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The Impacts of Urbanization on Agricultural Sustainability in Palestine after the Construction of the Separation Wall: The Case of the City of Tulkarem

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The Impacts of Urbanization on Agricultural Sustainability in Palestine after the Construction of the Separation Wall: The Case of the City of Tulkarem

by

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Abstract

Agricultural land use in the urban environment is a hot topic in global urban sustainable development. However, most cities are losing agricultural areas to urbanization. Cities in Palestine and especially the city of Tulkarem have experienced rapid urbanization that is responsible for an increased demand for land. At the same time, city expansion is restricted due to the political situation and existence of the Separation Wall along the city's west side. The squeeze of urban land results in loss of arable land for agriculture, degradation of ecosystems, and social changes within urban populations.

A study to document the impacts of urbanization on agricultural land use with the existence of the Separation Wall and unstable political conditions is needed, and that was the purpose of this research. The study presented views of the urban planners, decision makers and farmers. Quantitative and qualitative case study methods were employed where interviews were conducted with the study participants. At the same time, land use maps for the city of Tulkarem before and after creation of the Separation Wall were compared using the GIS software package. The GIS analysis and maps were compatible with the information shared by the interview participants concluding that the study area has been subjected to land use change, especially urban expansion, which have caused serious threats to available agricultural land. Political instability, poor economic situation of the farmers, lack of support and guidance, land fragmentation and lack of laws and bylaws and interest in protecting agricultural lands were found to be the main factors that lead to agricultural land loss for urban uses in the city of Tulkarem. Further, the study found from the interviews that most of the land owners who sell for urban uses are expatriates, who live outside the country, and cannot come back or stay in Palestine due to the political and economical situation in Palestine.

The impact of political factors, such as the Separation Wall and Oslo division of land to area A, B, and C, on this change in the Tulkarem area was clear. The political factors have direct and indirect impacts on Palestinian life conditions. The direct impact includes conversion of the land into Israeli structures, namely Separation Wall and C area as well as alienation of, or inaccessibility to, part or all of land, crops, water resources, and business assets, which caused wealth; income-generating and market access losses. The indirect impact is on the existing and future urban expansion, which will lead to losing more of the agricultural lands as there is no Palestinian control on the urban expansion directions and process.

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Glossary

Aerial photo: the term aerial imagery or photo refers to photography or digital pictures taken from the air.

ArcGIS: is a program integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographical data. GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, reports, and charts.

Carrying capacity: is the maximum number of individuals that an area of land can support, usually determined by their food, habitat, water and other necessities available in the environment.

Dunam: is unit for land area used in the Ottoman Empire. Its value now defined as exactly one decare (1000 m^2, 0.1ha).

Green line: refers to the demarcation lines set out in the 1949 Armistice Agreements between Israel and its neighbours (Egypt, Jordan, Lebanon and Syria) after the 1948 Arab-Israeli War. The Green Line is also used to mark the line between Israel and the territories captured in the Six-Day War, including the West Bank, Gaza Strip, Golan Heights and Sinai Peninsula (the latter has since been returned to Egypt). The name derives from the green ink used to draw the line on the map while the talks were going on.

Hectare (ha): is a metric unit of area defined as 10,000 m^2 or 10 dunams.

Land use/cover change (LUCC) driving forces: are the forces that cause observed landscape changes, i.e., they are influential processes in the evolutionary trajectory of the landscape. These forces have also been called keystone processes.

Orthophotography: is a synthetic image derived by computation from one or more source images. The data require orientation parameters for the source photographs and a digital terrain model of the geographic area to be covered by the orthophotography.

Remote sensing (RS): is the acquisition of data about an object or an area by a sensor that is far from the object. RS include aerial photography, satellite imagery and radar imagery.

Seam zone: The lands that are now located behind the Separation Wall, i.e. between the green line and the Wall, where the Palestinians have limited or no access to these lands.

Spatial resolution: the density of pixels in an image per unit length. Resolution may also be described as the relative clarity (crispness or fuzziness) of an image.

Sustainable land use: refers to the use of land-based resources to produce goods and services in such a way that, over the long term, the natural resource base is maintained, and that the human needs can be met.

Urban growth: is the increase in the size and population in an area over time, expressed as land area and number of person.

Urbanization: is the increasing proportion of country's population living within urban areas, which would be given most likely in a percentage of the total population or a ratio.

Chapter One- Introduction and Research Objectives

1.1 Introduction

Urbanization cannot be ignored in land-use/cover change (LUCC) studies. Cities are growing rapidly worldwide, and the impact of urbanization will continue to bring major global and local changes throughout this century (Rana 2011). Many developing countries are in a period of high population growth and urbanization (Long, Tang et al. 2007; Lu, Liang et al. 2011), which will continue to have significant impacts on the global carrying capacity of the Earth (Alberti 2005; Raddad, Salleh et al. 2010). Further, as cities grow, the urban population is uncontrollably and unpredictably increasing, which makes long-term population growth management policy implementation difficult and increasingly complex (Cohen 2006). Of particular concern are the risks to the surrounding environment, natural resources, health conditions, social cohesion, and individual rights. Further, for many observers, the greatest concern is surely the high levels of poverty and unemployment (Rana 2009; Rana 2011; Barbero-Sierra, Marques et al. 2013; Kanagalakshmi and Nagan 2013).

Countries of the Middle East have large populations increase rate compared to other developing and developed countries due to natural growth and migration. Urbanization is considered diverse in the Middle East region. For example, Bahrain, Kuwait and Qatar were already 80% urbanized during the 1970s. This is because of the economic boom linked to the oil and gas industries in those countries. On the other hand, most of the other countries are still rural (United Nations Human Settlements Programme 2009).

In agriculture based countries in the Middle East, the issue of irrigation is significant since they are dependent on water for their agriculture (Hassan, McIntyre et al. 2010). The declining water resources and the extended dry season is a common problem in those countries (Phillips,

Attili et al. 2007). Further, the political instability, low income of farmers, and expansion of housing are considered the main factors that affect the agricultural land use change and the increase of urbanization in these countries (Hassan, McIntyre et al. 2010; Hassan, Shahin et al. 2010; Raddad, Salleh et al. 2010). Thus, the level of urbanization in the Middle East is expected to reach 70% by 2030 (United Nations Human Settlements Programme 2009).

In Palestine, urbanization became obvious in the period following the signing of the Oslo Agreement in 1994 and before the beginning of 2000 Alaqsa Intifata (second uprising). Palestinian societies (West Bank and Gaza Strip) experienced a short period of economic recovery and growth, which was clearly reflected in the rapid development and expansion of Palestinian cities (Abdelhamid 2006). In physical terms cities extended into the surrounding agricultural lands and natural landscapes (Abu Hammad and Tumeizi 2010). Significant portions of land were annexed and developed for residential purposes: this involves a process of land purchase and subsequent subdivision into housing lots by profit driven developers who often are not sensitive to ecological necessities and urban quality of life issues (Abdelhamid 2006; Raddad, Salleh et al. 2010). Further, the political instability has an impact on existing and future urban expansion trends of Palestinian cities, which will lead to loss of more agriculture lands. At the same time, there is a continuous land confiscation for building Israeli settlements and by-pass roads (Abu Kubi 2005; Abu Hammad and Børresen 2006; Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010; Pallister-Wilkins 2011; Tamimi 2011; Ball 2012).

Furthermore, the construction of the Separation Wall along the West Bank has imposed a new situation and put various challenges before Palestinian urban planners. The Separation Wall plays a major role in the shape and expansion of the affected Palestinian communities (Pallister-Wilkins 2011; Tamimi 2011; Ball 2012). The construction of the Separation Wall, which started

in 2002 by the State of Israel along and within the West Bank, has negatively affected the development of Palestinian cities. Large portions of their land were extracted for the purpose of the Separation Wall's construction (Lagerquist 2004; B'Telem and Bimkom. 2005; Usher 2006; Trottier 2007). The impact of the wall affects the entire occupied territories, but varies from governorate to governorate and from town to town in terms of the size and nature of the damage (Lagerquist 2004; Alatout 2009; Tamimi 2011). The negative side effects have not been restricted to a particular facet of life; they have damaged education, health services, labor markets, social safety nets, economic activities, the environment and family and social ties (Falah 2004; Arsenault and Green 2007; Trottier 2007; Curti 2008; Bakan and Abu-Laban 2009; Batniji, Rabaia et al. 2009; Humanityvoice 2010; Tamimi 2011).

The city of Tulkarem (hereinafter Tulkarem) like other West Bank cities has experienced a rapid urbanization that is responsible for increased demand for land. At the same time, city expansion is restricted due to the political situation and existence of the Separation Wall along the west side of the city. Consequently, the limited available land in Tulkarem is associated with loss of arable land, degradation of ecosystems, as well as social changes in the urban populations. The current urbanization process in Tulkarem is indicative of planning processes that need considerable attention concerning transformation of societies and sustainable development.

Despite the current trend in urbanization, there has been limited comprehensive documentation on the impact of urbanization on agricultural land use in Palestine in general and Tulkarem in particular. Therefore, a study to document the impacts of urbanization on agricultural land use with the existence of the Separation Wall and unstable political conditions is needed. This study is the first of this kind and the results will inform the government on how

urbanization has affected agricultural land use, what factors influence these changes and priority actions to ameliorate negative impacts.

1.2 Research Conceptual Framework

As this study was conducted in an area experiencing political conflict, it focused through the "political ecology" lens when framing objectives, research questions, and collecting and analyzing data.

Political ecology is the study of the relationships between political, economic and social factors with environmental issues and changes (Greenberg and Park 1994; Peet and Watts 1996; Watts 2000; Watts and Peet 2000; Gerber, Veuthey et al. 2009). Early writings in political ecology focused on unequal power relations, conflict and cultural "modernization" under a global capitalist political economy as key forces in reshaping and destabilizing human interactions with the physical environment (Walker 2005; Gerber, Veuthey et al. 2009). (Bryant 1998) explained the meaning of political ecology as, "*political ecology is the notion that politics should be put first in the attempt to understand how human environment interaction may be linked to the spread of environmental degradation*". Running through most political ecology research is the notion of social and environmental conditions constituted through unequal power relations (Watts 1983; Peet and Watts 1996; Watts 2000; Watts and Peet 2000; Cadieux 2008; Gerber, Veuthey et al. 2009). Rocheleau and Roth (2007) explained the meaning of power: at one level, power is reflected in the ability of one actor to control the environment of another; sometimes as power against (resistance), and occasionally as power with (solidarity) (Rocheleau and Roth 2007).

A more detailed understanding of the third world's politicized environment is to be found in the analysis of how unequal power relations are often linked to conflict over access to and the

use of diverse environmental resources (Watts 1983; Peet and Watts 1996; Bryant 1998; Bryant, Paniagua et al. 2011). The research in political ecology provides useful insights into the ways in which environmental problems and crises may be socially constructed, to show how their selective identification and representation is a political process (Peet and Watts 1996; Orenstein, Jiang et al. 2011). Indeed, this process of knowledge production reflects, and in turn often reinforces, social and economic inequities (Bryant 1998; Walker 2005).

1.3 Statement of the Research Problem

Urbanization is manifested in transformed landscape patterns within an entire region, which can transform regional natural phenomena and ecological processes (Ge and Cao 2009). In the Palestinian context, and due to the political situation and expansion restrictions, urban development is taking over agricultural lands, which is the main source for food production and the backbone of the Palestinian economy (Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010). As urban expansion affects local and regional sustainable development, the study of the effective factors and driving forces of urban expansion is necessary to provide decision support for urban planning, urban ecological construction, and sustainable urban development. As a result, research on forces driving urban expansion on agricultural lands is needed.

1.4 Study Objectives

Agricultural land use and activities that take place in the urban environment have essential roles in sustainability, because agriculture supports urban food security and the urban economy especially for the urban-poor, and it protects the environment within cities (Bryld 2003; Cadieux 2008; Raddad, Salleh et al. 2010).

The loss of agricultural land to other land uses and to urban growth is an issue of global concern. The loss of prime agricultural land in urban areas is an unavoidable impact of urbanization. Its subsequent effects on food security, local development, poverty alleviation, and the environment cannot be fully anticipated (Cohen 2006; Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010; Barbero-Sierra, Marques et al. 2013; Kanagalakshmi and Nagan 2013). Thus, the purpose of this study was to assess the impact of urbanization on agricultural land in Tulkarem after the construction of the Separation Wall, and to investigate factors that lead to this change.

