

CHAPTER ONE

INTRODUCTION

Agriculture is the main occupation of majority of Nepali by which it contributes around 80 percent of employment to the people. It generates about 40 percent of national GDP of Nepal. Most of the people of Nepal are engaged in this sector. Nowadays, there is shrinking of population engagement in this sector not because of the next opportunity but of the foreign employment. Agriculture of Nepal is the backbone to national economy and without it promotion and development, no options will be remained to boom up the country's economic growth. About 21 percent of the land area of Nepal is under cultivation. A large number of poor families have small land and over two third of rural households own less than a hector of land (Lekhak and lekhak, 2005).

Agriculture is the major sector of the Nepalese economy. Therefore, the agriculture sector has been given priority in the tenth plan which recognizes that agricultural growth is an essential for attaining broad based growth. To achieve the targets of the agriculture sector of the plan, the APP has been taken as the core strategy. The APP has put emphasis on the following five aspects;

-) Controlled year round irrigation.
-) Easing fertilizer supply.
-) Expanded provisions of modern inputs and need based research and extension.
-) Linking potential production pockets with markets through rural agricultural roads.
-) Expansion of rural electrification (*PRSP RREVIEW 2005/06*).

1.1 Background of the Study

Agriculture is the backbone of Nepalese economy. More than 65% of the Nepalese population engages in agricultural occupation. Agriculture in general is basically rural based occupation. About 85.8% of the population in the country lives in the rural area (CBS, 2003) and agriculture continues to be dominant sector in the Nepalese economy. Agriculture extends employment opportunity (full and partial) to 80 percent of the

population (AEC, 1998). The development and enhancement of the productivity of this sector plays vital role in the productive employment generation and improving economic development of the country.

Performance of Nepalese Agriculture sector is not encouraging. During mid seventies Nepal was known to be the food exporting country. The share of agriculture gross domestic product (AGDP) is decreasing overtime (APP, 1995). Considering the fact, the government has launched 20 years strategic plan, Agriculture Perspective Plan (APP) to bring about acceleration at growth in agriculture sector. APP seeks to raise agriculture GDP growth from 2.96 percent in 1992-1995 to 4.88 percent by 2011-2015 (APPRSC and JMA, 19995).

1.1.1 Urban Agriculture

The term 'urban' refers to the over-crowded, more developed and facilitated area and urban settlement is civilized one more advanced than rural. The agriculture is supporting urban life in many ways. Tangible benefits from agriculture include food, fiber, fodder, fuel wood, building materials and so on. Environmental and social benefits relate to public health, recreation, and well being of the urban population. Urban agriculture (UA) refers to the production and management of crops, poultry and/or livestock products in the urban or periphery area, specially to meet local needs, including urban greenery management. There are two broad options for urban employment- agricultural and non-agricultural. UA is an option for employment and income generation for the low skilled, low education, poor and marginalized people, especially the migrants in urban areas. As the agriculture is the total way of life supporting system, UA should be achieved in such a way that it is supportive to alleviate poverty and food insecurity and to be market and technologically driven so as to enhance overall productivity of the marginalized urban farmers. This study analyzes the urban agriculture in Ichangunarayan 1, 2 and 3 Kathmandu in a systematic approach for its contribution to the urban income and nutrient supply.

1.2 Statement of the problem

Urbanization in Kathmandu valley is rapid. The pressure of population growth and migration is very high in Kathmandu (DDC, 2008). This rapid growth of urban areas is exacerbating serious problems such as scarcity of food, fuel, water, employment, and shelter. Agriculture is still the fundamental basis for urban development in developing countries like Nepal. Urban development or urbanization seems to be different from agricultural development. But, for the fulfillment of human needs in the urban and peri-urban areas, agricultural activities or functions are increasingly practiced. Whether the promotion of agricultural farming especially in the urban areas is socio-economically and ecologically justified function for the food security, overall development and sustainability of the urban society? This is one of the genuine research questions and in fact, the impact of the urban agricultural farming activities has to be critically reviewed with theoretical, practical and scientific bases for the prosperity of mankind and integrated urban-rural development. This study attempts to bridge these information gaps regarding urban agriculture and poverty issues in Kathmandu, Nepal.

In Ichangunarayan VDC ward no. 1, 2 and 3, the agriculture is the main occupation of the people and their way of life is connected with agricultural business. For the development of this business, many programs are designed to implement at local level by different agencies and found less effective even though, handsome investment. Aftermath the restoration of democracy, the population in Kathmandu valley is rapidly increased. It is very high in the ten years political conflict. Due to these various reasons, this VDC is also getting compact settlement and mass populations have very small portion of land. Beside it, the population is heavily dependent on this business with virtually commercialized in production of crops.

1.3 Rationale of the study

UA tends to complement rural and foreign sources of food supply to cities, strengthening poor urban households' food security in particular (Mougeot, 2000). Green areas can also provide habitats for biological diversity, protection of watersheds for urban water supply

and productive uses or safe disposal of urban wastes. However, some negative consequences also come with urban agricultural practices.

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Urbanization is an invisible force, transforming patterns and styles of living not only in towns but also within the surrounding rural hinterland areas. Agriculture is the main economic basis of development, but agricultural growth and development requires strengthening urban-rural linkage (Pradhan, 2003). UA is one source of supply in urban food systems and only one of several food security options for households. It is also one of the tools for making productive use of urban open spaces, treating and recovering urban solid and liquid wastes, generating income and employment and managing resources more effectively (Mougeot, 2000), along with conservation and management of urban environment. This study will investigate and analyze on both the positive and negative aspects of urban agricultural functions for the development of market towns and rural hinterlands.

1.4 Objectives of the study

The general objective of this study is to examine the contribution of agriculture in poverty alleviation in urban periphery of Kathmandu valley. More specifically, this study aims to:

- Analyze the attitudes of the urban people towards agricultural occupation.
- Analyze the impact of urban agriculture on environment, health and nutrient supply to urban farmers.

1.5 Major assumptions

The study analyzed the role of urban agriculture to generate employment and income along with nutritional supply and socio-economic implications. This also attempts to analyze the attitudes of the urban people with regard to the organizations involved in supporting to agriculture development activities in the study area. This study was based on the following basic assumptions.

-) The attitudes of the urban people towards agriculture and non-agricultural occupation functions are different.
-) There is an important contribution of farm products to urban economic development.
-) Nutrition required to the poor urban farmers are supplied from agricultural crops.
-) Agricultural production functions have both positive and negative impacts on the urban environment.
-) Different governmental and non-governmental organizations are supporting to agriculture development activities in the urban periphery.

1.6 Limitations of the study

The study was examined the role of urban agriculture to generate employment and income along with social, economic, nutritional supply and environmental impacts or implications. Specifically, the following limitations are made for this study;

-) This was also analyzed the attitudes of the urban people with regard to increasing agricultural production, with identification of the organizations involved in supporting to agriculture development activities in the study area.
-) This study is only limited to the Ichangunarayan VDC ward no. 1,2, and 3.
-) The output of the study had an immense scope in regional planning and policy formulation for integrated rural-urban development.
-) However, this was not covered the aspects of technology generation and improvement pertaining to urban agriculture farming.

1.7 Organization of the Study

Organization of the study is the sequential and organized form of the whole research report. In it, the first chapter deals introduction of the study, chapter two deals about the review of literature, chapter three research methodology, chapter four consists with data analysis and interpretation. Similarly, chapter five consists of the summary, conclusions and recommendations of the study. Thus, the overall organization of the study is managed.

CHAPTER TWO

REVIEW OF LITERATURE

This chapter deals with the review on different aspects of urban agricultural systems, employment and poverty reduction issues or perspectives.

2.1 Theoretical issues and concepts

The term 'urban' refers to the over-crowded and facilitated area, more advanced than rural. Agriculture is supporting urban life in many ways. Tangible benefits from agriculture include food, fiber, fodder, fuel wood, and building materials and so on. Environmental and social benefits relate to public health, recreation, and well being of the urban population. UA tends to complement rural and foreign sources of food supply to cities, strengthening poor urban households' food security in particular (Mougeot, 2000). Green areas can also provide habitats for biological diversity, protection of watersheds for urban water supply and productive uses or safe disposal of urban wastes. However, some negative consequences also come with urban agricultural practices.

Urban Agriculture is defined as the production of crops and livestock within the administrative boundary of the city (Mbiba, 2000). Urban agriculture can be classified in three categories based on its location:

1. **On-plot agriculture:** Farming practised on the plots around the houses, like backyard gardening. It involves mainly crop production. Poor households, tenants, and recent rural-urban migrants hardly have access to on-plot land.
2. **Off-plot agriculture:** This is conducted in public open spaces, utility service areas and agricultural allotments. The production is mainly for home consumption and some percentage is marketed. The poor and vulnerable groups, who could participate in this sector, are progressively pushed out by higher income households.
3. **Peri-urban agriculture:** This category of urban agriculture is the production of crops and livestock in areas outside the city boundary- up to a radius of 150 km- which is economically integrated into the city. This sector offers

immediate and viable options for enhanced food production to meet the employment and nutritional needs of the city (Mbiba, 2000).

Urbanization is an invisible force, transforming patterns and styles of living not only in towns but also within the surrounding rural hinterland areas. Agriculture is the main economic basis of development, but agricultural growth and development requires strengthening urban-rural linkage (Pradhan, 2003). UA is one source of supply in urban food systems and only one of several food security options for households. It is also one of the tools for making productive use of urban open spaces, treating and recovering urban solid and liquid wastes, generating income and employment and managing resources more effectively (Mougeot, 2000), along with conservation and management of urban environment.

Bhattacharai (2003) has described the issues in agriculture development in terms of four law of motion in agriculture as- (i) the question of 'prime mover' in agricultural development (Lenin seems to use the term 'carrier of technical process' interchangeably for 'prime mover'); (ii) the operation of the law of socialization in agriculture; (iii) characterization of 'peasant proprietorship'; and (iv) differentiation of the peasantry. As described by him, *Land* (the basic material element of agricultural production) and *labor* (the principle source of value in all production) are the basic conditions of factors of agricultural production. Besides, *irrigation* and *modern inputs* are the other factors of agricultural production. The absolute measure of level and growth of agricultural production is of crucial significance for a society dominated by use-value production. For this, it would be pertinent to evaluate the situation first with respect to:

-) Cropping pattern and cropping intensity
-) Level and growth of production by major crops, and
-) Net food balance.

Bhattacharai (2003) has also described and generalized the agrarian spatial structure of Nepal with the distribution of levels of development along Terai, Inner Terai, Kathmandu Valley and area of absolute backwardness or retardation in the vast hinterlands of hill and

Mountain, which can be taken as a typical manifestation of the underdevelopment process operating in the Nepalese economy.

2.2 Efforts on agriculture development in Nepal

Nepal is small but extremely diverse country with more than 24.8 million people at present (CBS, 2004). Agriculture in Nepal is contributing 65% employment of the economically active population. The share of agriculture in GDP is about 38%; more than 80% of the rural population depends heavily on agriculture sector for their employment and about 65% of the total income of rural households comes from agriculture (Kaini, 2003). As more than 80% rural population depending on agriculture and they are mostly fall below poverty line, poverty alleviation without agricultural development is not possible in Nepal. Realizing this fact, the government of Nepal has set a principal development objective of poverty reduction through agricultural development for the Tenth Plan (2002-2007). Poverty reduction is one of the principal objectives of the 20 years Agriculture Perspective Plan (APP, 1995-2015). To achieve the objectives, APP has identified livestock, high value crops, agribusiness and forestry as its priority outputs. Commercialization of agriculture is essential for alleviating poverty in Nepal and it is realized that agriculture can only be commercialized by effective uses of information and communication technologies, giving the farmers a commercial orientation (Kaini, 2003).

