Valley producing perishable vegetables. The purpose of the interview was to collect information from a wide range of peri-urban farmers including farmers who have migrated from the rural areas of Nepal, agribusiness groups from urban areas and native perishable vegetable farmers also known as *Jyapu*⁶. These peri-urban farmers, with their particular knowledge and understanding, can provide insight on the nature of problems and give recommendations for solutions. The diversity observed among the key informants is the basis to avoid a situation with results that are one-sided or biased. Thus, the wide range of social and economic backgrounds has disclosed varied perspectives and underlying issues. There are few important key

⁶ *Jyapu* is the typical name given to the indigenous farmers of the Kathmandu Valley. They have established their own existence and recognition preserving their own indigenous culture, language, costumes, arts, literature, life styles, traditions, etc).

assumptions made in the selection of the ‘key informant’ as shown below in Table 2. The peri-urban farmers selected for the interview are from the study area only, i.e. the area outside the existing ring road and inside the proposed outer ring road (Figure 6).

Nepal’s weak urban planning practice, urbanization policies and programmes to improve rural-urban linkages (Karki, 2004) and the changing political scenario have resulted into haphazard conversion of villages and VDCs into municipalities. Therefore, the key informants are from municipalities as well as VDCs, who practice perishable vegetable farming.

The first step in the selection process was to identify and create a list of potential key informants - individuals or groups to interview and gather information about the peri-urban farmers involved in perishable vegetable production. To get a diverse set of representatives with different backgrounds and from different groups, both peri-urban farmers with agriculture as their primary occupation and those with agriculture as their secondary occupation were taken into consideration. This diversity provides a broad range of perspectives. The study uses 126 key informants (Table 2). They were interviewed using open-ended questions addressing the circumstantial feedbacks as well.

Unit of analysis and classification

Multiple unit of analysis of the case study research method is used, which is an important way to validate and triangulate the information from the interviews (Yin, 2009). Multiple unit of analysis used in the research is the basis of classification of the peri-urban farmers interviewed. In consideration of the growing urban issues and development in the peri-urban areas, there have been no empirical studies to identify the peri-urban farmer’s classification. It is a very well-known fact that the farmers’ diversity along the peri-urban areas is not accounted, despite the different agriculture practiced, technique applied, etc. in an area with an already complex definition and delineation. In this area, variations and differences exist due to the social settings of the farmers producing perishable vegetables. Such considerations of the farmers and consumers’ preferences are ignored and have not been considered for their diversity and existence in the previous studies.

Table 2. *Classification of peri-urban farmers as key informants under five different units of analysis*

No.	Peri-urban farmers	Unit of analysis	No. of key informants
1.	Immigrants from the rural areas of Kathmandu, Lalitpur, Bhaktapur and outside as well (primary occupation)	A1	15
2.	Agribusiness in groups from the urban centres of the Kathmandu Valley (primary occupation)	A2	26
3.	Agriculture cooperatives involved in large scale perishable vegetable production	A3	4
4.	Native perishable vegetable farmers (primary occupation)	A4	36
5.	Self-consumption (health/ leisure/ saving/ secondary occupation)	A5	45
Total number of key informants ($A=A1+A2+A3+A4+A5$) in the study area			126

Based on observation, each peri-urban farmer interviewed is representing an agriculture household producing perishable vegetables. The total of 126 key informants were interviewed under the five different units of analysis i.e. A1, A2, A3, A4, and A5 (Table 2). The snowball sampling method was used to select the 126 peri-urban farmers. The technique is seen to be very precise in terms of effectiveness in getting the unit case in accordance with the criteria expected (Rachmawati et al., 2015). Here, each unit of analysis/classification comprises interviewees from all the three districts of the Kathmandu Valley. Figure 7 shows the composition of the interviewees in each unit of analysis from three districts. The number of key informants varies in all the three districts (Figure 7). This variability also reflects the availability of peri-urban farmers growing perishable vegetables. The research uses such variations to triangulate the viewpoints from five different units of analysis. As

stated by Yin (2009), triangulation is one of the important criteria for judging the quality of the research.

A1=Immigrants from the rural area (primary)
 A2=Agribusiness purpose (not farmers, but hires farmers)
 A3=Agriculture cooperatives involved (hires farmers)
 A4=Native perishable vegetable farmers (primary)
 A5=Self-consumption (health/ leisure/ saving/ secondary)