The study was conducted in Tulkarem, which is one of the West Bank cities affected by the creation and continued existence of the Separation Wall. Although, it is well known that there are various land uses in Tulkarem, this study focused on agricultural land use. It is worth noting here that the study aims to understand the situation in Tulkarem (the case study area) and not to make a comparative case study with another city in the West Bank or other cities in the developing countries. The specific objectives of this research study are as follows:

1. Explore and analyze the current spatial impacts of urbanization on agricultural land in Tulkarem since 2003, i.e., after the construction of the Separation Wall using the GIS software and the available aerial photos of Tulkarem
2. Construct a preliminary database of information from the GIS data and maps about agricultural land use in Tulkarem that will help land use planners and organizations to prepare future studies and maps.
3. Identify and highlight the major factors driving urbanization and the loss of agricultural land in Tulkarem and describe the impact of urbanization on urban agriculture by conducting qualitative interviews with the stakeholders in the city.

4. Highlight the importance of agricultural lands for the local society and provide suggestions and recommendations for urban laws, policies, and plans that emphasize sustainable agricultural land conservation and management.

1.5 Research Questions

The study research questions are as follows:

1. What is the current spatial impact of urbanization in the study area? And to what extent has urbanization impacted agricultural land use in Tulkarem?
2. What are the factors that lead to urbanization in the study area?
3. What are the factors that drive the loss of agricultural land when urban expansion occurs in the study area?
4. What are the feasible land management strategies (laws, policies and plans) that may contribute to sustainable agricultural land conservation and management in Tulkarem?

1.6 Guide to the Thesis

The thesis consists of five chapters and two appendices.

Chapter 1: This chapter provides insight to the importance of the research topic. The chapter then states the conceptual framework, research problem, objectives, and the purpose of the study, and provides the research questions.

Chapter 2: This chapter presents an extensive literature review about the concept of urbanization, an overview of urbanization theories, and the driving forces behind rapid urbanization, and its impact on society and the land. Further, the chapter highlights the relationship between urbanization and agricultural land use change and the factors that lead to

agricultural land loss. Then, the chapter reviews the main political factors that play a role in shaping the Palestinian landscape and urban patterns with details about the Separation Wall and its impact on the Palestinian communities. Finally, the chapter provides general information about the study area and the impact of the Separation Wall on the city. This chapter lays a foundation and serves as a roadmap for developing the questionnaires and performing the fieldwork.

Chapter 3: This chapter presents the qualitative and quantitative research methodology used to collect the data from the participating individuals. Further, the chapter presents the sample selection criteria, case study reliability and validity and the ethics consideration.

Chapter 4: This chapter presents the major findings based on the data collected for this thesis (described in Chapter 3). Using qualitative research analysis, data were coded into categories, which were then linked to create the main themes for the participants' questionnaires. A quantitative research methodology was used to present the statistical and GIS data analysis. At the end of this chapter, the discussion of the main findings is presented followed by the Compatibility between the study results and between the study results and the political ecology theory.

Chapter 5: This chapter provides conclusions reached from this study and recommendations for planners and decision makers about the importance of agricultural lands in urbanizing areas. Further, the chapter presents the importance of this study and its contribution to the body of knowledge and highlights the study limitation and recommendations for future studies. Finally, the appendices contain the approval letter from the Ethics Board to conduct this study, and the three different types of questionnaires that were used to conduct the research.

Chapter Two- Literature Review

2.1 Introduction

In this chapter, the concept of urbanization and its relationship to agricultural land use and sustainability is defined to add context for the research. The chapter provides an overview of land use and the environment, fundamental definitions of urbanization, factors that lead to urbanization, and land use practices and the relationship between urbanization and agricultural land use. Further, the chapter provides detailed information about the case study area with the impact of the political situation on its expansion, economic growth and social network. The chapter lays a foundation based on the literature and serves as a roadmap for how the research methodology and the questionnaires were developed.

At the early stages of this research, a preliminary review of the literature on LUCC was conducted to assist in narrowing down the researcher's area of interest. The changes of land use encompass the greatest environmental concerns of human populations today, including climate change, biodiversity loss and the pollution of water, soils and air. Monitoring and mediating the negative consequences of LUCC while sustaining the production of essential resources has therefore become a major priority of researchers and policymakers around the world. Many papers found in the literature investigate this issue and its driving forces such as (Anderson, Hardy et al. 1976; Klein Goldewijk and Ramankutty 2004; Lambin, Turner et al. 2001; Geist and Lambin 2002; Hardy et al. 1976; Logsdon, Bell et al. 1996; Veldkamp and Lambin 2001; Klein Goldewijk and Ramankutty 2004; Leemans and Serneels 2004; Biggs, Atkinson et al. 2010; Kanth and Hassan 2010; Lu, Liang et al. 2011; Wen, Khosrowpanah et al. 2011).

Urbanization was found to be one of the most important factors that lead to LUCC worldwide (Antrop 2000; Alphan 2003; Cohen 2006; Long, Tang et al. 2007; Abu Hammad and

Tumeizi 2010; Biggs, Atkinson et al. 2010; Lu, Liang et al. 2011; Rana 2011). Accordingly, the author of this study conducted a preliminary review of the literature on urbanization to verify the need for such a study and recognize any prior work in the field. Lots of papers identify the causes and driving forces for urbanization, while others highlight the theories of urbanization (Wingo 1967; Winoto and Schultink 1996; Antrop 2000; Alphan 2003; Xiao, Shen et al. 2006; Long, Tang et al. 2007; Abu Hammad and Tumeizi 2010; Biggs, Atkinson et al. 2010; Lu, Liang et al. 2011; Kanagalakshmi and Nagan 2013).

It was noted that the agricultural land change is the main influence of urbanization worldwide (Veldkamp and Lambin 2001; Bryld 2003; Perner and Malt 2003; Semwal and Nautiyal 2004; Raddad, Salleh et al. 2010; Azadi, Ho et al. 2011; Lu, Liang et al. 2011; Kanagalakshmi and Nagan 2013). This change has negative impacts, such as the loss of prime agricultural land and reduced agricultural jobs. Which may affect the agricultural production and threaten the food security (Azadi, Ho et al. 2011;Raddad, Salleh et al. 2010).

To this point all the reviewed literature was general papers and for cases around the world. To link these general themes to the specific case study area of this PhD work, more search was done about the urbanization and LUCC in the West Bank of Palestine. Anew factor leads to the loss of agricultural lands and restricts the urban expansion was identified which is the political factor. In the politically complicated areas like Palestine, where there is a political conflict over the same landscape, political factors may potentially mediate the impact of other factors. In other words, the study of the environmental, social and economic interactions shall be done through the political ecology lens. Therefore, papers of the political ecology theories and papers and reports about the impact of the political factors on the different life aspects of the Palestinians especially after the construction of the Separation Wall were reviewed such as

(Bryant 1998; Walker 2005; Gerber, Veuthey et al. 2009;Watts 1983; Peet and Watts 1996; Watts 2000; Watts and Peet 2000; Cadieux 2008). It is worth mentioning that searching for articles in the field of urbanization, LUCC, agricultural land use change and political ecology was not difficult and they were available in search engines such as Scopus, Google Scholar and Aqualine. On the other hand, there are only few scientific papers investigated the LUCC in the West Bank, none from political ecology point of view. This then forms the essence to conduct this study. Figure 2.1 shows a schematic diagram of the literature reviewed for this study.

2.2 Introduction to Land Use/Cover Change (LUCC)

The term land use has several meanings; it includes both land cover and land use (Anderson, Hardy et al. 1976; Klein Goldewijk and Ramankutty 2004). Land cover is the physical state of the land surface which includes both natural amenities (e.g., crop lands, mountains, vegetation, soil type, biodiversity, and water resources) and man-made structures (e.g., buildings and pavements) (Anderson, Hardy et al. 1976). Change in land cover usually happens in two ways, namely land cover conversion and land cover modification (Lambin, Turner et al. 2001; Geist and Lambin 2002). Land cover conversion is a change in the overall classification of land cover through a complete replacement of one type of land cover by another type due to change in urban extent, agricultural expansion or deforestation. Whereas, land cover modification is simply a change in the character of land cover without undergoing a change to its overall classification (Lambin, Turner et al. 2001; Geist and Lambin 2002).

On the other hand, land use is usually defined more strictly and refers to the way in which, and the purposes for which, humans employ the land and its resources (Veldkamp and Lambin 2001; Serra, Pons et al. 2008), such as farming, mining, housing, logging, or recreation. Therefore, land use change is the exploitation of land cover through its conversion and/or

modification over time primarily to serve human needs (Lambin, Turner et al. 2001; Veldkamp and Lambin 2001).

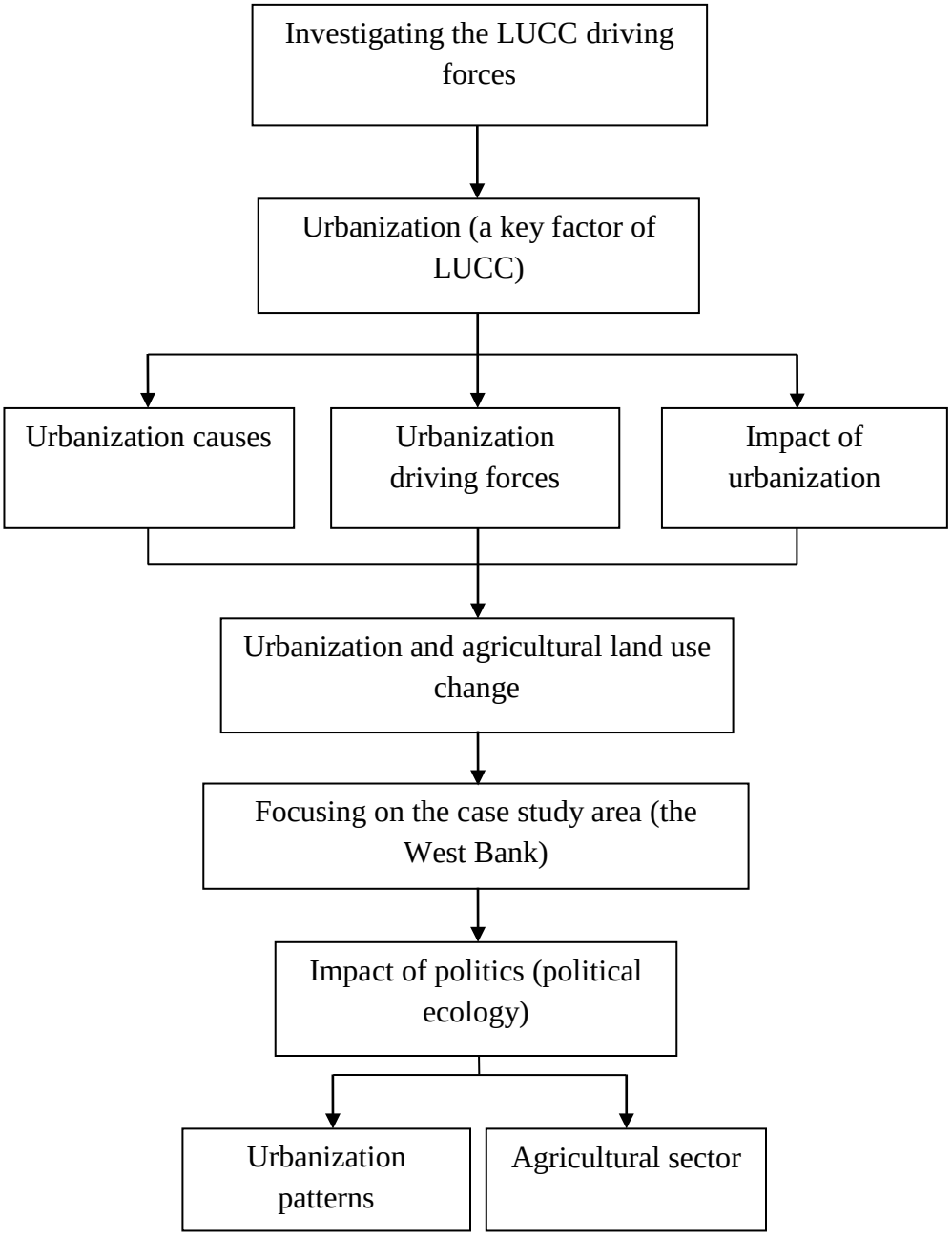

Figure 2. 1: A Schematic diagram about the literature review of this study.