Agriculture development in Nepal has passed through various models of development. In each model, horticulture and livestock sector have got the priority. With a view to put agriculture into a high growth path, APP was implemented. However, it failed to relate the development activities with the institutions responsible to implement them. (Thapa, 2001).

The aggregate agrarian process in Nepal is characterized by low technical level of production, pre-capitalist (or semi-feudal) relations of production, disarticulation with other sectors of economy- particularly industry, and a general state of stagnation and retardation (Bhattarai, 2003).

Agriculture sector in Nepal has remained as the main basis of food security, rural employment, poverty level reduction and national income (Shrestha, 2004). As a landlocked underdeveloped country with basically an agro-based economy, Nepal has to choose a road that fits own sustainable situation (Devkota, 2004). As a member of World Trade Organization (WTO), Nepal is to fulfill obligations and commitments required by WTO/SPS agreements latest by January 1, 2007 (Shrestha, 2004).

The Kathmandu Valley has an exotic setting and consists of three main towns of great historic and cultural interest- Kathmandu, Patan and Bhaktapur. Based on updated agricultural data and information (DDC, 2005; DADO, 2004), the agricultural scenario in the Kathmandu district has been presented in Appendix 13.

2.3 Poverty, agriculture and rural-urban development interrelations

Poverty is the major challenge to development and principal obstacle for prosperous human life (Devkota, 2006). Poverty and agriculture are interrelated to each other and the percentage of population below poverty line is estimated to be 23 and 44 in urban and rural areas, respectively. The APP has estimated that it would reduce poverty at a rapid rate to 14% within 20 years and the plan is designed to encourage those activities that skew the income distribution towards the poor, particularly, the poor women (Kaini, 2003). Some of the prominent agricultural programs that the government has focused to achieve the poverty reduction goal are vegetable and fruit production programs, fishery development program, sericulture and apiculture, goat farming, pig and poultry farming, agricultural training creating self-employment opportunities, and so on.

Agricultural and socio-economic development is such development that is people centered, concentrating on improving the human condition, and conservation based, maintaining the variety and productivity of the nature (Devkota, 2004). In this context, new options need to be researched to broaden the non-chemical approach of farming, directed towards ongoing problems of continuous agricultural production (Midmore, 1998, CABI Bioscience and FAO, 2000).

Agriculture and rural development are intrinsically interrelated elsewhere in the developing countries, especially true for a country like Nepal. It is claimed by the scholars that, for Nepal, agriculture is and will remain a major contributor to the sustenance, employment and development of the poor as well as the better-off sections of the population for a long time. Even in Japan, which is now a well known as an industrialized developed country, the number of people relying on agricultural sector did not reduce during a long period between 1870 and 1940. Such number did not decline even until the 1960s, although non-agric employment grew substantially by that time. In countries and areas such as Taiwan, Kenya, Thailand, Costa Rica, Columbia, and Punjab (India), it was the development of agricultural sector that chiefly led to economic growth and overall prosperity among the people.

2.4 Urbanization and agriculture

The world's urban population is expected to reach 5.5 billion by 2025, 80% of which will live in urban centers of developing countries. Many of those who migrate to cities, however, fail to obtain the desired occupations, being forced to exist at low level of subsistence in slums, mushrooming in the outskirts of the cities. Therefore, in developing countries, an increasing proportion of the target group for poverty alleviation is found to be in the urban centers. Thus, cities in developing countries which have been affected by recent economic crises, have seen an upsurge of urban agricultural activities and the debate over the value of urban agriculture as an acceptable input in sustainable urban development has recently gained momentum .

An important factor for the development of market town is agriculture and the climate is the single most important factor of agricultural development, particularly in mountainous country, like Nepal. But the potential production cannot be achieved due to inadequacy of irrigation water (Pradhan, 2003).

2.5 Urban agriculture, food security, health and nutrient supply

The concept of food security has been on the international agenda and urbanization is an inevitable consequence of socio-economic development. Urbanization also influences all

aspects of production and consumption. Specific aspects of food security applicable to the urban context include (i) the necessity to purchase most of the food needed by households; and (ii) greater dependence on the market system and commercially processed food. Waged employment and monetary income are therefore the main prerequisites for achieving food security. Since the early 1990s, as a result of political transition, two severe humanitarian and food crises occurred in Sofia: the first from 1990-91; and the second 1996-1997. During these crises, urban agriculture remained the most important way to overcome food shortage and was a strong stabilizing factor for food security of the population in Sofia .

Health issues in urban agriculture are mainly related to pollution- both chemical and biological- of food prior to harvesting and possible contamination during marketing and distribution. Armar-Klemesu (2000) has described the human and environmental health risks of inappropriate urban agricultural practices from the following ways:

-) Inappropriate handling of agrochemicals by producers;
-) Crop selection or location without due regard to the ambient pollution in the air, soil or water.
-) Livestock production;
-) Application of unsorted or insufficiently treated solid and liquid organic wastes to vulnerable crops; and
-) Poor handling during processing, marketing and distribution.

The WHO Surveillance Program for Control of Food-borne Infections and Intoxications in Europe has reported a dramatic increase in food-borne diseases over the last 10 years (Armar-Klemesu, 2000). Indiscriminate use of agrochemicals, such as fertilizers and pesticides, may significantly increase agricultural yield, but the residues can also have negative impacts on the environment and human health. At the same time, livestock production in cities can also be potential source of health problems. Livestock are the important carriers of parasites, bacteria and viruses that are dangerous to human health. For example, cattle, sheep, goats and pigs and horses are important reservoirs for the

Cryptosporidium parasites, excreting them in their faeces. Known routes of transmission are animal-to-person, consumption of animal produce and faecal contamination of environment, particularly by fertilization of crops with sewage sludge or waste water irrigation. Likewise, foods most often involved in disease outbreaks are raw or insufficiently cooked meat, milk, poultry and eggs .

One of the main beneficial impacts of urban agriculture is the potential to recycle urban waste products. Organic waste is popularly used as compost, which is certainly a favorable practice. However, attention must be given to health risk from the handling and application of manure from vector-carrying animals and the use of composted domestic waste also poses health risks if trash has not been sorted properly. Different governments and International organizations, such as FAO, UNDP and WHO, are involved in training research and development on environment and health effects and advocacy. According to Armar-Klemesu (2000), some recommended least-risk farming strategies may include:

-) **Crop choice:** for example, the metal absorption ratio in plants is (fruit+seeds): (leaves+roots) = 1:10, showing that fruits and seeds are ten times safer to grow and consume than leaves and roots in polluted area.
-) **Use of cash crops or bio-remediation** (using plants that take up toxic waste): Growing hedging species which can take up pollutants in soil and act as barrier to air borne pollution.
-) **Location of production:** Vegetables grown in industrial or mining, near road and close to emission sources suffer from contamination (such as higher deposition of lead particles).
-) **Other possibilities:** Involve adoption of farming techniques that prevent contact with contaminated soil altogether by growing crops in containers or raised beds with growing media or using hydroponics.

The consumption of enormous quantity of organic materials, such as foodstuffs by cities generates a correspondingly high quantity of organic waste estimate as amounting to 2/3 of all urban waste. The recycling of such urban organic waste in urban and peri-urban agricultural activities closes these nutrient cycles, reducing the cost of disposal and serves as an environment friendly solution to some of the negative ecological impacts of cities.

At the same time, urban agriculture can serve as a means of maintaining open spaces-green space- in urban areas (Pfeifer *et al.*, 2000).

Maxwell *et al.* (1998) report the linkage of urban agriculture and malnutrition in Kampala (Washington). When controlling for socio-economic status and other individual and household characteristic, they found that urban agriculture is positively and significantly associated with higher nutritional status in children, particularly in terms of higher-for-age, and there is a significantly lower proportion of moderately to severely malnourished children in households where someone is farming.

2.6 Urban agriculture and employment generation

In the present decades, poverty alleviation has been sought at its roots in rural areas by making rural life attractive enough to reduce the rural-urban migration of youths in particular. However, cities in developing countries, which have been affected by recent economic crises, have seen an upsurge of urban agricultural activities. Therefore an increasing proportion of the target group for poverty alleviation is now found in urban and peri-urban areas. And, many of the poor find employment in commercial urban agriculture undertaken in open spaces, supplementing their family diet with the help of a range of urban agricultural activities such as market gardening or livestock and poultry rearing. Once established in the city, some even secure access to the resources required to facilitate self-employment in urban agriculture.

2.7 Urban agriculture and environment

Urbanization in Kathmandu valley, including urban agricultural practices, implies various environmental implications. Both the forest and agricultural areas have decreased in the valley. The encroachment and decline in the forest area has affected not only the water recharge capacity of ground water sources, but also caused frequent landslides and soil erosion on the surrounding hill slopes and flash floods in the valley floor. Studies shows that the accelerated and haphazard urban growth and agricultural practices in the Kathmandu valley has resulted into squatting of open-public places, mismanagement of solid wastes and sewers, increasing in slums, increasing level of pollution of water and

air, depleting water sources, and so on are pronounced as environmental consequences (Pradhan, 2004). There is a fast growing interest in organic gardening and food seems to catalyze environmental concern, indicated by the rise in organic food sales. At the same time, urban agriculture in London has significant environmental effects (Garnet, 2000), as:

-) Pesticides- more likely to be used by food growers have been reduced and many growers walk to grow organically.
-) Composting practice increased which cause a major environmental benefit of food growing schemes.
-) Sewage is another untapped source of compost. Thames Water produces and sells more than 30% of the anaerobically-treated sewage used compost used in UK agriculture and marketed through garden centers.
-) Urban food production can play a significant role in reducing food transportation.
-) Organically managed allotments can also promote urban biological diversity, as can unused sites which harbor wildlife.
-) Food growers also reduce their non-food waste by substituting own grown vegetables for packaged foods.

The status of urban agriculture can be guided by the public and official view that urban agriculture poses a threat to the environment. Researchers have attempted to establish the extent of the threat and potential benefits such as CO₂ reduction, composting and microclimate improvement (Mbiba, 2000). The key research findings are summarized in Appendix 12.

2.8 Urban agriculture and sustainability

The international community is addressing the increasing issue of urban sustainability. The process began in Rio Earth Summit (1992) with Agenda 21, which called for all countries to develop National Strategy for Sustainable Development (NSSD) to translate the words and commitments of the Earth Summit into concrete policies and actions (Lekhak and Lekhak, 2003). It is recognized that cities nowadays use too many natural

resources and produce too much waste. The ecological footprints of cities are stamping out the habitat of many species. Moreover, cities are confronted with an increasing number of people and, therefore, an increasing number of mouths to feed. Along with other initiatives and activities, urban agriculture therefore has an important role in contributing to the future sustainability of cities (ibid).

2.9 Institutional aspect of urban agriculture

Mwalukasa (2000) analyses the mechanism of institutional strategies of urban agriculture in the context of an East African city, Dar es Salaam, which is one of the fastest growing cities in sub-Saharan Africa. The analysis shows that the policy agenda needs to focus on managing urban land uses for improving production of food to sustain the growth of cities. In the past, the growth and development of Dar es Salaam has been guided by the 1979 Master Plan that provided the framework to manage the future growth and development of the city. New initiatives include that the sustainable city program builds capacity of municipal authorities to enable them to plan, co-ordinate and manage their urban development through application of environmental planning and management (EPM) approach. The process is being carried out by the sustainable Dares Salaam Project (SDP) which focuses on the environment-development interaction and is both bottom-up and stakeholder-driven (Mwalukasa, 2000).