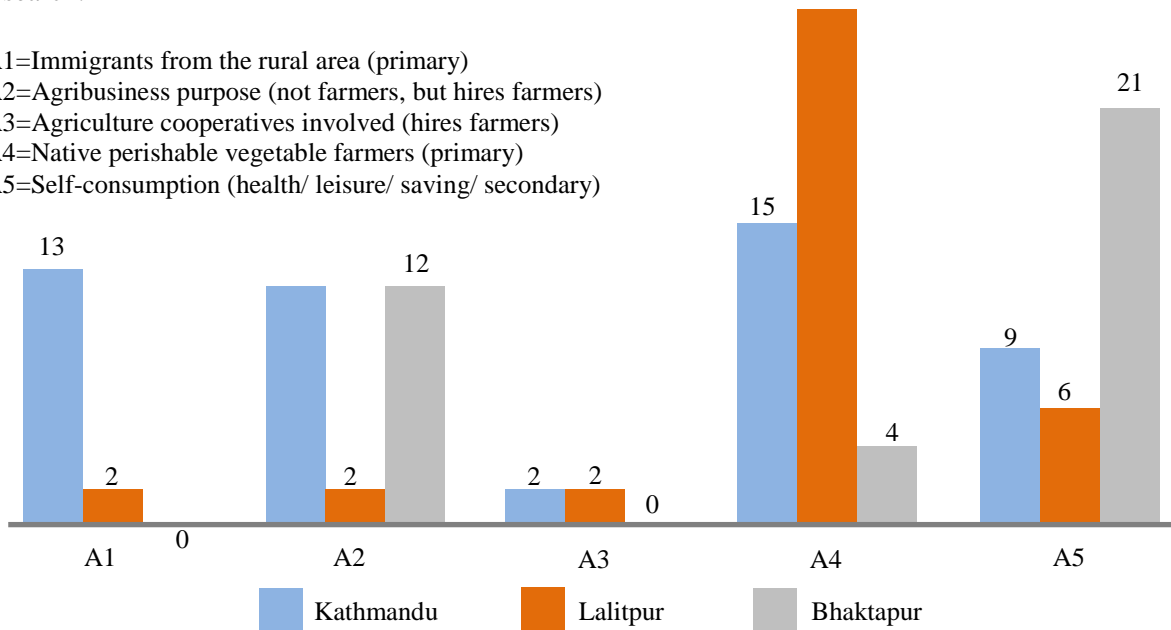


Figure 7. Number of key informants under the five units of analysis from the districts of Kathmandu, Lalitpur and Bhaktapur out of the total number of 126 selected key informants

In the process after the close observation of the peri-urban farmers, snowball sampling is carried out without a sampling frame. The in-depth interview would only be ended when the information received is not new to clarify the ongoing activity of the peri-urban farmers in the study area. In such kind of explanatory case study research with number of individual cases under different unit of analysis, the analysis further focused on cases with information relevant to determine the diversity and potential of perishable vegetable production.

RESULTS

The five different units of analysis in the research are also termed as the peri-urban farmer's classification/category A1, A2, A3, A4, and A5. This evidence shows a relationship between the peri-urban farmer's preferences with the fundamental values of the urban infrastructure/facility and the consumers. The increasing interest in peri-urban agriculture for the production of perishable vegetables is found among the rural migrants represented as (A1), among urban residents - mainly for business purposes (A2), and for individual household self-consumption (A5) (Figure 7). The first two categories (A1 and A2) are for occupational purposes; they find peri-urban agriculture as a prospective opportunity for business with profit. However, lack of water and competition of urban land for agriculture and urban purposes are posing threat to the peri-urban agriculture. Peri-urban farmers classified under A1 and A2 consider growing vegetables near urban consumers with urban infrastructure as a positive attribute and opportunity to flourish urban agriculture (Figures 8 and 9).

The rural immigrants interviewed in the valley who then used to farm in the rural areas around the valley faced problems such as the very low price their vegetables produced. In addition, vegetables often used to go for waste waiting for the vegetable dealers who enjoyed a greater share of the profit than farmers did. Now the peri-urban land around the valley is given out in lease/contract both for the purpose of perishable vegetable production and for poultry and pig farming (Figures 10 and 11). Most of the large-scale perishable vegetable production of the rural immigrant farmers was near the river basins. According to Kaplan (1984), spatial and natural settings tend to be highly favoured so that, in the case of rural migrants (A1), the natural settings play a vital role.



Figure 8. Rural immigrants and urban residents carrying out peri-urban perishable vegetable production in Dhapasi, Kathmandu district



Figure 9. Peri-urban perishable vegetable production in Bungamati, Lalitpur district

Photographs by Shreema Rana, 2015

Rural immigrants as peri-urban farmers (A1) are found in highest number in Kathmandu district followed by Lalitpur district (Figure 7). From the field evidence, the rural immigrants were not present in Bhaktapur district. All of them were either indigenous farmers (*gyapu*) or residents of the district with large agricultural land holding where perishable vegetable farming had been carried out for generations. The absence of A1 category also reflects the minimal effects of migration and commercialization in Bhaktapur district compared to the rest. The land ownership by the farmers themselves and less land fragmentation mark the prosperity of perishable vegetable production as a business in this district. However, here the number of key informants does not quantify the number of farmers (“how much”); rather, the number represents the participation and interest as qualities (“where, who, and why”).



Figure 10. Poultry farming in the peri-urban areas of Lalitpur district



Figure 11. Pig farming in the peri-urban areas of Kathmandu district

Photographs by Shreema Rana, 2015

Likewise A1, with farmers migrated from the rural areas with farming as their primary occupation, A5 comprises farmers growing perishable vegetables for self-consumption purposes, especially those who value food to good health, interest, household saving, and secondary occupation (Figure 13). The A5 category mostly practices rooftop farming (terrace gardening) and utilizes non-biodegradable household waste such as plastic sacks, thermo bins, plastic cans, etc. (Figure 12), contributing partially to household food expenses.