Land use/land cover changes (LUCC) represent some of the most important components of environmental change on both global and local levels due to their various implications for different aspects of life (Verburg, Schot et al. 2004). LUCC have direct impacts on wildlife habitat, climatic changes, land degradation, and water supply (Anderson, Hardy et al. 1976; Logsdon, Bell et al. 1996; Veldkamp and Lambin 2001; Klein Goldewijk and Ramankutty 2004; Leemans and Serneels 2004; Biggs, Atkinson et al. 2010; Kanth and Hassan 2010; Lu, Liang et al. 2011; Wen, Khosrowpanah et al. 2011).

2.2.1 LUCC Driving Forces

Driving forces are the forces that cause observed landscape changes, i.e., they are influential processes in the evolutionary trajectory of the landscape (Lambin, Turner et al. 2001; Bürgi, Hersperger et al. 2004). These forces have also been called keystone processes. The driving forces form a complex system of dependencies, interactions, and feedback loops and they affect several temporal and spatial levels (Bürgi, Hersperger et al. 2004; Kanagalakshmi and Nagan 2013).

It should be noted that, there are always factors behind the ones directly causing a certain change. It is therefore often appropriate to distinguish between primary, secondary, and tertiary driving forces, as driving forces characteristically have to be interpreted in nested scales of explanations (Bürgi, Hersperger et al. 2004; Serra, Pons et al. 2008; Ge and Cao 2009). The driving forces are not equally important, to the point that some driving forces are even redundant (Ge and Cao 2009). Further, the speed of the drivers that affect the change process varies. Drivers can affect LUCC through slow incremental processes that occur over decades or more, or fast changes that suddenly affect the human-environment system (Veldkamp and Lambin 2001).

LUCC is usually driven by a large number of interacting factors, acting synergistically and originating from coupled human-environment systems. Therefore, determination of the drivers of LUCC is often problematic and a subject of discussion, and in practice not restricted to a specific method (Bürgi, Hersperger et al. 2004). Widely examined drivers of LUCC are the followings (Bičík, Jeleček et al. 2001; Lambin, Turner et al. 2001; Veldkamp and Lambin 2001; Bürgi, Hersperger et al. 2004; Long, Tang et al. 2007; Serra, Pons et al. 2008; Ge and Cao 2009; Li, Wu et al. 2009):

1. **Biophysical factors**: (e.g., soil, slope, land cover patterns, and climate) are variables over time and space which define the natural capacity for LUCC (Veldkamp and Lambin 2001). They might constrain the human choice of land use where rates of suitability for certain types of land uses vary (Lambin, Turner et al. 2001). Though biophysical factors do not usually cause land use change directly, they can drive land cover change through climate change and affect land use allocation decisions. Climate affects vegetation cover at broader scales, while at finer scales the impact of disturbance factors such as demographics become greater (Lambin, Turner et al. 2001)
2. **Demographic and social variables**: Demography in general and population growth in particular are expected to be major drivers of LUCC, due to dramatic increases in the global population (United Nations Human Settlements Programme 2009). It is not just the total number of people that drives LUCC. Other aspects of population such as distribution, urbanization, household number, population density, family structure, mortality rate, and migration play an important role in LUCC (Lambin, Turner et al. 2001). Demographic factors interact with a diverse set of factors, such as lifestyle, consumption patterns, social organizations and technology (Geist 2002).

3. **Technology:** it has significantly assisted in the modification of the surrounding environment. Technology affects surroundings by playing an important role in resource procurement, consumption rates, and cost (Cohen 2006).
4. **Institutional factors**: Political, legal, traditional and economic institutions interact with individual land use decisions. Governmental institutions and their policies play a crucial role in LUCC. They develop several social, legal and economic realms that affect land use, such as fertility, prices, subsidies, property rights, finance and resource management (Long, Tang et al. 2007; Li, Guo et al. 2011).
5. **Economic development**: is an increasingly important land use driver that raises the demand for ecosystem services, causing LUCC (Ananda and Herath 2003; Kim 2011). LUCC is mainly driven by people's responses to economic conditions, mediated by institutions in which landowners generally make land-use decisions to maximize economic returns from land (Lambin, Turner et al. 2001). Economic factors and related governmental policies that affect land use decisions include taxes, subsidies, consumption, profit, trade treaties, production, and capital flow and investment. Economic and socioeconomic factors are important drivers in LUCC; particularly urban expansion.
6. **Geopolitical factors**: In some regions like Palestine (the case study of this thesis) this factor is crucial and it expected to play an important role in LUCC. For the case of Tulkarem in Palestine, the geopolitical factors that could play a major role in the city LUCC include: area classification (A, B, and C), the Separation Wall, and Israeli structures, such as settlements, bypass roads, checkpoints, crossing points, and industrial factories. The political conflicts over the same landscape may potentially mediate the impact of socioeconomic and

biophysical factors. When political factors play a dominant role in land use decisions, other considerations such as ecological ones might be underestimated.

It should be noted here that these underlying factors are also the causes of urbanization which in turn is the driver of land use change (Geist and Lambin 2002).

2.3 Overview of Urbanization as a Development Indicator

Urbanization is not a modern phenomenon; it has been occurring since about 5000 B.C. (Lu, Liang et al. 2011). The level of urbanization, measured by the proportion of urban population to total population, has been increasing over the years (Barbero-Sierra, Marques et al. 2013). After the Second World War, urbanization took place rapidly around the globe. Urbanization levels are high in developed countries, for example Europe and North America, with more than 75% of the population living in urban areas with low rates of urban population growth (Lu, Liang et al. 2011; Rana 2011). While, it remains low in the developing countries, where about 44% of the population lives in urban areas (Rana 2011), developing countries have the fastest rate of urbanization worldwide (United Nations Human Settlements Programme 2009). For example, currently 81% of the North Americans reside in urban areas making it the most urbanized region in the world; at the same time, the urban population is declining. On the other hand, Sub-Saharan Africa is the least urbanized; but the most rapidly urbanizing region in the world (3.4% per year) (United Nations Human Settlements Programme 2009).

The United Nations Global Report on Human Settlements (United Nations Human Settlements Programme 2009) defines the concept of urbanization as the shift from a rural to an urban society, which involves an increase in the number of people in urban areas during a particular year. According to the U.N. urbanization is the outcome of social, economic and political developments that lead to urban concentration and growth of large cities, changes in

land use, and transformation from rural to metropolitan pattern of organization and governance (United Nations Human Settlements Programme 2009). A country is considered to be urbanized when more than 50% of its population live in urban areas (Lu, Liang et al. 2011). Urbanization also refers to an increasing shift from agrarian to industrial services and distributive occupations. These services and occupational opportunities act as pull factors that cause many people to move from rural areas to urban areas while being stimulated by push factors like, natural disasters, economic stagnant, and poverty (Cervero 2001; Lu, Liang et al. 2011).

Friedmann (1966) gave two broad definitions that are applicable to urbanization in lesser developed countries. The first one leads to the evolution of a spatial settlement system, and the other to the evolution of a socio-cultural system. In other words, urbanization refers to processes that incorporate a growing proportion of the total population into urban settlement patterns, giving rise to the city as a basic ecological matrix for social life and production and leading to its expansion, multiplication, and transformation in space; and incorporate a growing proportion of the total population into urban social structures and styles of life and leading to the modification and transformation of these structures into new configurations (Friedmann 1966).

Urbanization is increasing in both the developed and developing countries (United Nations Human Settlements Programme 2009). The world's urban population has multiplied more than tenfold during the past century, from 224 million in 1900 to 2.9 billion in 1999. It has risen from 14 to 50% of total world population. In 1900, only 16 cities had a population exceeding 1 million; by 2000, more than 400 did. By the year 2030, more than 60% (4.9 billion) of the estimated world population (8.1 billion) will live in cities; 83.5% of the population of developed countries (1.01 billion), and 56.2% of that of the developing countries (3.88 billion)

with a large percentage of this population being poor (Alberti 2005; Hassan, Shahin et al. 2010; Raddad, Salleh et al. 2010).

2.3.1Causes of Rapid Urbanization

Numerous articles in the literature assumed that urbanization is linked to economic and social development, which results from modernization (Antrop 2000; Alphan 2003; Cohen 2006; Long, Tang et al. 2007; Abu Hammad and Tumeizi 2010; Biggs, Atkinson et al. 2010; Lu, Liang et al. 2011; Rana 2011). Most industries in the developing countries are found within urban centres, resulting in rapid rural-urban migration by rural residents in search of employment (Lu, Liang et al. 2011).

The reasons for the rapid urbanization vary from country to country (Rana 2011). For most countries, 60% of urban growth is due to natural growth (i.e., a higher birth than death rate), and 40% to rural-urban migration and areas expansion (Cohen 2006; United Nations Human Settlements Programme 2009; Rana 2011). Even though the share of migration in total urban growth is smaller than natural growth rates, the absolute number of people pouring into cities every year is enormous (United Nations Human Settlements Programme 2009; Rana 2011; UN 2012). For example, in the United States the rural to urban migration was facilitated by large-scale industrialization and the need for labour (Rana 2009; Rana 2011). In the developing world, this is not the case; instead high population growth is placing a great deal of pressure on urban areas without the benefit of industrialization (Lu, Liang et al. 2011).

Rural-urban migration is often caused by a mix of pull and push factors (Cohen 2006; Barbero-Sierra, Marques et al. 2013). Pull factors make cities attractive to rural migrants: cities often offer higher wages and better employment options. In addition, cities tend to have a better and greater availability of services, like health care and education, than rural areas. Finally, cities

are centers of modern living: they offer large varieties of cultural and social opportunities (Cohen 2006; Rana 2009; United Nations Human Settlements Programme 2009; Rana 2011). On the other hand, push factors such as: displacement by conflict, disasters, or droughts; land degradation and desertification; population pressure in rural areas; and escape from discrimination and social stigma in rural areas, force migrants to leave rural areas (Cohen 2006; Rana 2009; Lu, Liang et al. 2011; Rana 2011).

Lipton (1977) argues that the policies and regulations in most developing countries focus on the development of urban areas at the expense of rural areas, which leads to the 'urban bias' hypothesis. This hypothesis states that most resources and investments in most poor countries are systematically allocated to urban areas rather than rural areas where most people live. This situation gives advantages to urban residents, through the fact that they have higher average personal incomes and greater average consumption levels than rural residents (Lipton 1977).

2.3.2 Urbanization Driving Forces

As mentioned in section 2.2.1, the rapid urbanization causes LUCC. This means that driving forces of LUCC can be also considered as driving forces for urbanization. The available literature documented that the general driving forces of urbanization can be roughly divided into five categories, which will be considered in the current study (Bryld 2003; Chen, Messing et al. 2003; Veldkamp and Verburg 2004; Liu, De Smedt et al. 2005; Ge and Cao 2009; Xi, He et al. 2010):

1. The physical and geological factors: These factors constrain urban expansion to some extent, so they decide the overall trend of urban expansion on the macroscopic scale.
2. Economy: The rapid development of the economy is the dominant factor of urban expansion.

3. Transportation: This is an important driving force for the urban expansion. Usually, urban expansion is along the main roads or highways.
4. Population: Rapid population increase is also an important factor for urban expansion.
5. Policy and planning: Policy provides a guiding role for urban expansion. Weak planning systems especially regarding agriculture issues play a critical role in loss of agriculture lands.

In this study, the political factor plays the essential role in the urbanization; which contributes further to the deterioration of the environment as well as the farmers' socio-economic conditions. Such deterioration is reflected in a noticeable increase in pollution, loss of control over water resources, poverty, decreasing the farmers' access to their lands, land fragmentation and the loss of the farmers' land ownership due to land confiscation for military and colonial activities.

It should be noted that there are always factors behind the ones directly causing a certain change. It is therefore often appropriate to distinguish between primary, secondary, and tertiary driving forces, as driving forces characteristically have to be interpreted in nested scales of explanations (Bürgi, Hersperger et al. 2004). The driving forces are not equally important, to the point that some driving forces are even redundant (Ge and Cao 2009). The implemented process of choosing the driving forces is discussed in details in Chapter 3.

2.3.3 Impact of Rapid Urbanization

A closer look at the nature of the current trends reveals that urbanization does not simply imply that most of the world population will be living in cities, but urbanization does and will continue to have a significant impact on the global carrying capacity of the Earth. Humans depend on Earth ecosystems for food, water, services; and resources like land, which are not elastic enough to accommodate the increasing urban population (Alberti 2005; Raddad, Salleh et al. 2010; Rana

2011). These changes in ecosystem conditions that result from human actions in urban areas ultimately affect human health and well-being (Alberti 2005; Raddad, Salleh et al. 2010; Barbero-Sierra, Marques et al. 2013).