A working group within SDP was formed to deal with the development and management of urban agriculture in relation to recreational areas, open spaces, hazardous areas and greenbelts. The group comprised representatives from various stakeholder groups:

-) Segments of the urban dwellers (urban poor, youth, women, etc)
-) Village governments (especially in the peri-urban areas)
-) Various government ministries and financial institutions
-) The Dar es Salaam City Council
-) National Environment Council
-) Business groups and informal businesses
-) Civil Society groups, NGOs, and CBOs within the cities and in the urban villages

-) Informal business, such as petty trading, street hawking, street food vending, marketing operators
-) Livestock owners/ Keepers, etc.

The other instruments to enhance the urban agriculture strategy included informal campaigns, economic incentives, provision of finance for long-term investments, regulations and increasing co-ordination. The institutional aspect indicates that future emphasis needs to be placed by the city authorities if urban agriculture is to prosper. This consensus is being practically addressed through cross-sectional working groups (Mwalukasa, 2000).

2.10 Urban agriculture on policy agenda

Urban agriculture exists under the range of policy environments that may be prohibitive or supportive to its existence and development (Zeeuw *et. al*, 2000). It can have different purposes, such as, food security /subsistence; city ecology improvement; and income or employment generation. Urban agriculture has been variously studied and included in the policy agenda for sustainable urban development in different parts of the world. (Gertel and Samir, 2000).

City farming is one of the strong and positive urban residents are undertaking in an effort to take control of food security, social ills, and environmental degradation in their communities (Bourque, 2000). It has provided food, jobs, environmental enhancement, education, beatification, inspiration and hope (UNDP, 1996). Mwalukasa (2000) highlights the structural and policy problems of urban agriculture in the context of the African city Dar es Salaam with key aspects of new strategy to prosper urban agriculture. The strategy has the following elements.

-) Restructuring land access and land-use laws.
-) Using new urban agriculture techniques to use land more intensively (in small and marginal areas)
-) Incorporating non-food production, for example, floriculture and arboriculture (planting trees on roadsides, in homes, watersheds).

-) Moving large livestock to peri-urban areas.
-) Composting of organic waste collected in the city centers and transporting it to peri-urban areas.
-) Generating biogas where composting is taking place.
-) Encouraging people to use more underground water from wells and boreholes, using hand pumps and electricity, where possible.
-) Using biodegradable wastes from market centers and homes for composting to grow mushrooms, and
-) Developing aquaculture in coastal lagoons and other appropriate inland areas and in tanks.

A mixed land use strategy for the city that would incorporate the demand for agricultural activities has several specific components (Mwalukasa, 2000), such as:

-) Maintaining green spaces with flowers and ornamental trees to beautify the city.
-) Avoiding sub-division of the areas by overbuilding, and keeping open spaces under some form of agriculture.
-) Maintaining tree wind breaks to reduce air pollution.
-) Encouraging livestock keeping and crop growing in low density residential areas where this is already common practice, provided stipulated bylaws are followed.
-) Supporting vegetable growing and small livestock keeping in high-density areas where open space is available and small scale farming is common practice.
-) Large peri-urban areas should be allowed space for fodder production, disposal of manure or construction of composting systems.
-) No livestock rearing in high density residential areas.
-) Zero-grazing in built-up low density residential areas, and
-) Open grazing only in peri-urban areas.

Adopting the above mentioned strategies, the project for urban horticultural garden development in the Dar es Salaam to provide urban food security, create jobs and alleviate poverty.

Cities in developing countries, which have been affected by recent economic crises, have seen an upsurge of urban agricultural activities. The debate over the value of urban agriculture as an acceptable input in sustainable urban development has recently gained momentum (Pfeifer *et al.*, 2000). As a consequence it has drawn the attention of a growing number of policy makers and commentators in and around municipalities, bilateral and multilateral organizations, NGOs and universities to the subject of urban agriculture.

Nepal's resource base for agriculture is severely limited by the nature of the terrain. Only 3.1 million hectares or 21% of the total land area is cultivated and there is no significant potential for expansion. Due to high population pressure, the average landholding is declining over the years. Poverty, food insecurity, social and economic inclusions are the major problems, especially in the rural areas of Nepal (Joshi, 2006). The mountain agriculture is traditionally composed of elements of self-sufficiency. Nepalese hill farming includes the field crops, livestock; horticulture, forest and beekeeping cover the risk against famine and other natural disaster (Pokhrel, 2005). There is extreme skewedness in the spatial distribution of cultivated land in the country (Bhattarai, 2003).

Increasing use of agro-chemicals, higher production cost and deteriorating ecosystem health have advocated a need to change traditional and external input use agriculture towards safe and sustainable organic production. Current research focuses on the constraints and opportunities of organic agriculture and consumers awareness and willingness to pay more for vegetables by selecting producers from Lalitpur and Bhaktapur districts using spatial sampling and consumers from Kathmandu valley randomly.

The Kathmandu valley has an exotic setting surrounded by a tier of Green Mountain. Even in the highly urbanized Kathmandu valley, large tracts of land outside the city area are devoted to farming. And, agriculture in the Kathmandu city cannot be ignored while thinking and executing for overall development of the city. Thus, the integration and/or inclusion of urban agricultural development in Kathmandu city is essential for integrated urban-rural development, poverty alleviation and urban food security carried out a study

on social determinants of agricultural productivity in hill farming systems with a case study spring maize productivity at Khamari Village, Gorkha, Nepal and the major suggestion/ recommendations to increase crop productivity includes the need of establishment of farmers level cooperative for agricultural inputs supply, effective extension service, soil conservation and fertility restoration. (Pradhan, 2003).

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter provides the way and design of actions taken in the study. This study has been based on the following methods;

3.1 Research Design

Since, it is the micro level study; this study was limited in exploratory research design to dig out its role of agriculture in poverty alleviation and together with its descriptive character. The former had applied to investigate the contribution of agriculture in poverty alleviation where as, later for analyzing the information obtained from the field and secondary sources. In addition, case study had been applied for households' survey.

3.2 Rationale of Selection of the Study Area

Urban agriculture is one of the major sources to reduce the hand to mouth problems prevailing in the urban sites. It contributes also to balance the environment in urban area as well as promotion of urban tourists.

-) Ichangunarayan 1, 2 and 3 are the semi urban areas where majority of the population engaged in agriculture.
-) There are various types of agricultural activities as off-season floriculture, vegetables, poultry farming, animal husbandry, paddy farming and others.
-) This VDC is composed different ethnic groups such a Newars, cherries, Tamangs and Dalits etc.
-) Furthermore, it is felt easy to collect data and carry out the study because the researcher is already well known to this area and it is accessible to the researcher to collect data. So, this site is selected.

3.3 Sampling Procedure

The area of this study is selected by applying purposive sampling. There are 600 HHs in three wards; out of them, 20, 24 and 20 households were selected as sample in ward no.

1, 2 and 3 respectively using simple random sampling method. In total, 64 HHs were taken as sample for this study.

3.4 Sources of data and information

The study is based on both primary and secondary source of data and information. The main sources of primary data include snowballing sample survey, key informant interviews and visual observations. The main sources of secondary data/information include reports, documents, maps, journals, books, etc published by various institutions and organizations.

3.5 Method of Data Collection

The study is based on the field survey. So, the data collection tools and techniques were as follows;

3.5.1 Household Survey

Household survey was conducted by using structured questionnaire to obtain detailed information about population characteristics like as age & sex composition, marital status, caste/ ethnic, religious, occupation and educational status etc.

Observation

Observation had been used to collect qualitative information like role of this UA in poverty alleviation. For this, the researcher had visited twice time during the research period. It had provided the geographical information as well as the real pattern of this occupation. It was followed using check lists.

3.5.3 Key Informant Interview and FGD

Key informant interviews and focus group discussions were conducted in the concerned subject, considering the VDC/ward representatives, leader farmers and school teachers as the key informants for this study. Key informants is used to dig out the prevailing problems in the sector. It is also important to trial the data agglomerated from the other sources.

Similarly, FGD as an essential technique of PRA was applied to generate the required data in the study. It was used in the local women divided in five groups.

3.6 Data Analysis

The data were collected through various sources using various data collection techniques and tools. The qualitative data had been analyzed and interpreted descriptively making the argument in logical way. The quantitative data were coded and the basis of nature of data and then presented in various tables by using simple statistical tool such as table, percentage, and figures with the help of simple computer programme.

CHAPTER - FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction to the Study Area

4.1.1 Physical Setting

Ichangunarayan Village Development Committee (VDC) is situated in the middle hill of the Central Development Region of Nepal. This area lies between 85°15'00" and 85°17'30" East Longitude and 27°42'30" to 27°45'00" North Latitude. It is located nearly 3km North-West to Kathmandu Metropolitan City. The VDC comprises moderate steep to very steep hills, the ridges and the valleys created by rivers flowing from north to south. Most of the areas are sloppy. The altitude ranges from 1300m to 1860m from mean sea level. There are few rivulets in the VDC. The Dholunge originates from Nagarjun forest, Ward No. 1 of this VDC in the North and flows to the South and meets Bishnumati Khola...

4.1.2 Climate and Hydrology

Ichangunarayan VDC, located within the Kathmandu valley, is characterized by typical monsoon climate and dry winter. Pre-monsoon season during March to May is mostly dry and warm. This period is characterized by hazy atmosphere with dusty winds. Later parts of this season brings down some precipitation with thunderstorms and is frequently associated with hailstorms. Over 80% of the total rainfall is encountered during monsoon period starting from early June and ending by late September. Post monsoon, starting from September to November is sunny and is mostly dry with gradually decrease in rainfall and temperature. Few spells of the rain are, however, brought down during winter from January to February.

At Kathmandu, the highest maximum average temperature was recorded during August (24.55°C). The minimum average temperature was recorded during January (11.12°C). The average precipitation was highest during July (1192.9mm) and lowest precipitation was recorded during December (9.3mm). This climate is also fitted for the installation of biogas in this VDC since the two decades.

4.1.3 Social Composition

There are 5459 population in this VDC according to CBS 2001. In case of sex, it is 50 percent female and rest are male. The composition of the population of this VDC has been diversified. The majority are Newars, Chhetries and Brameens and other are Tamangs, and dalits. Due to the various castes in this area, there are varieties of costumes and traditions. In case of the religion, Hindu are the dominant followed Buddhism and Christianity.

4.1.4 Infrastructure Facilities

Due to the low level of literacy rate and a great land slides, there has been how developing its infrastructures. Such as, health, education, electricity, communication course, road, market access etc. Since the VDC is nearest to the district headquarter, various NGOs, GOS and INGOs are working there to kick out the prevailing problem.

4.1.5 Educational Status

Education plays vital role in overall aspect of human life. The literacy rate age above 6 years of Ichangunarayan VDC is 67 percent. In Ichangunarayan VDC, there are 9 public schools and 3 private schools. Among the 9 public schools, four lower secondary schools, four primary schools & one Higher Secondary School. There is a great opportunity for people to study in this VDC gradually this VDC is going to transform into educational centre which is good icon for farther economic development.