Figure 12. *Individual household growing vegetables on terraces as A5 unit of analysis*



Figure 13. *Individual household growing vegetables in spare land as A5 unit of analysis*

Photographs by Shreema Rana, 2015

According to Kalimati Fruits and Vegetables Market Development Board (KFVMDDB, 2014), the contribution of vegetables is more from Bhaktapur district compared to others. However, with the political turmoil that has led to mass rural-urban migration to the urban fringes of Kathmandu district, it is also producing now a good amount of perishable vegetables. Based on the evidences from many cases of peri-urban farmers from A1, A2 and A3 units of analysis, growing perishable vegetables and depending on it as a primary occupation is not so easy as compared to other forms of urban jobs. Agriculture depends not only on the consumers and market but also on the climatic factors, pollution and technology used. Apart from these physical aspects, social aspects of farmers, agriculture business and value also determine the prosperity of doing agriculture near the urban areas.

The benefits people derive from the peri-urban agricultural land that produces perishable vegetables while maintaining the cultural and aesthetical values are not comparable to other urban occupation. In the old Nepalese context, peri-urban land was only for traditional agricultural products such as rice, wheat and others. Now they are being replaced by all-year-round perishable vegetable farm products. The collected evidence shows that most farmers prefer agriculture close to urban consumers where they have assured sale. Apart from the farmers' preferences, increasing food price, fuel price and awareness of health and nutrition are adding to the preference for peri-urban products.

According to KFVMDDB report (2014), Kathmandu, Lalitpur and Bhaktapur districts along the Kathmandu Valley provide about 70% of the total vegetables consumed depending on the season, 15% by Terai region of Nepal and 15% through import from the neighbouring countries especially India. In the broad perspective, the cases of peri-urban farmers reveal characteristics such as the need of perishable vegetables for daily life, easily available, approachable compared to the imported food and reliable in terms of health concern. These benefits overcome their fear of surviving in the urban context and competing with other urban businesses. Farmers' satisfaction is closely related to the consumer's availability and the consumer's values towards peri-urban products.

DISCUSSION AND CONCLUSION

Evidence about peri-urban farmers growing perishable vegetables includes many multifunctional benefits (Rana and Marwasta, 2015), not only to farmers but also to consumers and environment. Considering the potential peri-urban agricultural land with keen interested farmers, restrictive zoning and agricultural subsidies should be included as in the case of Canada's agricultural land reserves (Ives and Kendal, 2013). The diversity of peri-urban farmers and the existing fertile agricultural land should be brought into synchronization by bringing spatial planning approach in use. The conventional land use planning system from the western practices should not be directly brought into use in our context but rectified as per our context and potential based on the function. The

determination criteria for the land use plan and policy should be evidence-based, but to facilitate the peri-urban farmers of the Kathmandu Valley. Just as national parks are maintained and protected for their value to the whole society, the peri-urban agricultural land should have some similar preservation norms for its multiple benefits (Ives and Kendal, 2013) and contribution to the people and environment. The pattern of urban perishable vegetables consumed in the Kathmandu Valley from the surrounding rural districts and the neighbouring countries shows the demand, making the peri-urban agriculture business more promising. However, peri-urban farmers complain about the low-priced vegetables imported from the neighbouring countries that replace the market due to lack of buyers' awareness and policy weakness. Evidence from the peri-urban farmers also shows that the consumer's awareness and government policy on the importance of sustainably produced vegetables with no preservatives for freshness and chemicals for mass production would add value to peri-urban vegetable production.

The effective promotion of peri-urban agriculture requires the simultaneous and coordinated attention for the peri-urban farmer's values and preferences, urban land use developers and policy makers. It is important to implement policies to protect peri-urban agricultural land and recognize the existing peri-urban farmers and their classification first in the Kathmandu Valley. The multifunctional peri-urban agricultural land can benefit from the cooperative interactions with the existing peri-urban farmers and their dynamics. Planning and its developmental tools should be designed in such a manner as to encourage stakeholders involved (Cocklin et al., 2006) and the recognized classification of peri-urban farmers should be incorporated. Such actions may include government incentives for the peri-urban vegetable production and for the agriculture-related preservation of environment, fresh vegetables, open space, etc. In addition, there is a need for further research on the market and consumption of the perishable vegetables produced in the Kathmandu Valley, which helps to identify the nature of relationship for better policy recommendations.

Thus, policy makers and business entrepreneurs should recognize such prospective to learn and formulate a path towards sustainable development. In a broad sense, decision makers should look beyond the holistic view of the agriculture and food system of the valley and the whole nation. They should consider the strategic approach by focusing on the key dependencies and the processes involved. Therefore, the key challenge to the agricultural nation of Nepal is to ensure the sustainable and resilient food system. The attempts to address the sustainability of the peri-urban agriculture in the Kathmandu Valley must include the policy considering agriculture as an urban and not a rural activity. In addition, the plans and policies for the Kathmandu Valley development should incorporate peri-urban agriculture as the parameter for sustainable development.

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