It is also undeniable that rapid urbanization causes a formidable challenge to sustainable development efforts in many of the developing countries (Cohen 2006; Lu, Liang et al. 2011; Rana 2011; Barbero-Sierra, Marques et al. 2013). The growth of large cities in the developing countries is always associated with problems of unemployment; poverty; inadequate health; urban slums; and lack of infrastructure and basic services like; water, sanitation, electricity, health care, and waste; (Antrop 2000; Alphan 2003; Cohen 2006; Lu, Liang et al. 2011; Rana 2011).

Urban population in developing countries is uncontrollably and unpredictably increasing, which makes implementing policies on a long-term basis difficult (Cohen 2006; Barbero-Sierra, Marques et al. 2013). Rapid urban growth is taking place in countries least able to cope in terms of the ability of governments to provide urban infrastructure (Cohen 2006; Rana 2011). The speed and sheer scale of the urban transformation of the developing world presents alarming challenges (Lu, Liang et al. 2011). Of particular concern is the risk to the surrounding environment and natural resources (Rana 2009; Raddad, Salleh et al. 2010; Rana 2011). As a result of urbanization processes natural and agricultural lands are converted to urban land uses and lead to environmental and ecological problems in the urban and rural environments (Raddad, Salleh et al. 2010).

2.4 Theories of Urbanization

Limited space constrains a thorough discussion of every theory of urban development in the developing countries. Thus, the key urbanization theories that will be discussed in this study are: modernization/ecology theory, dependency theory and urban bias theory.

2.4.1 Modernization/Ecology Theory

Modernization/ecological theory explains the concept of urbanization in developing countries by referring to the modern/traditional economic dichotomy and demographic transition theory (Freeman 1979; York and Rosa 2003). According to this view, city building in developing countries can be attributed to cultural lag in equilibrating fertility and mortality differentials as well as to the massive rural to urban migration due to rural-push and urban-pull factors (Bradshaw 1987; Cohen 2006; Rana 2009; Rana 2011). The two main points in this theory are; first, although mortality-reducing technology is easily diffused throughout most of the developing countries, this is not the case for the institutional/industrial web of modernity in general. For a variety of reasons associated with agglomeration economies and the inactivity of infrastructural development, countries of the developing world at the beginning of modernization concentrate investment and therefore population into one or a few large cities (Freeman 1979; Bradshaw 1987; Bryld 2003; Rana 2009; Rana 2011). Second, constrained opportunities in rural areas and the attraction of modern cities lead to urban migration from rural areas (Ananda and Herath 2003; York and Rosa 2003; Theobald, Spies et al. 2005). Moreover, the age-selectivity of migrants and an overall high rate of fertility enlarge urban areas beyond their capacities to provide infrastructure, housing, social services, and employment (United Nations Human Settlements Programme 2009).

2.4.2 Dependency Theory

All dependency and world-systems theorists share the idea that either through intentional coercion or through the inherent logic of capitalism certain areas and their populations have been "underdeveloped" (Kentor 1981; Bradshaw 1987). The dependency theory depends on historical processes in explaining the changes that have occurred in the structure of cities because of the switch from the pre-capitalist to capitalist mode of production (Smith 1985; Sonaike 1988). Further, the theory emphasizes the dependent nature of capitalist development in developing countries, which depends on external economic forces in the study of cities (Gwynne 1985). The dependency school argues that developed countries use developing countries as a source of input (raw material supplier) for their factories. This results in foreign investment in large-scale agricultural production, which displaces peasant farmers in the rural areas. The displaced farmers then move to the urban areas to seek employment (Bradshaw 1987).

Further, large foreign investments in capital-intensive manufacturing in urban areas results in increased output and industrialization in these areas. This does have a multiplier effect since businesses spring up to provide services that are linked either directly or indirectly to the manufacturing activities in urban areas (Gwynne 1985; Zhang and He 1997). This creates the false impression for rural residents that there are high-paying employment opportunities for them in urban areas hence their migration to urban areas. Upon their arrival to urban areas, they cannot get the high paying employment, which causes them to end up in the informal sector (Gwynne 1985; Rana 2009; Lu, Liang et al. 2011; Rana 2011).

2.4.3 Urban Bias Theory

Another approach for understanding urban development in developing countries is through the application of urban bias theory. This theory shifts the emphasis of urban development from the

economic perspective to political perspective. This perspective, spearheaded by Lipton (1977), argues that policies favor urban areas to the detriment of rural areas, hence the concentration of facilities and the creation of favorable conditions occur in urban areas (Lipton 1977). In addition, governments in developing countries tend to invest domestic capital on the provision of development facilities. These facilities are largely located in urban areas while a larger proportion of the population is found in rural areas (Bradshaw 1987; Cohen 2006). The facilities include hospitals, schools, libraries and other government/semi-government facilities. Investable resources in favor of rural residents, who are basically farmers, in the form of roads, small-scale irrigation facilities, agricultural machinery and storage facilities are often downplayed by the policy makers (Lipton 1977; Rana 2011).

Higher standards of living are created in urban areas resulting in the creation of disparity between urban and rural areas. As a result, rural residents tend to migrate to urban areas to take advantage of more favorable policies (Lipton 1977; Rana 2009; Rana 2011).

2.5 The West Bank Urbanization

There is no global standard for classification of urban environments. Virtually, all countries distinguish between urban and rural population, but the definition of what constitutes an urban area varies among countries and in some cases it even varies over time within a single country (Cohen 2006). Urban communities can be defined in any number of ways including by population size, population density, administrative or political boundaries, or economic function. Places that are classified as urban in one country may be classified as rural in another (Cohen 2006; Rana 2011).

The Palestinian population all over the World accounts today for more than 11 million Palestinians distributed in the Palestine, Israel, the Arab World and other foreign countries.

According to the Palestinian Central Bureau of Statistics (PCBS) 2012, the Palestinian population living in Palestine is 4.29 million of whom 2.65 million (62%) live in the West Bank and 1.64 million (38%) live in the Gaza Strip (Statistics 2012). There are approximately 661 Palestinian built-up areas in the West Bank spread over an area of 35,487 Hectares (ha) ((PCBS) 2008).

According to PCBS, the localities are divided into three types; namely: urban, rural and camps as follows:

1. Localities whose population amounts to 10,000 persons or more are **urban**. In addition, urban refers to all localities whose population varies from 4,000 to 9,999 persons provided they have at least four of the following elements: public electricity, public water network, post office, health center with a full-time physician and a school offering a general secondary education.
2. Localities whose population is less than 4,000 persons or whose population varies from 4,000 to 9,999 persons but lacking four of the above mentioned elements are **rural.**
3. Localities referred to as refugee camps and administered by the United Nations Refugees and Work Agency in the Near East (UNRWA) are **camps**. There are 19 refugee camps accommodating approximately 1.8 million in Palestine. 757 thousands (29.7%) of the West Bank population are registered refugees in the West Bank; while 1.1 million (67.4%) of Gaza strip population is registered refugees (Statistics 2012).

According to the Ministry of Planning and Administrative Development (MOPAD) report, both rural and urban areas are in need of development after the long-time occupation. The Israeli territorial strategies of unrealistically limiting border expansion of cities and villages has overloaded infrastructure and increased population density in the built-up areas. It has also

translated to the random, unplanned, and unlicensed construction of houses. Furthermore, it has contributed to rural-urban migration by people who are unable to find housing in the rural areas" (Planning 2008)

According to MOPAD, the living conditions in the West Bank are degrading due to population growth and unsatisfactory urban development. In the refugee camps, the living conditions are generally lower than elsewhere. They are very densely populated, have poor sanitation, narrow streets and poor quality houses.

2.6 The Palestinian Urban Patterns

Many elements contributed in shaping the patterns of Palestinian urban areas in the West Bank. The topography, the shape of the transportation routes, the surrounding agricultural and hinterlands, the location, planning and control, are among the elements that contributed to development and the shaping of urban patterns (Dudeen 2001; Alon-Mozes 2011).

Some Palestinian cities have strategic locations within the West Bank such as Hebron, Ramallah, and Jerusalem. Their urban pattern was shaped as a result of their location at the main nodes from which the main and regional roads radiate to connect the West Bank, and the function they perform in relation to their surrounding or other urban centers. In other cities, the urban pattern was shaped because of their location on areas that have natural resource potentials. For example water or agriculture are the foundations of the cities of Jericho and Qalqiliya. In cities like Tulkarem, the urban pattern was shaped as a result of location near the borderline, the potential derived from their function as market areas and as nodes of connection with other regions inside the West Bank (Thawaba 2009).

2.7 Urbanization and Agricultural Land Use

In an era in which the majority of the world's population lives in cities, food and agriculture industries are evermore unsustainable (Lu, Liang et al. 2011). Agricultural land in urban areas has an essential role in the sustainability of urban development, because it supports urban food security, and urban economy; especially in the urban poor areas, as well as protects the cities' environment (Kanagalakshmi and Nagan 2013).

The urbanization process is the major factor that influences the change of agricultural land use and has been widely studied (Veldkamp and Lambin 2001; Bryld 2003; Perner and Malt 2003; Semwal and Nautiyal 2004; Raddad, Salleh et al. 2010; Azadi, Ho et al. 2011; Lu, Liang et al. 2011; Kanagalakshmi and Nagan 2013). This change has negative impacts, such as: the loss of prime agricultural land and reduced agricultural jobs (Azadi, Ho et al. 2011). Consequently, it could affect agricultural production and threaten food security (Raddad, Salleh et al. 2010).

Agricultural Land use change is a phenomenon that is almost unavoidable during economic development and population growth periods and it varies from country to country in terms of intensity, trend and drivers(Lu, Liang et al. 2011). Globally , the estimated loss of agricultural lands by 2050 represents 5.7% of the total land under agriculture in 2000 (Azadi, Ho et al. 2011). Several regions can be expected to lose higher shares: Southeast Asia may lose more than 10% of its cultivated lands; Western Asia and North Africa, close to 10%; South and Central Asia, 8%; and East Asia, close to 7%. Though these losses could be considered worst-case scenarios, they offer quite realistic orders of magnitude of how much new land will need to be put under cultivation to meet projected food needs (Azadi, Ho et al. 2011). Subsequently, some countries such as China, Japan and the United States have tried to preserve agricultural land from being converted to other uses (Lu, Liang et al. 2011; Kanagalakshmi and Nagan 2013).

The literature provided several driving forces that contribute to agricultural land use change, which can be categorized into two main drivers: internal and external (Boardman, Poesen et al. 2003; Bryld 2003; Abu Hammad and Børresen 2006; Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010; Azadi, Ho et al. 2011; Lu, Liang et al. 2011; Barbero-Sierra, Marques et al. 2013; Kanagalakshmi and Nagan 2013). The external drivers include: industrialization, urbanization, road infrastructure development, socio-economic conditions and government policies. The internal drivers are related to the location, slope, land potential (including land productivity), ownership pattern (including land size) and household size and income.

2.7.1 Agricultural Land Use Change External Drivers

1. Industrialization: Despite the fact that industrial development is widely seen as an engine for economic growth, it is the main factor causing extensive agricultural land change (Lu, Liang et al. 2011). In some areas, land change is followed by other transformation such as a transition from agricultural economy to industrial and service-based activities, which means a decline in the number of households involved in agricultural activities (Azadi, Ho et al. 2011).
2. Urbanization: the urbanization process and rural–urban migration are two major factors that influence agricultural land use change and have been widely studied (Abu Hammad and Børresen 2006; Cohen 2006; Alphan, Doygun et al. 2009; Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010; Lu, Liang et al. 2011; Barbero-Sierra, Marques et al. 2013; Kanagalakshmi and Nagan 2013). These researchers found that there is a significant positive correlation between urban population growth (as the main measurement of urbanization) and agricultural land use change, because greater

population means an expansion of built areas to provide more housing and employment opportunities. This urban expansion is happening on the cost of fertile agricultural lands (Friedmann 1966; Alphan 2003; Cohen 2006; Rana 2011).