4.1.6 Occupation

The majority of population of this VDC is based on agriculture. Mix type of agricultural activities is practiced in this VDC. Beside this, the population are engaged in government and private services, foreign employment, wage labours and so on.

4.1.7 Agriculture Land

The VDC has contained a suitable land for agriculture purpose. The land is composed of very fertile plain land in middle part in wards 1, 2 and 3. Middle part of it is made for seasonal cash crops such as floriculture, ginger, carrot, vegetable; because, this area has

irrigation water for those crops. Livestock raising is also an important part of the agriculture which is source of manure, milk, meat etc. Mainly cows, buffalo, Ox, goats, chickens are the major species of livestock raised in the study area.

4.2 Data Analysis and Interpretation

The study explains the urban agriculture as the means of increasing income, employment and nutrient supply including socio-economic and institutional implication. This also analyzes the attitudes of the urban people with regard to increasing agricultural production, with identification of the organizations involved in supporting to agricultural development activities in Ichangunarayan area. The major highlights of the study include the following.

4.2.1 Household size and types of houses

The study shows that the overall average family size in the sampled households in the study area was 5.75 people per household. The study reveals that the majorities of the houses in the study area include the zinc sheet roofing houses (46.91%), followed by RCC/RBC (34.57%) and tiled roofing (13.58%) types. Table 4.1 shows the major housing types (roofing patterns) in the study area.

Table 4.1.

Housing types (roofing patterns) of the farm households in the study area.

House Types	No. of HHs	Percentage
RCC/RBC	32	50
Zinc sheet roofing	26	40.62
Straw (Khar/Seula) roofing	0	-
Khapta roofing	0	-
Tiled roofing	6	9.38
Total	64	100

Source: *Field Survey, 2010.*

) The total numbers of houses exceed the number of HH surveyed as some families have more than one house of same or different types.

The above table mentions that 50 percent of the total respondents have RCC/RBC housing pattern followed by the 40.62 percent of the Zinc sheet roofing. The rest of the sampled 6 HHs have tiled roofing houses. It shows also the characteristics of the urban settlement.

Assessment of the awareness level of farmers on improved agricultural technology in the study area indicates that majority of the farm families are not trained in modern agricultural techniques. Figure 5.1 describes the comparative awareness level of the farm families in the study area on improved agricultural technology.

Figure no.4.1 Comparative awareness level of the farm families

Very few farm family members have obtained training on modern agricultural technology. The subjects at which they obtained training include goat/sheep farming, mushroom cultivation, vegetable production, beekeeping and so on. The institutions or

agencies providing training to the farmers in the study area include DADO/ DLSO, Women Development Office, Village Development Committees, etc. And, it was found insufficient in this sector. The local people desired to take training based on floriculture business.

4.2.2 Employment pattern

Based on observation, the variation in employment (%) was computed and farmers' responses in this concern were analyzed. The principal sectors of employment in the study area were agriculture, service sector, trade/business, waged labor and foreign employment. Table 5 describes the gender wise comparative employment patterns of the farm families in the three selected pockets under the study.

Table 4.2.
Employment patterns of the farm families in Ichangunarayan, 2009.

Sector	Variations in employment (%)								
	Ward no.1 (HH = 20, n = 190)			Ward no. 2 (HH = 24, n = 161)			Ward no. 3 (HH = 20, n = 145)		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Agriculture	25.26 (48)	25.79 (49)	51.05 (97)	29.81 (48)	22.36 (36)	52.17 (84)	25.52 (37)	20.69 (30)	46.21 (67)
Service sector	2.10 (4)	4.21 (8)	6.31 (12)	1.24 (2)	1.24 (2)	2.48 (4)	0.00 (0)	3.45 (5)	3.45 (5)
Trade/business	1.58 (3)	4.44 (4)	3.68 (7)	1.24 (2)	4.35 (7)	5.59 (9)	0.00 (0)	0.69 (1)	0.69 (1)
Waged labor	1.05 (2)	7.37 (14)	8.42 (16)	0.00 (0)	7.45 (12)	7.45 (12)	1.38 (2)	8.97 (13)	10.35 (15)
Foreign employment			3.16 (6)			4.35 (7)			1.38 (2)

-) HH= The total number of household surveyed;
-) n = Total population surveyed.
-) The figures in the parentheses are the total observed figures.
-) Percentage figures indicate the percent of total population surveyed.

The hypothesis regarding to difference in employment patterns in terms of 5 employment options (agriculture, service sector, trade/business, waged labor and foreign employment) was tested applying Chi square test, fitting the observed occupational data into 5X3 contingency table (Appendix 4). The observed χ^2 value was not significant at 5% level (Observed χ^2 value 11.036; table value of χ^2 at 5% level and 8 degrees of freedom 15.51). The analysis, thus, comes to the conclusion that the variations in employment

opportunities in terms of agriculture, service sector, trade/business, waged labor and foreign employment, in general, was not significant in the three selected urban pockets. Thus, the study reveals the substantial role of women in the urban farming system in Ichangunarayan area, which is likely with the study results reported by . And, likely with the report of the findings supports the hypothesis that differences in gender and ethnic roles need to be accounted for urban agricultural policy formulation and planning.

4.2.3 Landholding pattern

Land is the major source on Nepalese people. It is stable type of property transfer from generations to generations. Land plays vital role to erect the community economy. In case of study area, maximum size of landholding was observed to be 20 Ropany and most of the land was un-irrigated upland. Landholding pattern in the three pockets of study area has been comparatively described by means of a bar diagram as under (Figure 4.2).

Figure 4.2 Average landholding patterns in the three pockets of Ichangunarayan area.

Source: Field Survey, 2010.

This above figure reveals that majority of the respondents have their own land to cultivate. There is little portion of rented land holders in agricultural activities. So, this

area is rich in cultivating own land. It is because of the feeling of hesitation to cultivate land of others even if they are landless.

4.2.4 Attitude of the Urban People towards Agricultural Occupation

The variations in the employment patterns of the urban people in terms of agriculture and non-agricultural occupation functions revealed from the study has been described earlier and presented in the Table 4.3 Farmer's responses with regard to agriculture as a profession were tested by collecting and analysis of data on their engagement pattern in agriculture. Majority of the farmers responded that agriculture was the principal source of income and employment for their family. Table 4.3 describes the variation in the responses of the farmers in this regard as revealed by the study.

Table 4.3

Farmers' Responses to Agriculture in terms of Employment.

Response to agriculture	Frequencies of farmers (%)			
	Ward no 1 (n=20)	Ward no 2, (n= 24)	Ward no 3, (n =20)	
As full employment	35.00 (7)	54.17 (13)	55.00 (11)	
As partial employment	50.00 (10)	41.67 (10)	45.00 (9)	
As additional income source	10.00 (2)	4.17 (1)	0.00 (0)	
As means for using spare time	5.00 (1)	0.00 (0)	0.00 (0)	

Source: *Field Survey, 2010*

The hypothesis regarding to difference in agriculture in terms of income and employment was analyzed. The analysis, thus, comes to the conclusion that the access to facilities including road and market is conducive to the farmers for searching other alternatives to agricultural occupation. As a result, there might be low percentage of households having agriculture as full employment and more people adopt agriculture as partial employment but market oriented production. Contrary to this, if the pocket is isolated with less access to facilities required, higher percentage of people remain in subsistence agriculture with lesser search for other alternatives and market oriented production.

4.2.5 Major crops and cropping pattern

The major crops grown observed and reported in the study area include paddy, wheat, maize, potato, sugarcane, millet, chilly, onion, garlic other vegetables and very few fruits. In Ichangunarayan area, very few fruit crops were observed. where some farmers are growing some fruits. Relatively, the crops observed or reported to be grown in the three pockets studied in Ichangunarayan have been presented in figure 5.3. Major cropping patterns being adopted in the study area has been presented in Table 5.4.

Figure 4.3. Major crop types grown in Ichangunarayan area.

Ward no. 1	<p>Millet</p> <p>Sugarcane</p> <p>Chilli</p> <p>Onion</p> <p>Vegetables</p> <p>Garlic</p> <p>Fruits</p>
Ward no. 2	<p>Maize</p> <p>Millet</p> <p>Tomato</p> <p>Vegetables</p> <p>Papaya</p> <p>Wheat</p> <p>Potato</p> <p>Citrus Fruits</p> <p>Peach/plum</p> <p>Onion</p> <p>Garlic</p>
Ward no. 3	<p>Maize</p> <p>Millet</p> <p>Onion</p> <p>Garlic</p> <p>Fruits</p> <p>Vegetables</p> <p>Chilli</p>

Table 4.4

Major cropping patterns adopted by the farmers in Ichangunarayan.

Study Area	Major Cropping Patterns	
	Lowland	Upland
Ward no. 1) Paddy - Wheat) Paddy – Wheat – Maize) Maize– Paddy (Ghaiya)- Millet) Maize – Vegetables) Maize – Millet, Flowers
Ward no. 2) Rice – Wheat) Paddy – Vegetables) Paddy – Wheat - Potato) Maize – Millet) Maize - Paddy (Ghaiya)) Fruits (Citrus fruits, Papaya, Peach/Plums, Pear, etc.), Flowers
Ward no. 3) Paddy – Wheat) Paddy – Potato) Maize – Millet) Maize – Wheat , Flowers,

The above table mirrors that the major crops production pattern in the study sites. Paddy is the major crops of these sites. It also clears that three wards produced mixed types of crops. It can be also concluded that there is the integrated farming as a whole. Besides other crops, floriculture is one of the most wanted jobs for the local people from which they maintain their child education.