3. Road infrastructure development: infrastructure development, such as road construction also contributes to agricultural land use change in most countries (Cervero 2001; Rana 2011). As industry and urban development grow rapidly, the agricultural sector becomes commercialized, the people's income grows, and the number of commuting people increases, a reliable and efficient transport infrastructure is therefore needed for sustained economic growth, which demands a large amount of agricultural land (Alberti 2005). Many scholars believe road construction that supports industrial development and links to highways has caused a severe loss of fertile agricultural lands (Cervero 2001; Abu Hammad and Børresen 2006; Ge and Cao 2009; Abu Hammad and Tumeizi 2010; Rana 2011).
4. Governmental policy: most of economic development policies tend to promote industrial growth and indirectly stimulate intensive land use change in many developing countries, such as China (Lu, Liang et al. 2011). Furthermore, spatial development policy, which determines whether an area becomes industrial site or residential, boosts the change of agricultural land in that area (Cervero 2001; Xiao, Shen et al. 2006; Raddad, Salleh et al. 2010; Azadi, Ho et al. 2011; Rana 2011). Current housing regulations in Palestine for example, support local government to provide housing for the growing population by expanding into the surrounding lands even if they are fertile agricultural lands (Alberti 2005; Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010).

2.7.1 Agricultural Land Use Change Internal Drivers

1. Land productivity: land slope, distance to nearest cities and highways and natural characters are variables hypothesized as factors fostering agricultural land use change (Abu Hammad and Børresen 2006; Serra, Pons et al. 2008; Abu Hammad and Tumeizi 2010).

    a. *Land slope*: The vast majority of land use change is of those lands that have little slope, as lands with high slopes are less profitable for residential development due to high cost of landscape leveling. Construction costs (e.g., road construction, foundations and wells) on flat lands are almost always less than on uneven lands (Alberti 2005; Abu Hammad and Børresen 2006; Abu Hammad and Tumeizi 2010).

    b. *Distance to nearest cities and highways*: lands close to a city and major highways are prone to be converted to urban uses. Such prime locations attract housing development. The urbanization in these areas happens regardless of land fertility and production as lands with such characteristics i.e. close to cities and service are generally productive agricultural lands (Abdelhamid 2006; Lu, Liang et al. 2011; Rana 2011).

    c. *Natural factors*: such as rainfall characteristics and soil properties play an indirect role in agricultural land use change, as they affect land productivity. In other words, less productive land is easier to change to urban uses (Abu Kubi 2005; Abu Hammad and Børresen 2006; Abu Hammad and Tumeizi 2010).

2. Technology intensity: when using improved and modern technologies in agriculture demand for labor will decrease. Technologies will create a labor surplus in the agricultural sector. Laborers will look for jobs in urban areas and therefore require more lands for more services for the growing economy and population. Therefore, the more cities expand to fringe areas, the more agricultural land use change for urban uses can be expected (Xiao, Shen et al. 2006; Serra, Pons et al. 2008; Rana 2009; Lu, Liang et al. 2011; Rana 2011).
3. Farmers socio-economic factors: poverty, low level of education, decrease in standard of living, and poor health condition are causes of agricultural land use change (Abu Kubi 2005; Abu Hammad and Børresen 2006; Abu Hammad and Tumeizi 2010). Landis an important variable which should be considered due to the scale of economy and land value (Azadi, Ho et al. 2011). From the housing developers' point of view, it is more feasible and profitable to choose large lands rather than small ones due to the economy of scale. Therefore, the land value increases alongside its size (Zanganeh Shahraki, Sauri et al. 2011). It is the opposite in Palestine, as Abu Hammad and Tumeizi (Abu Hammad and Tumeizi 2010) found in their study that the smallholder farmers sold their lands for immediate benefits to counter their low standard of living. This trend is mainly attributed to the high poverty rate and the high price offered for the land. Further, the study found a direct significant correlation between the education level and the trend of the farmers to sell their land for urban uses. The study results were in agreement with a study conducted by Raddad et al. in (Raddad, Salleh et al. 2010),which found a strong correlation between the aforementioned factors and selling of land for urban uses. Another important social factor in agricultural land use change is land fragmentation due to the inheritance system,

which is related to the Islamic Law of Inheritance, where the fathers' land is divided between sons and daughters (Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010).

All of these factors can be considered driving forces contributing to agricultural land use change and loss of arable lands. In this study, and due to the unique situation in Palestine, another important factor that will be investigated deeply is the political factor. Agricultural land use change and loss is noticeable due to land confiscation, decrease in the farmers' access to their lands, land fragmentation and the loss of the farmers' land ownership for military and colonial activities as well as for construction of the Separation Wall.

It is worth noting that in a politically complicated (conflict) area like Palestine, where there is a political conflict over the same landscape, geopolitical factors may potentially mediate the impact of other factors. More details about the political situation in Palestine are discussed in the Section 2.9 after a brief description about the agricultural sector situation in Palestine, which is presented in the section 2.8

2.8 A Review of the Palestinian Agricultural Sector

About 11.5% of the Palestinian workforce work in the agricultural sector in the year 2012, while 20% work in the trading and restaurant services and 30% in the service and governmental sector (Statistics 2012). Many people, who have been unable to continue jobs in Israel as a result of ever tightening restrictions, are absorbed by the agricultural sector.

In general, agricultural production in Palestine is aimed at domestic consumption. Producers sell any surplus after domestic consumption in both the local and external markets ((PCBS) 2008). At present, the agricultural sector is able to exceed demand in the production of the main vegetables such as tomatoes and cucumbers, but is under-producing commodities like

potatoes and garlic. Fruit production is generally unable to meet the requirements of the population, the exceptions being olives and grapes (Ministry of Agriculture 2012).

According to the size of producing areas, rain fed agriculture is the main sub-sector, occupying 87.0% of the total cultivated land. However, its contribution to overall plant production is only 28.5%, compared with the open irrigated agriculture, which occupies 11.0% of total producing areas, yet contributes 43.1% of the total plant production. Irrigated protected agriculture occupies only 2.0% of the total cultivated area, but produces almost half of the total plant production (28.4%) (Statistics 2012).

2.8.1 The Diversity of Planted Crops

The total cultivated area in Palestine is usually categorized into fruit trees (62.6% of total area), field crops (27.6%) and vegetables (9.8%) (Statistics 2012). In the West Bank, there is a predominance of fruit trees followed by field crops, both mostly watered under a rain-fed regime. Nevertheless, there is a significant area of irrigated vegetable production. In the Gaza Strip, there is a clear dominance of irrigated agriculture, mostly devoted to vegetables and fruit trees, with a significant area also for rain-fed field crops ((MAS) 2005).

Currently, up to 105 main crop types are cultivated, including 38 types of fruit tree (olives, almonds, other nuts, plums, apricots, peaches, pears, cherries, etc.) and 37 types of vegetable crop (snake cucumber, cucumber, tomato, onion, etc.) in addition to cut flowers and 30 types of field crop and grain (particularly wheat, barley, chickpeas, lentils, sorghum and vetch), which are cultivated according to rain fed and/or irrigation techniques (Statistics 2012).

1. **Fruit Trees**

Rain fed fruit orchards span much of the West Bank. Olives, citrus fruit, grapes and plums represent the leading fruit crops within the West Bank with a clear dominance of olive

production accounting for up to 81.4% of the fruit tree area in Palestine. The plantations are concentrated in the north districts of the West Bank such as Tulkarem. Production can vary between 5,000 and 180,000 tons according to the bi-annual olive cycle (Statistics 2012).

Citrus is by far the most important fruit crop in terms of value, although they account for only 2.4% of the total fruit tree area in Palestine, and the harvest is relatively small (approximately 60,000 tons annually). The production is heavily water intensive and concentrated mainly in the Gaza Strip (Statistics 2012). Grapes are also an important rain fed crop, contributing approximately 50,000 tons to total annual production, and accounting for 6.6% of the total fruit tree area. Grapes are concentrated primarily in south districts of the West Bank. Almonds account for 3.7% of the total fruit tree areas, and are concentrated in Jenin and Tulkarem districts. In a relatively smaller area, but of larger economic importance, are various stone fruits, including plums, peaches and apricots, which are generally well maintained, efficient producers (Statistics 2012).

2. Vegetables

Cucumber, tomato, okra and squash are the main vegetable crops, comprising 63.8% of the total vegetable area of Palestine. Palestinians produce more than 87,210 tons of vegetables annually. While 42.9% of that production is produced in the Gaza Strip, the rest is produced in the West Bank, in both cases there is a high predominance of irrigation production (Statistics 2012).

3. Field Crops

Wheat and barley are vital crops that respond well to the environmental conditions of the Mediterranean region. Wheat covers 42.2% of the total area of the field crops, while the area devoted to barley cultivation is 21.6% of the total area of field crops (24,541 ha) (Statistics 2012).

2.8.2 Economic Contribution of the Agricultural Sector

The agricultural sector is a vital sector in the Palestinian economy, as it has demonstrated to be one of the key sources of growth in the Palestinian economy ((MAS) 2005). The changes in agricultural activities are usually linked not only with climatologic conditions but also with sociopolitical changes and conflicts. The Palestinian economy is highly susceptible to external shocks, political events and the Israeli business cycle, including fluctuations in Israeli agricultural productivity (Tamimi 2011).

For this reason, the Palestinian economy is extremely vulnerable. Prior to the Intifada in 2000, the agricultural sector contributed 6.4% to the gross demotic product (GDP) in the year of 1997. The GDP estimates for the years 2005 and 2006 showed that the agriculture contribution to the Palestinian GDP reached 7.0% and 8.0%, respectively, while it contributes 8.2%, 5.9% and 4.8% in 2007 2008, and 2009. The estimation for the year of 2012 was 5.6%. While,service activities recorded the highest growth rate in 2012 for 13.2%, follwoed by construction with 6.5%, and information and communication with 5.9% (Statistics 2012).Therefore, the contribution of the agricultural sector varies from one year to the next, based on the activity of other economic sectors, and the accessibility of the Israeli job market to Palestinian workers.

2.8.3 Contribution to Exports and Foreign Exchange

Agricultural products account for 25% of the export trade from Palestine (Statistics 2012). Fruit (including strawberries and dates), olives and olive oil, vegetables and cut flowers are the primary export products. The shift to export-oriented agriculture increased the dependency on imports of agricultural inputs used for intensive farming. It also increased the dependency on Israel, as Israel controls all access to external markets, and so produce destined for other areas in the world must first pass through Israel. Israel is the main importer of Palestinian agricultural

products (around two-thirds of the total), followed by the Arab Countries and the European Union (World Bank, 2006, Ministry of Agriculture 2012). Due to political conflicts, the value of agricultural commodities exported to Israel and other countries fell from US $97.3 million in the year 2000 to US $21.1 million in 2003, with a negative balance of US $76.2 million. During this period, exports to Israel fell by 84.7% ((PCBS) 2008). This demonstrates the significant impact of export reduction on Palestinian economic strength and viability. Thus, the export potential of the Palestinian agricultural products depends essentially on access and mobility, which in turn is influenced by the geopolitical situation.

2.8.4 The Impact of Geopolitics on Agriculture

The agricultural sector in Palestine faces a number of serious constraints, most of which are a direct result of the activities of Israeli control. The ongoing construction of the Separation Wall and the increasing number of physical impediments to movement, such as roadblocks and checkpoints are all having a dramatic effect on the ability of farmers to access their lands and markets (Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010; Tamimi 2011). The costs of transporting goods to market, and receiving agricultural inputs, have increased because of longer journey times. Produce destined for external markets frequently spoils as it is detained at checkpoints. In addition to the restrictions on movement, the Separation wall and network of Israeli roads, are effectively annexing important areas of agricultural land and agricultural water resources (Trottier 2007; Pallister-Wilkins 2011; Tamimi 2011). Therefore, the occupation has caused a huge financial loss to the agricultural sector in Palestine.

2.9 The Impact of Political Factors on the West Bank Landscape

Since 1967, successive Israeli governments have pursued policies that have affected the landscape of the West Bank. These policies resulted in direct physical change to the landscape, such as settlements and bypass roads, dividing the West Bank to A, B, and C areas and the Separation Wall.

In 1994, representatives of the State of Israel and the Palestine Liberation Organization (PLO) signed the "Oslo Accords". The Oslo Accords contain a set of mutually agreed-upon general principles regarding a five-year interim period of Palestinian self-rule. The "permanent status issues" are deferred to later negotiations, to begin no later than the third year of the interim period (Facts 2011). The permanent status negotiations were intended to lead to an agreement that would be implemented to take effect at the end of the interim period. The main point of the Oslo Accords was the transfer of powers and responsibilities to the Palestinians in the West Bank and Gaza, so they may have control over their own affairs (Facts 2011). Figure 2.2shows a map of the Palestinian Territories (the West Bank and Gaza Strip) (USAID 2005).

Figure 2. 2: A Map of the Palestinian Territories (the West Bank and Gaza Strip) (USAID 2005).