4.2.6 Livestock and Poultry Production

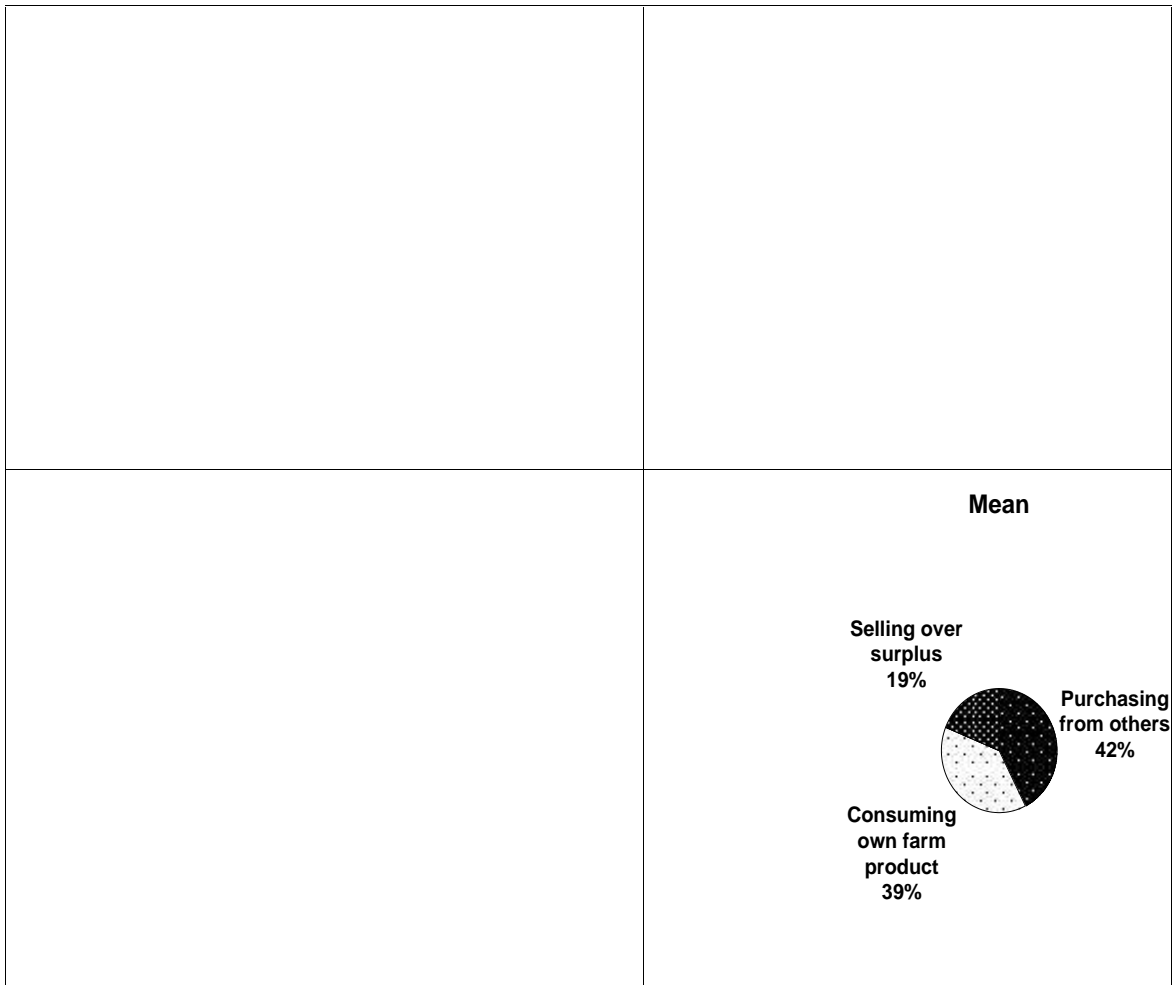
Major livestock and birds domesticated in Ichangunarayan area include buffalo, cattle, goat, sheep, poultry and ducks. Based on the observation, relative abundance of different animals and birds domesticated in the three study pockets of Ichangunarayan area has been one of the typical features in this site for tourists.

4.2.7 Supply of Nutrition to the Urban Farmers

The study shows that 39% of the urban farmers fulfill their nutrition requirements from their own farm products and 19% of the farm families are selling over their surplus farm

products. And, the remaining 42 percent are fulfilling their nutrition purchasing from other farmers. The figure 4.4 shows it more clearly;

Figure 4.4. Contribution of Farm Products in the Nutritional Supply of Urban Farmers.



Source: Field Survey, 2010.

The survey reveals that 15.6% of the farmers in the study area have not knowledge about nutrition requirements. The observed data on the nutrient supply patterns to the urban farmers strongly supports the hypothesis that nutrient required to the poor urban farmers are basically supplied from the farm products. Table 5.5 describes the patterns of nutrition supply to the urban farmers in the study area.

Table 4.5**Patterns of Nutrition Supply to the Urban Farmers in the Study Area.**

Nutrient Supply Pattern	Maximum Occurrence (%)			
	Ward no 1 (n = 20)	Ward no 2 , (n = 24)	Ward no. 3, , (n = 20)	Mean
Purchasing from others	68.30	75.00	83.67	75.38
Consuming own farm product	56.70	72.00	75.00	68.20
Selling over surplus	25.00	43.06	30.00	33.33

The study shows the general patterns of nutritional supply to urban farmers in Ichangunarayan VDC. Similar type of study carried out in Chitwan suggests that social and economic variables such as size of landholding, income and employment structure of households are positively related to the nutritional status .

4.2.8 Resource Recycling Pattern in Agriculture

Resource recycling pattern in the three selected urban agriculture pockets were analyzed based on the observed, especially on the farmers' practice on bio-gas, composting toilet, vermin-composting practice, in-situ manuring practice and waste water utilization. Resource recycling index (RRI) has been determined and presented in Table 5.6

Table 4.6**Resource Recycling Practices in Agriculture Observed in Ichangunarayan, 2009.**

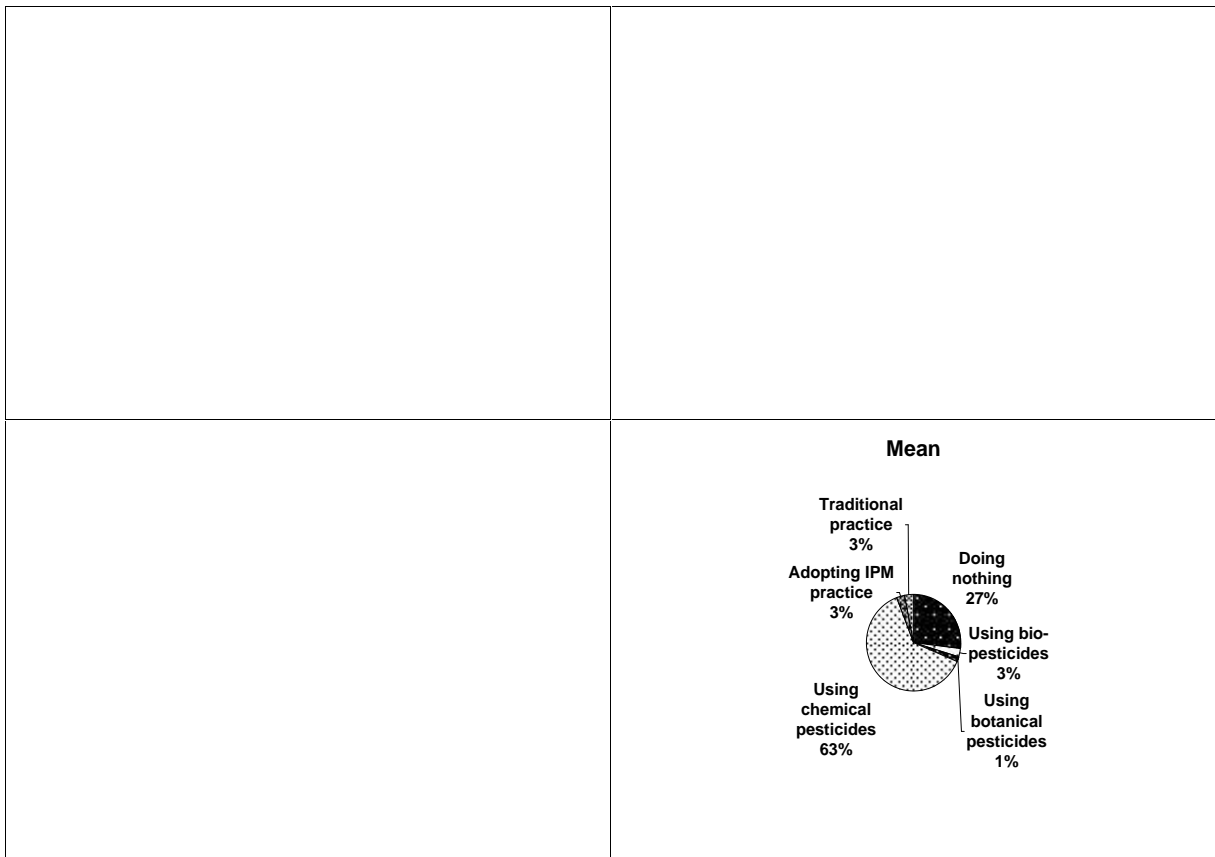
Resource Recycling Agricultural Functions	Practiced Household (respondent %)			Mean (%)
	Ward no 1 (n = 20)	Ward no 2 , (n = 24)	Ward no. 3, , (n = 20)	
Biogas use	10.0 (2)	8.3 (2)	0.0 (0)	6.3 (4)
Composting toilet	35.0 (7)	4.2 (1)	5.0 (1)	14.1 (9)
Vermin-compost use	0.0 (0)	0 (0)	0.0 (0)	0.0 (0)
In-situ manure use	5.0 (1)	0 (0)	0.0 (0)	1.5 (1)
Household waste water utilization	35.0 (7)	58 (14)	60.0 (12)	48.4 (31)
Resource recycling index (RRI)	17.0 (0.17)	14.1 (0.141)	13.0 (0.13)	14.0 (0.140)

Source: *Field survey 2010.*

4.2.9 Crop Pest Management Practice

The analysis farmers' responses in terms of crop pest management practice adopted by them in the study area indicates that majority of the farmers (65.8%) use chemical pesticides to control crop pests and diseases. Whereas, 29.6% farmers do nothings for pest management and very few farmers are adopting IPM (Integrated Pest Management) practice (Figure 5.5).

Figure 4.5. Crop Pest Management Practices in Ichangunarayan.



4.2.10 Production Trend in Agriculture

Agricultural productivity in the study area seems to be decreased as compared to the production in the past. Among the 64 farm households surveyed, 75% of the farmers responded that their farm production is in decreasing trend. Whereas, 12.5 % responded that agricultural production is increasing, and, 12.5% responded that there is no any

change in agricultural productivity. The comparative responses of the farmers' with regard to production trend in agriculture in the three pockets have been depicted in the

4.2.11 Agricultural development services and facilities

Agricultural service and facilities available in the three selected study pockets was comparatively analyzed based on observation and discussion, especially in terms of facilities and services. The development of the study area was measured and analyzed in terms of infrastructure index, which was built on the basis of logical expression of 1 and 0 for the presence and absence of the facilities respectively. Thus, based on the infrastructure index observed, Ichangunarayan 1, 2 and 3 were comparatively better facilitated area among the three pockets, whereas ward no. 2 was observed and grouped as least facilitated.

4.2.12 Organizations Supporting to Agriculture

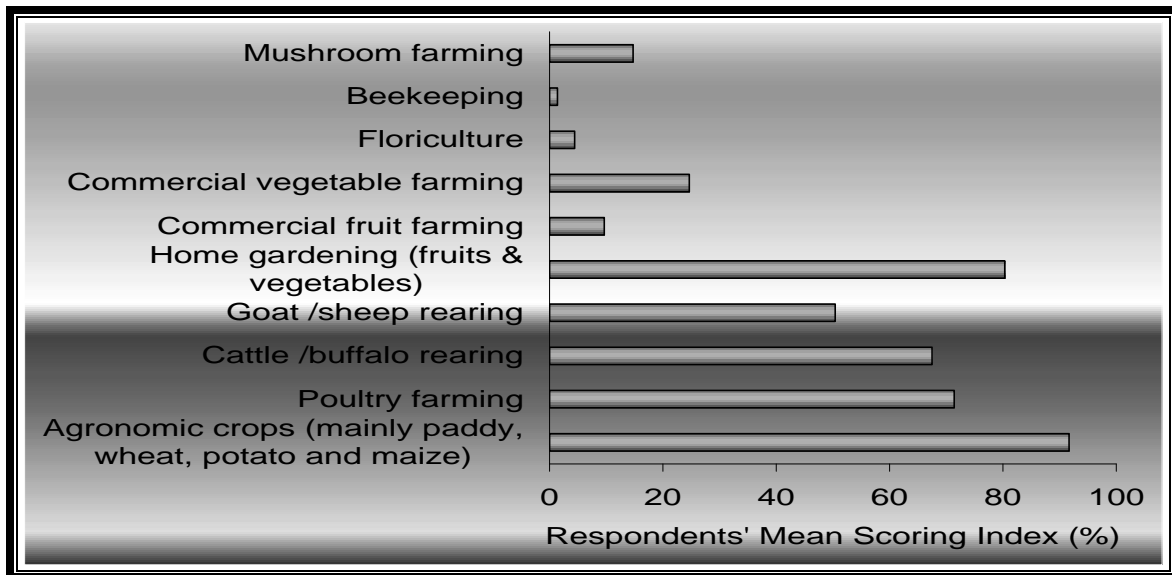
Different governmental and non-governmental organizations are involved in supporting agriculture development activities in the urban periphery. The study reveals that the major governmental institutions supporting to agricultural development in Ichangunarayan includes Agricultural Service Center (ASC/DADO) and Livestock Service Center (LSC/DLSC). However, due to the present conflict conditions, the service provided by the governmental institutions seems to be very limited. As the local governmental institutions, Village Development Committees (VDCs) also support to agricultural development activities in Ichangunarayan, especially in providing training and other service supports to promote agricultural development. Besides, different NGOs, including UNICEF and Plan International, also conducted different support programs for agricultural development in the past. At present, no significant impacts of NGOs were observed. At local level, different clubs, Guthies, Women Groups and Cooperatives, Community Forest User Groups, Local Saving and Credit Cooperatives and so on are presently involved in supporting, awareness and self-help activities in the study area.