Moreover, the Oslo Accord resulted in dividing the West bank into three regions, A, B, and C. Area A is under full civil control of the Palestinian Authority, Area B, under the Palestinian administration and Israeli security control, and Area C under full Israeli control. After the beginning of the second Intifada (uprising) in 2000 and the resulting new political situation, Israelis reoccupied all the Palestinian cities and towns, including these located in areas A and B, and took the decision of constructing the Separation Wall, where large portions of Palestinians' land were extracted for the purpose of constructing the wall (Lagerquist 2004; B'Telem and Bimkom. 2005).

The existence of the Israeli settlement structures, including settlements, bypass roads, the West Bank Separation Wall, and check points as well as the division into Areas A, B, and C caused significant fragmentation for the West Bank land and impacted the urban form and expansion of the Palestinian cities. All these factors are described in details as follows:

2.9.1 The Israeli Settlements

In the West Bank there are 144 settlements distributed along major roads, around the major Palestinian cities and towns, and at high points (Statistics 2011). Settlers may settle for ideological reasons. Others may also be driven by the relatively high quality of life, economic opportunities and incentives given by the Israeli government to encourage settlement expansion. These incentives include low taxes, low-interest mortgages, cheap land plots and housing units (Hever 2005). Settlements keep receiving incentives, though living standards in settlements are higher than the average inside Israel. Settlers have higher incomes, better levels of education, and lower unemployment rates than their counterparts inside Israel (Hever 2005). Settlements have regional and municipal control of 40 % of all the West Bank, with a further

20 % marked as land reserves and/or security zones ((PCBS) 2010). Figure 2.3shows a map for the Settlements in the West Bank ((UN) 2006).

The building of these settlements within the West Bank puts restrictions and impacts on the expansion of the Palestinian communities, as well as extracting their lands. Many settlements are built on prime agricultural land confiscated from Palestinians, or over key water resources such as the Western Aquifer basin, springs and wells (Hever 2005; (UN) 2006). Israeli West Bank settlers domestically consume 280 Liters/day of water per person compared to 60 L/day per person available for Palestinians in the West Bank ((UN) 2006). The World Health Organization (WHO) and the United States Agency for International Development (USAID) recommend 100 L/day of water per person as the minimum quantity for basic consumption (B'TSELEM 2008), which means that settlers utilize far more than double the water required, while Palestinians do not approach the minimum.

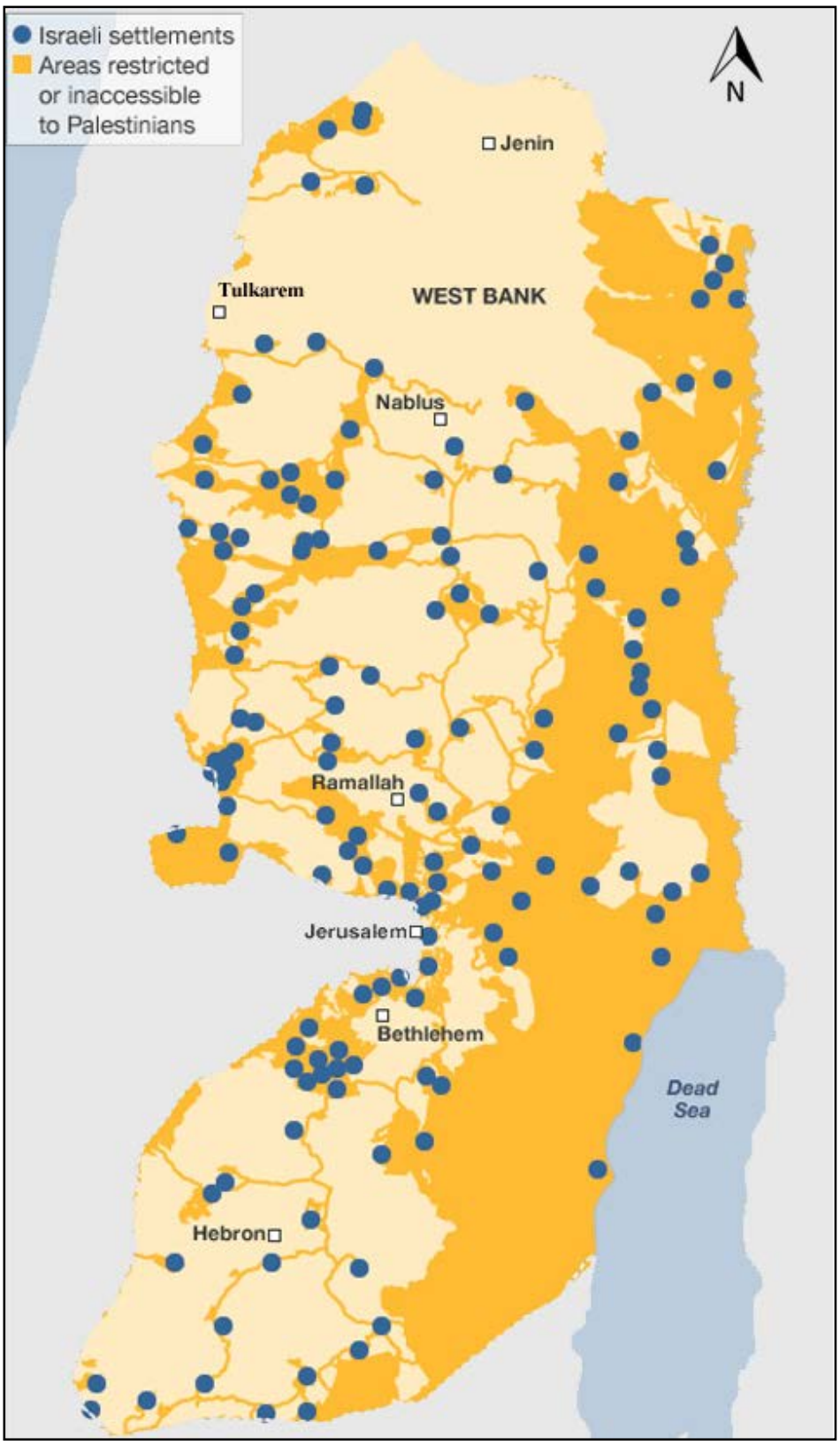

Figure 2. 3: A Map for the Israeli settlements in the West Bank ((UN) 2006).

2.9.2 The Israeli Bypass Roads in the West Bank

The bypass roads enable Israeli settlers to travel to settlements and Israel without having to pass through Palestinian communities. According to the Israeli information center for human rights in the occupied territories (2004) ((B'TSELEM) 2004), the bypass roads may be classified into three categories based on the restriction on the Palestinian travel on these roads:

1. First are roads where Palestinian use is prohibited. This category includes 17 segments of roads that total 120 km.
2. The second category includes roads on which Palestinians can travel in private cars if they have a special permit. Ten roads, totaling 245 km in length, fall within this category.
3. The third category includes roads that Palestinians are allowed to use without a special permit but the access to these roads can reach only via an intersection with a checkpoint. Fourteen roads are within this category, with a total 365 km.

To date it is unclear how many kilometers of road Israel is planning to build. All bypass roads have a 50–75m buffer zone on each side (B'TSELEM 2004). Therefore, it can be estimated that about 10,950ha of land located in these buffer zone. Construction and agricultural activities are not allowed in these areas, which have led to a great loss of agricultural and privately owned Palestinian land.

2.9.3 The Administrative Division of the West Bank

Political decisions and orders after the signing of the Oslo Accords in 1994 have classified the control over land into three categories (Gvirtzman 1998):

1. Area A: in these areas the Palestinians have a political and security control as well as the responsibility for planning and development issues in such areas. Mainly, Palestinian urban centers. This constitutes 12% of the West Bank land area.
2. Area B: Palestinian civil control including the responsibility of planning and development and joint Israeli-Palestinian security control. Includes areas of many Palestinian towns and villages and areas. These areas constitute 26% of the West Bank land area.
3. Area C: these areas are under full Israeli civil and security control. Areas C include all Israeli settlements (cities, towns, and villages), land in the vicinity of these localities, most bypass roads that connected the settlements as well as strategic areas described as "security zones" and almost all of the Jordan Valley and the Judean Desert. These areas constitute 62% of the land area. Figure 2.4 shows a map for the land classification according to the "Oslo Accords" (Jadallah 2009).

Areas A and B are themselves divided among 227 separated areas by Israeli-controlled Area C, 199 of which are smaller than 2 km^2 (Bimkom 2008; Jadallah 2009). Such classification of land has resulted in the fragmentation and the limitation of urban expansion of most Palestinian cities close to areas of category C, where the Palestinians do not have any planning authority or are forbidden, through military orders, to build in this area. Therefore, irregular urban forms or even fragmented forms will take place especially when the land devoted for future development is very limited (Abdelhamid 2006).

Figure 2. 4: A Map of the West Bank A, B and C areas according to Oslo Accords (Jadallah 2009).

It is worth noting that housing is considered to be the biggest problem as currently there are 6.4 residents on average per housing unit, a very large number by the developed country standards (Abdelhamid 2006). If Palestine's population in West Bank rises from 4.29million in the year 2012 to nearly 6.60 million over the next ten years, and if current housing densities are to remain stable at 5.76 persons/unit, 401,000 new housing units will have to be constructed during this period (Eldar 2005; Abdelhamid 2006; Statistics 2012). With an average area of 119m^2/unit, it can be estimated 4.77 km^2 (477 ha) is needed for these housing units. This leads to an expansion of built up area on the surrounding agricultural and natural resources land due to the political restrictions which will lead to environmental and ecological problems in the urban and rural areas (Hassan, Shahin et al. 2010; Raddad, Salleh et al. 2010).

2.9.4 The West Bank Separation Wall

After the beginning of the second Intifada (uprising) in 2000, the Israelis reoccupied all the Palestinian cities and towns, including these located in areas A and B. In addition, the Israeli government took the decision of constructing the Separation Wall along the "Green Line". The construction of the Wall has affected the development of Palestinian cities, where large portions of their land (mostly land devoted for future expansion in addition to agricultural land) were extracted for the purpose of the Wall construction (Lagerquist 2004; B'Telem and Bimkom. 2005).

The Separation Wall's total length is 723 km, which is twice the length of the Green line. When completed, approximately 14% of the Separation Wall will be constructed on the Green line or in Israel, while 86% will be inside the West Bank (Trottier 2007). Figure 2.5 illustrates a map that shows the path of the Separation Wall in the West Bank (Forum 2005).

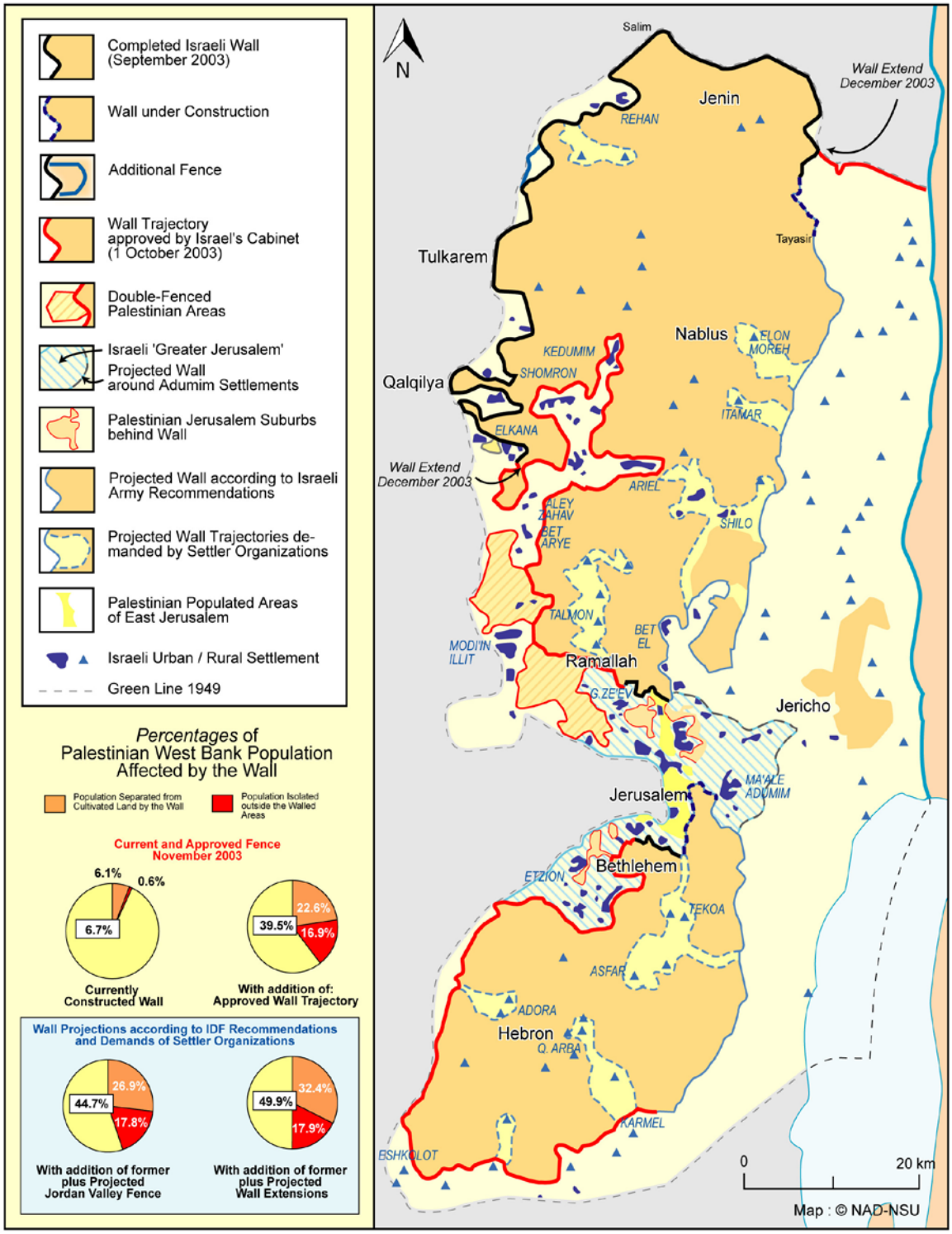

Figure 2. 5: A Map illustrates the Separation Wall in the West Bank (Forum 2005).