The study analyzed the access of agricultural extension services, organizations and infrastructures for local farmers to facilitate their farming activities. In the overall scenario, very limited institutional and infrastructural supports to the local people were reported. Thus, the study shows that the access to organizations, institutions and infrastructures related to agricultural development in Ichangunarayan are limited only in the urban center. The farmers in the hinterlands and isolated pockets are still disadvantaged and excluded.

4.2.13 Agricultural Integration Potentials

The study reveals that there are immense potentialities for agricultural development in Ichangunarayan if the resource base, institutions and infrastructures required organized properly in a coordinated and consolidated manner. However, the present agricultural scenario in the location seems to be traditional. Modern agricultural technologies are not so much introduced and/or adopted in Ichangunarayan. Based on observation and collection of farmers' response, the present study analyzed the integrated agricultural development potentialities in the area. Figure 4.6 indicates the overall integrated agricultural development potentialities in the study area.

Figure 4.6. Agricultural Potentiality Indices in Ichangunarayan Based on Farmers' Responses



Source: Field Survey, 2010.

Moreover, Table 4.7 describes the comparative potentials of agricultural integration in the three selected study areas based on farmers scoring indices in the respective agricultural component enterprise. The study shows that the highest potentiality in the areas include growing agronomic crops (mainly paddy, wheat and potato and maize), followed by integrating livestock and poultry farming.

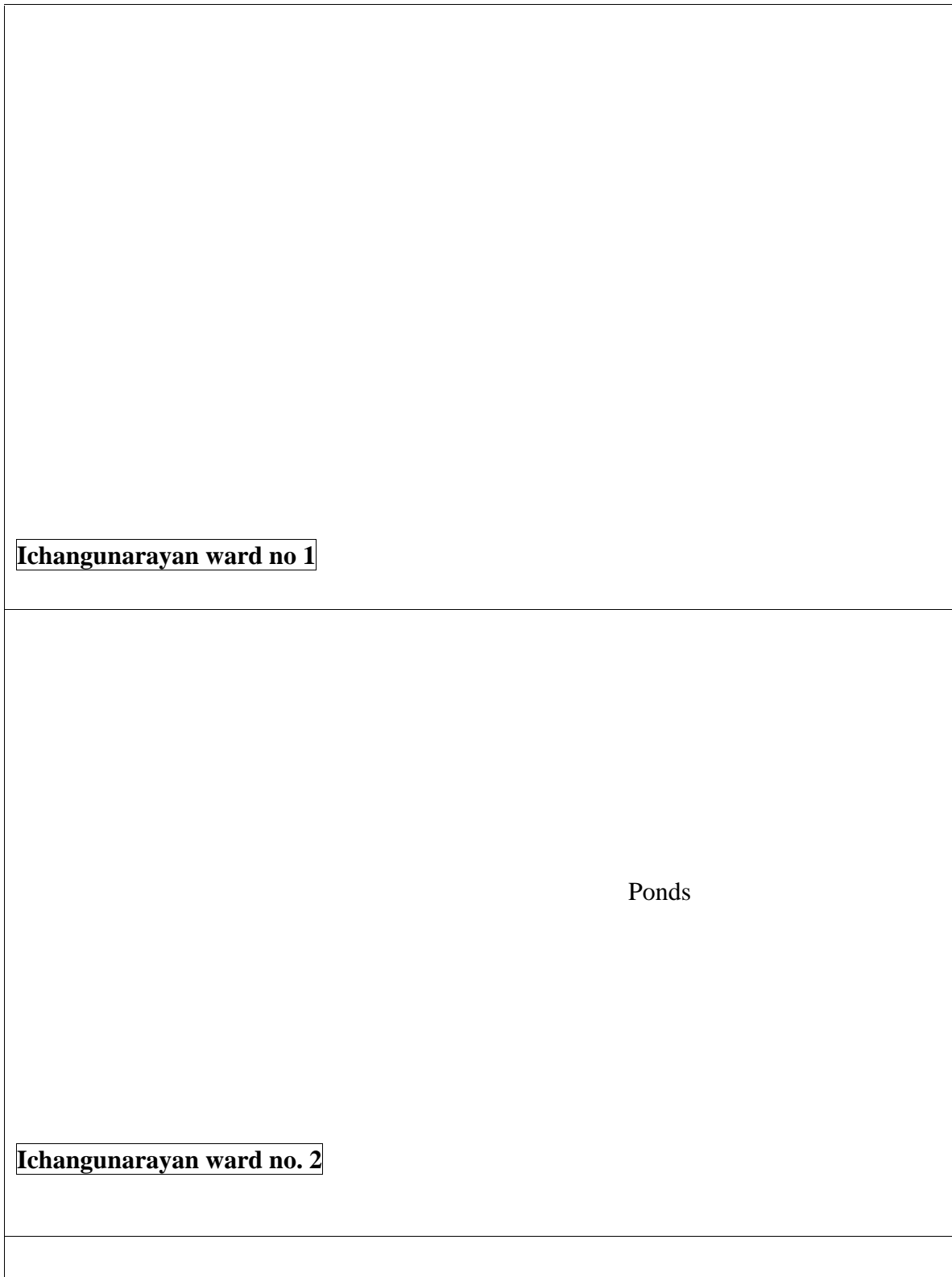
Table 4.7
Agricultural Integration Potentials in the Ichangunarayan area.

Agricultural Enterprises	Observed Score (Respondent %)			
	Ward no 1 (n = 20)	Ward no. 2 , (n = 24)	Ward no. 3 , (n = 20)	Mean
Agronomic crops (mainly paddy, wheat, potato and maize)	75.00	100.00	100.00	91.66
Poultry farming	70.00	79.20	65.00	71.40
Cattle /buffalo rearing	65.00	75.00	62.50	67.50
Goat /sheep rearing	52.5	56.25	42.5	50.40
Home gardening (fruits & vegetables)	80.00	91.00	70.00	80.33
Commercial fruit farming	0.00	29.20	0.00	9.66
Commercial vegetable farming	30.00	29.00	15.00	24.66
Floriculture	5.00	8.30	0.00	4.43
Beekeeping	0.00	4.20	0.00	1.40
Mushroom farming	35.00	4.20	5.00	14.73

4.2.14 Analysis of Surrounding Environment

The observation of the surrounding environment in Ichangunarayan seems to be pleasant as the location lies to nearby Nagarjun forest (National park) area. However, the traditional agricultural activities in the Ichangunarayan area, at the same time, have been causing pollution and degradation of the surrounding environment. Due to haphazard agricultural practices and unmanaged systems, the city is being reportedly polluted and degraded.

Figure 4.7. Major Environmental Components Causing Crucial influences to Surrounding Environment in Ichangunarayan.



Ichangunarayan ward no 3

4.2.15 Agricultural Problem Intensity and Development Priority

Ranking of problems related to agriculture was carried out from farmers' perspective through 1-7 point based scoring, followed by marking with scoring index has been presented in Table 5.8. Inadequate irrigation facility was ranked as the most crucial problem related to agriculture in Ichangunarayan, followed by lack of agro-inputs, technical problems and decreased interest of people in agriculture. Unlikely to this Tulachan *et al.* (1983) presented the main constraint of foods and fodders for livestock and the problems of diseases and parasites.

The farmers' priority to different development functions in the study area as determined by means of priority scoring from the respondent farmers based on 1-6 point scoring and indexing with regard to the respective development function(s) shows that agriculture was the first priority of the respondents for the livelihood and development in the study area. Table 5.9 describes the farmers' priority to different development functions in the different studied pockets and Figure 15 depicts overall development priority by the farmers in the Ichangunarayan area.

Table 4.8

Intensity of Problems in Agriculture from Farmer' Perspectives in Ichangunarayan.

Problem Related to Agriculture	Average Marks (Based on 1-7 Scores Index)			Mean Marks	Problem Rank
	Ward no 1 (P ₁), n=20	Ward no 2 (P ₂), n=24	Ward no 3 (P ₃), n=20		
Irrigation problem	7.0	6.1	6.9	6.6	1
Marketing problem	2.3	3.7	3.5	3.2	5
Lack agriculture inputs	4.5	5.6	4.4	4.9	2
Technical problem	4.9	4.3	4.3	4.5	3
Decreased interest in agriculture	4.3	3.1	4.4	3.9	4
Financial problems	3.2	2.2	3.1	2.8	7
Inadequate road network	1.3	2.8	4.5	2.9	6
Total marks	27.5	27.8	31.1	28.8	
Agricultural Problem Index, API (%)	56.1	56.7	63.5	58.8	

Source: *Field Survey, 2010.*

Figure 4.8 Respondents' Priority for Different Development functions in Study area.

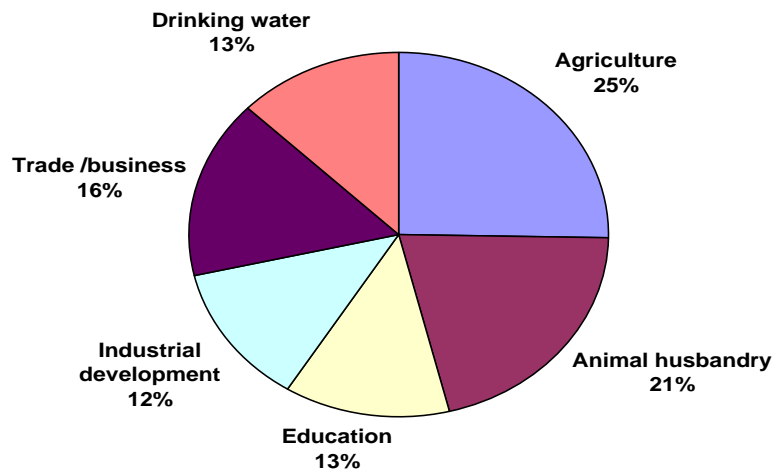


Table 4.9**Farmers' Priority to Different Development Functions in Study Site**

Development Functions	Average Marks (based on 1-6 scores)			Mean Score (Marks)
	Ward no 1(P ₁), n=20	Ward no. 2 (P ₂), n=24	Ward no. 3 (P ₃), n=20	
Agriculture	4.7	5.6	5.1	5.1
Animal husbandry	3.4	4.7	4.3	4.2
Education	2.8	2.5	2.5	2.6
Industrial development	3.9	2.3	1.6	2.5
Trade /business	4.5	3.0	2.2	3.2
Drinking water	2.4	1.8	3.9	2.6
Road	1.4	2.9	4.9	3.1

For instance, the correlation between the selling over surplus agricultural products and the landholding by the farmers was observed overwhelmingly significant. Likewise, farm occupation was observed as highly significantly correlated positively with the family size. It means to conclude that if the family size is large and there are no better non-farm employment opportunities, the people remain in the agriculture sector for their livelihood. At the same time, more interestingly it was observed that farm and non-farm occupations were also correlated in positive direction which indicates that non-farm occupations can be created only if there is developed condition of farming. In terms of the priority to agriculture sector, highest and positive r-value was observed with size of rented land and not with the owned land.

It lends to the conclusion that the people who have large sized owned land were not interested to engage in agriculture. Those who were still engaged in agriculture were the landless and the marginal farmers. The engagement was more compelling for subsistence rather than their interest. However, the priority of the respondents was not significantly correlated with none of the parameters observed in this case. It means that the factor which determines the priority to agriculture might be other than the above factors under observation.

CHAPTER: FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The present study has assessed and analyzed urban agriculture in Ichangunarayan, Kathmandu for its contribution to the economic well-being of urban and peri-urban farmers for their livelihood and poverty reduction. It examined the role of urban agriculture to generate employment, nutritional supply and socio-economic implications. This also analyzed the attitudes of the urban people with regard to increasing agricultural production, with identification of the organizations involved in supporting to agriculture development activities in the study area.

Ichangunarayan is an ancient city highly potential for the development of urban agriculture. Based on the observed scenario, market oriented agricultural production in Ichangunarayan at present includes vegetables, milk and poultry products. At the same time, there is an immense potentiality in Ichangunarayan for the development of beekeeping, mushroom farming, cereal production, goat and sheep farming, fruits and vegetable farming and floricultural enterprises. However, there are some problems in order to grasp with such potentialities. The most critical problems of agricultural development include the inadequate irrigation facilities, less developed road network and infrastructural facilities including storage structures and inadequate technical support to the farmers.

The study indicates that all the farmers in Ichangunarayan are mainly dependent on agrochemicals (chemical fertilizers, and pesticides) for crop production and concept of organic farming has not been introduced. But, with the increased standards of living and awareness to health and environmental concerns, questions are being raised regarding the quality of agricultural products. In this regard, agriculture in Ichangunarayan need to avoid crop contamination, environmental pollution by farming practices in order to attract urban consumers with better health and environment. At the same time, national policy makers need to develop a sustainable food growing policy, encompassing

financial, technical and other supports, including research, for promoting urban agriculture, specially for reducing urban poverty through urban food security and employment generation. The strategies are needed to further promote private initiatives in urban farming. Measures such as irrigation, technology extension, cheap credit for agriculture, promotion of foreign investment in the processing of local agricultural production and reduction of production risks can support the process of stabilizing private urban farming. More specifically, based on the present study, the following recommendations are made to promote urban agriculture in Ichangunarayan for enhancing employment and urban food security.

5.2 Conclusion

Based on the existing scenario, one of the most frequently practiced agricultural enterprises in Ichangunarayan is the growing agronomic crops, specially paddy, wheat, potato and maize, mainly in a subsistence manner. This study has derived the following findings;

-) More than 80% farm households have home garden, but only for family consumption of fruits and vegetables.
-) In spite of its higher potentiality, very few farmers in Ichangunarayan produce fruits and vegetable for market purpose.
-) Livestock, mainly buffalo, cow, goat farming, poultry production and floriculture are highly potential in the area.
-) Integrated development of crops, livestock and poultry, market oriented organic vegetable production, fruit growing, sustainable community forest management and beekeeping seems to be highly potential in Ichangunarayan for maintaining agricultural productivity, sustainability and conservation of biodiversity, enhancing urban food security and employment.
-) Majority of the HHs are Newars and the educational status of this area is satisfactory.

-) Most of the people of this area are engaged in agriculture and allied activities. However, there is a lack of desired level of irrigation which in turn, has negative impact on agriculture business.
-) In fact, urban agriculture can be one of the most appropriate means to alleviate the urban based poverty in this area.

5.3 Recommendations

The following points are derived as recommendations for the further research and development studies on urban agriculture in Ichangunarayan area.

- Irrigation is the major problem of agricultural production in Ichangunarayan as reported by the farmers. In the ward no 1, although there is irrigation canal including *Rajkulo*, irrigation water is inadequate. In Ichangunarayan, the problem of irrigation is more critical. So, studies are needed to promote irrigation facilities through utilizing surface and underground water sources.
- Beekeeping is no more practiced in Ichangunarayan area. But, beekeeping promotion is also potential in the area if integrated with horticulture, seed production and forest development. As Ichangunarayan is nearby Naggarun forest, wild beefloral resources are also adequately available around the location. Further studies regarding apicultural promotion are imperative in the area.
- Organic farming, including market oriented organic vegetable farming should be promoted in Ichangunarayan to attract the urban consumers and the agro-tourists. Farmers need to be trained in organic practices, such as composting, vermin-composting, green manuring, etc.
- Fruit farming practice is very low in Ichangunarayan. Fruits such as lemon, pear, peach, plum, straw berry, etc. can be kept under in-depth research.
- Few farmers practice mushroom farming and they are interested in mushroom cultivation commercially, but they reported lacking in technical know how on it.

So that DADO/ASC and other concerned institutions should conduct studies, training and extension programs on mushroom farming in Ichangunarayan.

- Agro-processing and storage facilities are lacking in Ichangunarayan. Considering farmers' needs and possibilities, studies are needed towards establishment of agro-product processing and storage structures.
- Agricultural extension service seems to be no more effective in Ichangunarayan. DADO and DLSO should functionalize Agricultural Service Center and Livestock Service Center in Ichangunarayan with appropriate group and cooperative mobilization, co-ordination with other institutions involved in agriculture and financial supports. Access to improved agricultural inputs, such as quality seed, should be improved as needed to the local farmers.
- Local Governmental Institutions (VDCs/ DDC) should also implement policies and programs for promoting sustainable urban farming towards market oriented organic production systems in coordination with concerned institutions. Further policy research and developmental studies are requested to alleviate poverty through the development of commercialized urban agriculture in Ichangunarayan VDC.

REFERENCES

- APROSC and JMA (1995). *Agricultural Perspective Plan, 1995-2015*. National Planning Secretariat, NPC/HMG-Nepal.
- Armar-Klemesu, M (2000). *Urban Agriculture and Food Security, Nutrition and Health*. Bakker, N, M. Dubbeling, S. Gundel, U. Sabel-Koschella and H. Zeeuw (eds.), Growing Cities, Growing Food: UA on the Policy Agenda. Proff offsetdruck, D-82547 Eurasburg. DSE/ SIDA/ CTA,/ GTZ/ ACPA.
- Bhattarai, B.R. (2003). *The Nature of Underdevelopment and Regional Structure of Nepal*. Adroit publishers, Delhi-110053.
- Bourque, M (2000). *Policy options for urban agriculture*. In: Bakker *et al* (eds.), Growing Cities, Growing Food: UA on the Policy Agenda. DSE/ CTA/SIDA/GTZ. Proff offsetdruck, D-82547 Eurasburg.
- Bowyer-Bower, T and D. Drakakis-Smith (1996). *The Needs of the Urban Poor Versus Environmental Conservation: Conflict in Urban Agriculture*. Research Report: ODA Project R5946, London.
- CBS (2004). *Nepal in Figures 2004*. Central Bureau of Statistics, Thapathali, Kathmandu, Nepal.
- DADO (2005). *Barsik Krishi Bikas Karyakram Tatha Uplabdhii Ek Jhalak* (FY 060/61), District Agriculture Development Office, Kathmandu, Nepal.
- DDC (2005). *District Profile Analysis: Kathmandu*. District Development Committee, Kathmandu, Nepal (FY: 2062/062 BS).
- Devkota, F. R. (2004). *Agriculture and Sustainable Development: Conceptual Approach*. Nepalese Journal of Development and Rural Studies, Vol. 1, No. 2 (Jul-Dec, 2004).
- Devkota,R and Ghimire B(2005). *Challenge of Agriculture in Nepal*, Ratna Pustak Bhandar, Kathmandu.
- Foeken, D and A.M. Mwangi (2000). *Increasing Food Security Through Urban Farming in Nairobi*. Bakker *et al* (eds.), Growing Cities, Growing Food: UA on the Policy Agenda. Proff offsetdruck, D-82547 Eurasburg.
- Garnett, T. (2000). *Urban Agriculture in London: rethinking our food economy*. Bakker *et al* (eds.), Growing Cities, Growing Food: UA on the Policy Agenda. Proff offsetdruck, D-82547 Eurasburg.
- Jacobi, P., J. Amend and S. Kiango (2000). *Urban Agriculture in Dare Salaam*. Bakker *et al* (eds.), Growing Cities, Growing Food: UA on the Policy Agenda. Proff offsetdruck, D-82547 Eurasburg.

- Joshi, S. (2006) *Agriculture Production in Nepal . . A Case Study of Ilam District*. Unpublished M.A. Dissertation Submitted to Central Department of Economics, TU., Kirtipur
- Kuchelmeister, G (1997). *Urban Agriculture in Dry lands: Urban trees in arid landscapes* (Internet search). <http://ag.arizona.edu>.
- Kaini, R. K. (2003), *Agriculture and Urban Lifestyles*. Aditya Publication, Nepal.
- Lekhak, H.D. and B. Lekhak (2003). *Natural Resource Conservation and Sustainable Development*. Kshitiz Publication, Kirtipur, Kathmandu, Nepal.
- Maxwell, D.; C. Levin and J. Csete (1998). *Does Urban Agriculture Help to Prevent Malnutrition? Evidence from Kampala*. FCND Discussion Paper 43. Washington.
- Mbiba, B (2000). *Urban Agriculture in Harhare: between suspicion and repression*. Bakker *et al* (eds.), *Growing Cities, Growing Food: UA on the Policy Agenda*. Proff offsetdruck, D-82547 Eurasburg.
- Mougeot (2000). *Urban Agriculture: definition, presence, potentials and risks*. Nico Bakker *et.al*. (eds.) *Growing Cities, Growing Food: UA on the Policy Agenda*. Proff offsetdruck, D-82547 eurasburg (PP 1-42). DSE/ SIDA/ CTA,/ GTZ/ ACPA.
- Mwalukasa, M (2000). *Institutional Aspects of Urban Agriculture in the City of Dar Es Salaam*. In: Bakker *et al* (eds.), *Growing Cities, Growing Food: UA on the Policy Agenda*. DSE/ CTA/SIDA/GTZ. Proff offsetdruck, D-82547 Eurasburg.
- Novo, M.G. and C. Murphy (2000). *Urban Agriculture in the City of Havana: a popular response to a crisis*. Bakker *et al* (eds.), *Growing Cities, Growing Food: UA on the Policy Agenda*. Proff offsetdruck, D-82547 Eurasburg.
- NPC (2002). *Tenth Plan (2002-2007)*. National Planning Secretariat, NPC/HMG-Nepal.
- Pokhrel, P.(2005).*Relationship between Poverty and Agriculture. . A Case Study of Dang District*. Unpublished M.A. Dissertation Submitted to Central Department of Economics, TU., Kirtipur
- Pradhan, P.K. (2004). *Population Growth,Migration and urbanization: environmental consequences in the Kathmandu Valley, Nepal*. John D. Unruh *et al*. (eds.), *Environmental change and its implication for population migration*. Kluwer Academic Publishers, London.
- Pradhan, P.K. (2005). *Policy issues in urban-rural linkage in rural development in Nepal: empirical study of two medium sized towns*. Nepalese Journal of Development and Rural Studies. Vol. 2, No. 1.