According to B'Tselem (The Israeli Information Center for Human Rights in the Occupied Territories) statistics, which was published in June 2012, the completed part of the Wall is 440 km (62.1% of the total length). Upon completion, 8.5% of the West Bank area will be on the Israeli side of the Wall, and 3.4% partly or completely surrounded on the eastern side (B'TSELEM 2014).

Ninety percent (90%) of the length of the Separation Wall is a fence with vehicle-barrier trenches surrounded by an on-average 80 m (260 ft) wide exclusion area, as illustrated in Figure 2.6 (B'TSELEM and Bimkom 2005), while 10% of the Separation Wall is 8 m (26 ft) tall concrete slabs. Along the Separation Wall, there are watchtowers and entry gates (Trottier 2007). Figure 2.7 and 2.8 show photos for different sections of the Separation Wall, both fence and concrete slabs.

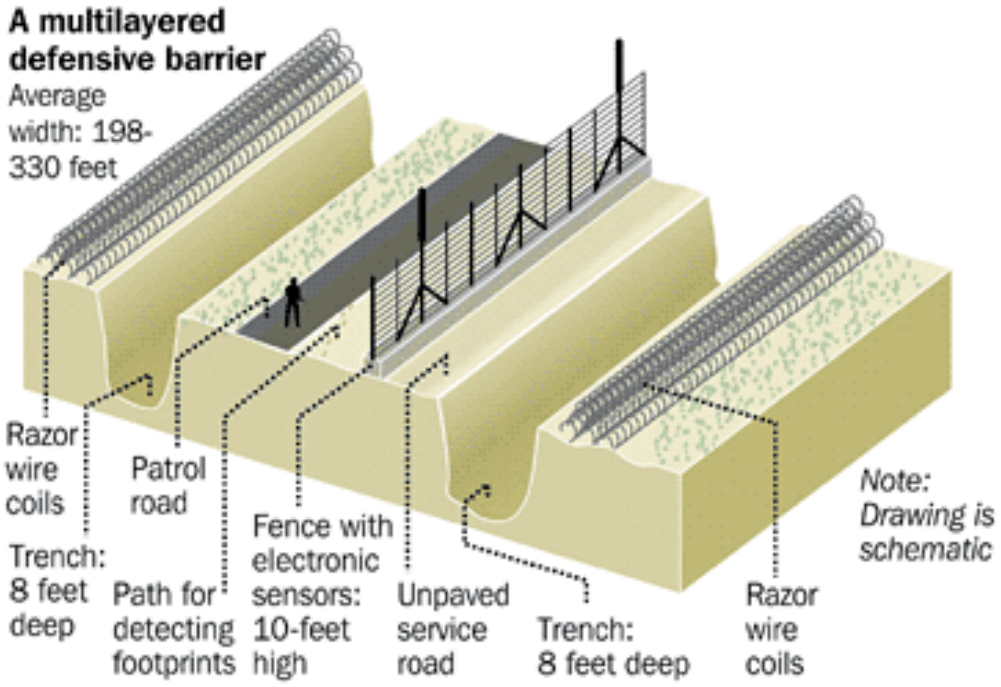

Figure 2. 6: A cross section shows the component of the Separation Wall fence (B'TSELEM and Bimkom 2005).

Figure 2. 7: Photos show different sections of the fence Separation Wall in the West Bank (Parry 2003; Humanityvoice 2010).

Figure 2. 8: Another photo for a section of the concrete slabs Separation Wall in the West Bank (ThridAge 2011)**.**

The enclosed areas, which is called the "Seam Zone" includes a large partition of the West Bank's farming regions (approximately 15% of the West Bank agricultural lands). This would likely add further fragmentation of ecosystems and habitats as well as impose a huge

impact on the Palestinian agricultural sustainability (Abu Hammad and Børresen 2006; Abu Hammad and Tumeizi 2010; Harker 2010). Figure 2.9 shows a map of the West Bank land use classification with the existence of the Separation Wall.

In areas containing large Palestinian communities close to the Green Line where the path of the Separation Wall follows the 1948 borders, the Israeli authorities erect an additional depth barrier (a trench) a few kilometers east of the main Wall. This trench's objective is to channel movement in those areas to a number of security monitoring points (Lagerquist 2004).

Although no official map showing the course of the barrier has been authorized by the Israeli authorities, the Tulkarem District Coordination Office (DCO) of the Israeli Defense Forces (IDF) confirmed that such a trench will surround Tulkarem, extending eastwards to include Nur-Shams camp, which will make the city enclaves, isolated between the Separation Wall on the Green Line and a trench to the east (Lagerquist 2004; Department 2011). The map of Figure 2.10 identifies Nur Shams and the planned trench around Tulkarem (Lagerquist 2004).

The existence of the Separation Wall severely affects the Palestinian communities (Parry 2003; Lagerquist 2004; Usher 2006; Trottier 2007; Pallister-Wilkins 2011; Tamimi 2011). Approximately 35,000 West Bank Palestinians are located in the Seam Zone. They require permits to live in their homes and can only leave their communities via a gate in the Wall. This is in addition to the majority of the 250,000 East Jerusalem residents. Another 125,000 Palestinians in 28 communities are surrounded on three sides by the Wall and 26,000 Palestinians in 8 communities are surrounded on four sides by the Wall, with a tunnel or road connection to the rest of the West Bank (Lagerquist 2004; Arsenault and Green 2007; Fields 2010; Amir 2011).

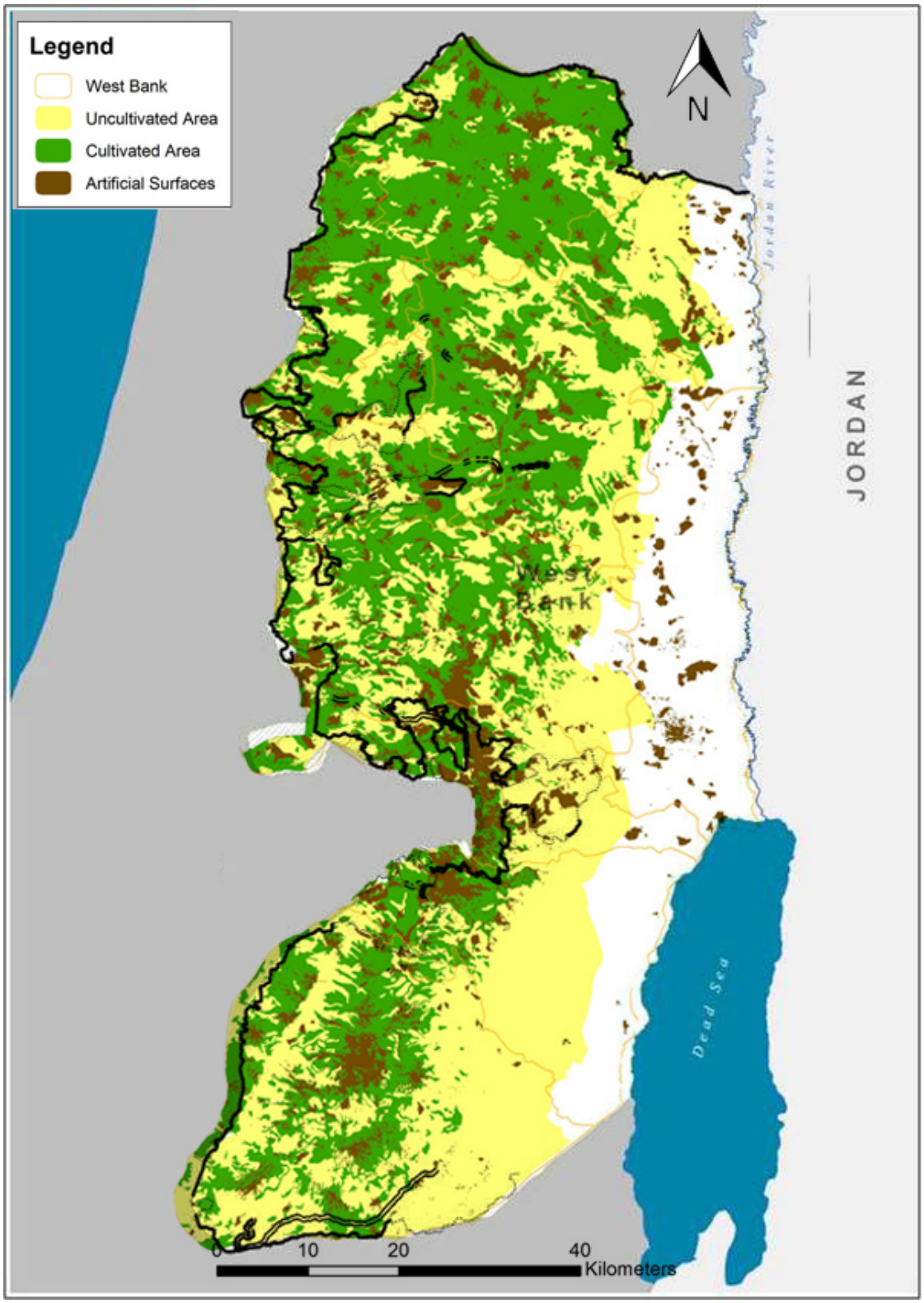

Figure 2. 9: A Map of the West Bank land use classification with the existence of the Separation Wall (ARIJ 2012).