- Pradhan, P. K. (2003). *A manual for rural urban linkage and rural development analysis*. New Hira Books Enterprises, Kirtipur, Kathmandu.
- Purnomohadi, N (2000). Jakarta: *Urban Agriculture as an Alternative Strategy to Face the Economic Crisis*. Bakker *et al* (eds.), Growing Cities, Growing Food: UA on the Policy Agenda. Proff offsetdruck, D-82547 Eurasburg.
- Shrestha, B. (2005). *Problem of Nepalese Agriculture. A Case Study of Bhaktapur District*. Unpublished M.A. Dissertation Submitted to Central Department of Economics, TU., Kirtipur
- Shrestha, S.S. (2004). Foreword. *In Agricultural Marketing Information Bulletin* (Special Issue -2004). Marketing Development Directorate, DOA/MOAC, Government of Nepal.
- Thapa, G. (2001). *Income Inequality in Rural Nepal: an Empirical Analysis*. J. Inst. Agric. Anim. Sci. 12:63-72.
- UNDP (1996). *Urban Agriculture: Food, Jobs and Sustainable Cities*. Volume 1. Habitat II Publication series. New York: UNDP.
- Upreti, G, J. P. Dutta, K. R. Adhikari, D. P. Ghimire, N. N. Joshi, T. B. Khatri-Kshetri and A. Sukla (2001). *Effect of Rehabilitation and Improvement Programs on the Performance of Farmer Managed Irrigation System in East Rapti Irrigation Project Area of Chitwan*. J. Inst. Agric. Anim. Sci. 21-22:55-74.
- Zeeuw, H, S. Gundel and H. Waibel (2000). *The Integration of Agriculture in Urban Policies*. Bakker, N, M. Dubbeling, S. Gundel, U. Sabel-Koschella and H. Zeeuw (eds.), Growing Cities, Growing Food: UA on the Policy Agenda. Proff offsetdruck, D-82547 Eurasburg. DSE/ SIDA/ CTA,/ GTZ/ ACPA.

Appendix 1. Questionnaire used for the HHs

Name of HH Head:Male/Female Total family members:
 Address: VDC/Na.Pa.: Ward No.: Tole:

SA = Single Answer	SAS = Single Answer with Sub-answer
MA = Multiple Answer	MAS = Multiple Answer with Sub-answer

1. House Types

- | | |
|---|---|
| (a) RCC/RBC
(b) Zinc Sheet Roofing
(c) Straw (Khar/seula) roofing | (d) Khapta roofing
(e) Tiled roofing |
|---|---|

2. Family statistics:

1.1 Employment situation (Number)						1.2 Cultivated land						1.3 Livestock and poultry				
Sector	M	F	Total	Major	minor	Type	Area (Ropany)		Major crops grown	Annual producti	Purpose		Type	No.	Purpose	
							Own	L.Lords			Cons	Sal			Cons	Sal
						Irrigated										
Agric						Khet							Bufa			
Labor						Pakho							cattle			
Service						Unirri							Goat			
Trade/ business						Khet							Poult			
Teaching						Pakho									
.....						Total									

3. What is the agricultural occupation to your family? (SA)
- | | |
|------------------------------------|--|
| 0 (a) Means of full employment | 0(d) Hobby or recreation |
| 0 (b) Means of partial employment | 0(e) Means of proper use of spare time |
| 0 (c) Source of additional incomes | |
4. Prioritize following works (1-6) for the integrated development of this location (MAS).
- (...) (a) Agriculture (Fruits/ vegetables/ Cereals/ Floriculture/ Beekeeping/ Mushroom)
- (...) (b) Livestock (Cattle/buffalo/ Poultry/ Duck/ Goat/ Other (specify)
- (...) (c) Industry (if possible, specify)
- (...) (d) Trade/ business (if possible, specify)
- (...) (e) Educational institutions (if possible, specify)
- (...) (f) Others (specify)
5. Do you have knowledge on nutrition ? 0 (a) Yes. 0 (a) No.
6. How does the nutritional needs of your family fulfill? (MAS)
- | | | | |
|------------------------------|----------------|------------|-------------|
| 0 (a) Market purchase: | 0 1. Sometimes | 0 2. Often | 0 3. Always |
| 0 (b) Purchase from farmers: | 0 1. Sometimes | 0 2. Often | 0 3. Always |
| 0 (c) Consuming own product: | 0 1. Sometimes | 0 2. Often | 0 3. Always |
| 0 (d) Selling over surplus: | 0 1. Sometimes | 0 2. Often | 0 3. Always |
7. Do you practice use/re-use of HH waste water? 0 (a) Yes. 0 (a) No.
8. Where does the drains from toilet, sheds, pen, etc go ?

- (a) Street/ Road (b) Compost pit (c) Bio-gas plant
 (d) Stream (e) Other (specify)
9. Do you use chemical fertilizer ? (a) Yes. (a) No.
 If yes, for which crop?
 From where do you brought?
10. Do you use following materials in farming ? (Tick whatever is applicable).
 (a) FYM (b) Compost
 (c) Green manure (d) Vermi-compost
 (e) Veterinary medicines (f) Micronutrient fertilizers
 (g) Lime
11. What do you do when pests/ diseases attack to your crop ? (**MA**)
 (a) Doing nothing (b) Using bio-pesticides
 (c) Botanicals (d) Chemical pesticides
 (e) Adopting IPM practices (f) Traditional methods (if Yes, specify).....
12. Have you (or anyone of your family) participated in any training, study, visit, etc, related to improved/modern agricultural technology? (a) Yes. (a) No.
 If yes, specify.
13. Are there any institutions/organizations supporting to your farming ?
 (a) Yes. (a) No.
 If yes, fill the following:

Type of organization	Name(s) of the organization /institution(s)	Type of assistance
(a) Governmental		
(b) Local governmental		
(c) NGOs		
(d) Private firms		
(e) Academic institutions		

14. Have you borrowed agricultural loan? (a) Yes. (a) No.
 If yes, for what purpose?
 From where (source): How much (Rs):
15. Please assign priority (1-7) to the following agriculture related problems in your area.
 (...) a. Irrigation problem (...) b. Marketing problem
 (...) c. Lack of agricultural inputs (...) d. Financial /economic problem
 (...) e. Technical problem (...) f. Decreased interests in agriculture
 (...) g. Other (specify):
16. As compared to the past, what is the existing trend in agricultural productivity?
 (a) Decreasing productivity
 (b) Constant productivity
 (c) Increasing productivity
 Specify the cause/reason:
17. Have you any suggestions for agricultural development (If yes, specify wording).

Thank You

Appendix 2. Observation Sheet

Locality Name:..... Tole: Ward No.:..... VDC/Na. Pa.:.....
Community /ethnic group: Settlement Type: Urban / Rural /Dispersed/ Agglomerated

A. Housing Types:

-) Construction materials:
-) Windows :.....
-) Doors :
-) Roof type: RCC/ RBC/, Zinc Sheet, Khar/Paral/Seula, Others (specify):.....

B. Surrounding Environment:

- 1. Field
- 2. Forest
- 3. Human settlement
- 4. Ponds
- 5. Streams/ rivers
- 6. Others (specify):

C. Irrigation Pattern:

- (1) Canal
- (2) Rajkulo
- (3) Traditional system
- (4) Tubewell
- (5) River /stream (specify)
- (6) Others (specify)

D. Market Facility:

Are there shops nearby, related to agriculture? (a) Yes (b) No
If yes, specify the type and number of shops dealing with farm products.

Type	number
1
2

E. Access to agricultural extension/ service:

- 1. Agric. Service Center nearby (yes/no):.....
- 2. Livestock Service Center nearby (yes/no):.....
- 3. Agro-vet shop nearby (Yes/no):
- 4. Access to road (Yes/no):
- 5. Agro product storage facility (Yes/no):
- 6. Availability of financial (bank, etc.) service (Yes/no):

F. Agricultural Integration:

- 1. Agronomic crops (Yes/no):
- 2. Poultry farming (Yes/no):
- 3. Goat/ Sheep farming (Yes/no):
- 4. Livestock (cattle/ buffalo) farming (Yes/no):
- 5. Home/Kitchen gardening (Yes/no):
- 6. Commercial fruit orchard (Yes/no):
- 7. Commercial vegetable farming (Yes/no):
- 8. Floriculture/ Flower Nursery (Yes/no):
- 9. Beekeeping (Yes/no):
- 10. Mushroom farming (Yes/no):

G. Resource Recycling:

- 1. Biogas plant (Yes/no):
- 2. Composting toilet (Yes/no):
- 3. Vermi-composting (Yes/no):
- 4. In-situ manuring (Yes/no):
- 5. Household waste water utilization (Yes/no): If yes, describe the purpose and type of utilization of HH waste water:

-XXX-

Appendix 3. Inquiry Checklist used for Key Informant/Focus Group Discussion

Number of person: Sex: Male, Female.....
Type: Caste/ Ethnic group:
Place: Date:

1. Production trend in agriculture:
2. Crop production pattern (types):
3. Market demand:
4. Agricultural infrastructure:
5. Problems related to agriculture and livelihood:
6. Agricultural potentialities:
7. Transportation:
8. Role of institutions:
 -) Government (central):
 -) Local government:
 -) Cooperatives:
 -) NGOs:
 -) Private institutions:
9. Investment pattern:
10. Partnership/ Collaborative (%):

Thank you!

Appendix 4. Chi square analysis of variations in employment pattern

Calculation of Chi Square for Employment Pattern								
Calculation of expected frequencies								
Sector	Observed frequencies				Expected Frequencies			
	Ward no 1	Ward no. 2	Ward no. 3	RT	Ward no 1	Ward no. 2	Ward no. 3	RT
Agriculture	97	84	67	248	99.4884	83.628	64.884	248
Service	12	4	5	21	8.42442	7.0814	5.4942	21
Trade/Business	7	9	1	17	6.81977	5.7326	4.4477	17
Waged labour	16	12	15	43	17.25	14.5	11.25	43
Foreign employment	6	7	2	15	6.01744	5.0581	3.9244	15
CT	138	116	90	344	138	116	90	344
Calculation of Chi square Value								
	(O-E)				(O-E) ² /E			Total
	Ward no 1	Ward no. 2	Ward no. 3		Ward no 1	Ward no. 2	Ward no. 3	
Agriculture	-2.48837	0.372093	2.116279	0.06224	0.0017	0.069	0.132919	
Service	3.575581	-3.0814	-0.49419	1.51759	1.3408	0.0445	2.902873	
Trade/Business	0.180233	3.267442	-3.44767	0.00476	1.8624	2.6725	4.539649	
Waged labour	-1.25	-2.5	3.75	0.09058	0.431	1.25	1.771614	
Foreign employment	-0.01744	1.94186	-1.92442	5.1E-05	0.7455	0.9437	1.689224	
CT				Observed Chi Square value				11.03628 ns
Df = (c-1)(r-1)								8
Table value of Chi square 1% LS								20.09
5% LS								15.51
<p>* Significant at 5% level ** Significant at 1% level ns- Not significant</p>								