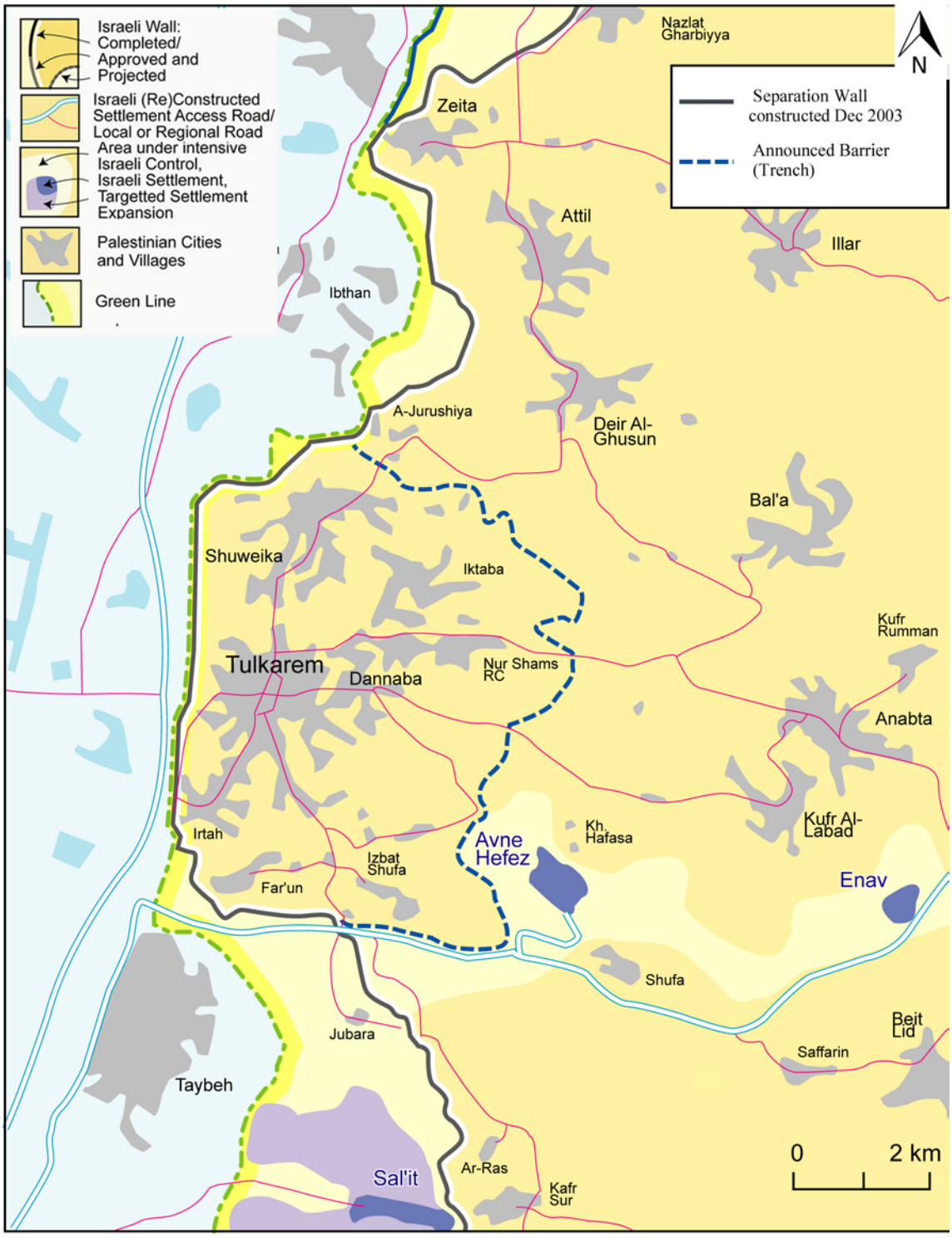

Figure 2. 10:A Map shows the planned trench around Tulkarem (Lagerquist 2004).

Further, the Separation Wall augurs a further unraveling of the economic and social fabric of Palestinian life in the West Bank. Bleak evidence is already at hand along its completed parts in the northwestern West Bank and around East Jerusalem, where Palestinian access to land, water, markets, and health and education providers has been severely curtailed (Lagerquist 2004; Arsenault and Green 2007; Trottier 2007; Batniji, Rabaia et al. 2009; Amir 2011; Pallister-Wilkins 2011; Tamimi 2011). Already, the approximately 210,000 Palestinians living in the Qalqilya, Jenin, and Tulkarem districts suffer its consequences (B'TSELEM and Bimkom 2005).

Generally, in the predominantly rural region covered by the completed parts, the Separation Wall has separated farmers from some 12,146 ha of land not including 1468haon which the Wall is built and the some 102,000 olive and fruit trees uprooted to make way for its path (Lagerquist 2004; Harker 2010; Tamimi 2011). Local irrigation networks and water storage facilities have also been destroyed in this process, compounding the woes of farmers cut off from a large proportion of their irrigation wells (MacDonald, Ó Dochartaigh et al. 2009).

Though agriculture accounted for only 10-15% of the Palestinian economic output before the 2000 intifada, it has become an important local subsistence buffer following the economy's collapse, particularly for the estimated 70% of the households in areas covered by the west part of the Separation Wall construction (Lagerquist 2004; (MAS) 2005; Trottier 2007; Fields 2010; Pallister-Wilkins 2011). The longer-term development of Palestinian agriculture, already constrained by regional water shortages, will be further undermined by the existence of the Separation Wall, which extracted the main ground water aquifers areas and cut the farmers off from their main irrigation wells (Trottier 2007; MacDonald, Ó Dochartaigh et al. 2009). Figure 2.11shows a map of the Separation Wall and the West Bank's main underground water resources.

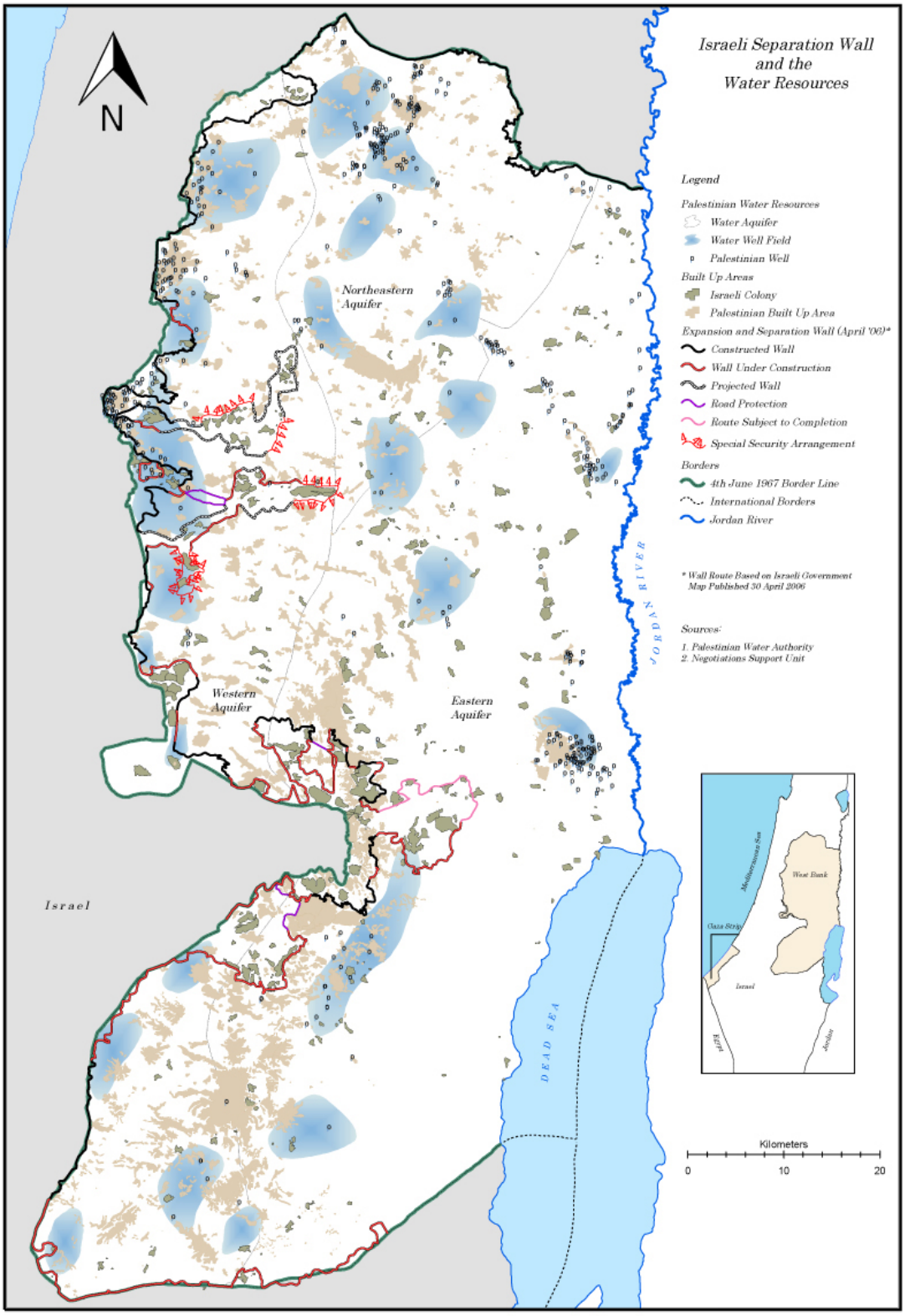

Figure 2. 11: A Map of the Separation Wall and West Bank the main underground water sources (Palestinian Ministry of Planning 2006).

Also, the existence of the Separation Wall has a deep social impact on the communities located in the Seam Zone because the residents of these communities find themselves separated from schools, clinics, and social services (Arsenault and Green 2007; Harker 2011), that have impact on the living conditions and will induce migration flows. It is worth noting here that, in some communities, the Wall has divided the community itself like the case of East Jerusalem that separated families from each other. It has an impact on the social life of the community and its citizens (Falah 2004; Arsenault and Green 2007; Amir 2011).

In the context of economic impact, the available census data and information indicate that Palestinian villages and towns in Tulkarem, and Qalqiliya located on or near the Green Line generally fared better in economic terms prior to the intifada and the construction of the Separation Wall than communities in the same district situated further from the Green Line (UNRWA 2003; (MAS) 2005). Several factors gave the border communities advantages and greater income-earning opportunities such as: they had easier access to the Israeli labor market; the relatively porous borders allowed manufacturers, farmers, and merchants from border areas to penetrate the wealthier Israeli consumer market; and large numbers of Israelis, both Arab and Jewish, regularly frequented the border towns to purchase lower-cost goods and services, boosting commercial and service incomes (Lagerquist 2004; Humanityvoice 2010; Tamimi 2011).

However, the natural and acquired economic advantages of this region have been steadily eroded since the construction of the Separation Wall (Tamimi 2011). Increasingly mobility restrictions for people and vehicles have rendered the Israeli labor and commodity markets considerably less accessible, and have drastically reduced the numbers of Israeli shoppers in local markets. Direct and indirect evidence suggests that the loss of these advantages has

considerably impacted these communities (Lagerquist 2004; Tamimi 2011). Contributing to the economic downturn has been the destruction of both private property and public infrastructure, which some built with donor assistance, for the purpose of the Wall construction (Trottier 2007; Pallister-Wilkins 2011; Tamimi 2011). A total of US$110 million damage was inflicted upon Jenin, Tulkarem, and Qalqiliya districts alone. About 58% of this damage has occurred to infrastructure, 23% to private property, and about 21% to agricultural land and assets (UNRWA 2003; (MAS) 2005). Direct damage to these communities from the Wall construction included the destruction of some 83,000 olive and other fruit trees, 61.5 ha of irrigated land (including greenhouses), 37 km of water networks and 15 km of agricultural roads. In addition, a total of 2,3834 ha of land are being isolated in the Seam Zone with 57% of this land cultivated, mostly with olive trees and field crops (UNRWA 2003; Falah 2004; Lagerquist 2004; (MAS) 2005; Arsenault and Green 2007; Trottier 2007; Harker 2010; Humanityvoice 2010; Pallister-Wilkins 2011; Tamimi 2011).

Crossings and Gates in the Seam Zone

Under what it terms a 'Fabric of Life' policy, the Israeli army claims that it is making efforts to minimize the Wall's impact on Palestinian lives, by allowing access through some 66 gates, on the condition that they have a permit and following a security check. Further, the Israeli army has set up six crossings, which also serve as the last point for checking people before entry into Israel. These crossings are open daily, for between 12 and 24 hours, and people and goods cross through them from the West Bank into the Seam Zone and from there into Israel and in the opposite direction, from the Seam Zone into other parts of the West Bank. Soldiers or Border Police officers operate these crossing points (B'TSELEM 2012).

It is worth noting that the official Israeli policy documents were not available. So, the following information was published by B'Tselem in October 2012 in response to the claimed policy statements (B'TSELEM 2012).

The Separation Wall Gates

There are three main categories of gates(B'TSELEM 2012):

1. Twelve agricultural day gates, opened 2-3 times a day, generally for periods of 15-90 minutes. Palestinian farmers are required to finish their day's work before the gates close. Any farmer with a permit may cross the barrier to reach his lands via one particular gate.
2. Ten agricultural weekly and seasonal gates, which are open for one to three days a week to enable access to olive groves.
3. Forty four seasonal gates, opened only during the olive harvesting season, generally between September and November, and on rare occasion during the plowing season.

There are also a few operational gates along the route of the barrier that serve the security forces exclusively.

The Permit Regime

The "*permit regime*" is a system of instructions and orders issued by the Israeli military for the purpose of imposing control on who enters and who is present in Seam Zone areas. The Israeli military formulated a list of reasons for which Palestinians require a permit from the Civil Administration to enter the Seam Zone. The permits are time restricted from between one day to two years. In the language of the military order, other "*types of people*" Israelis, Jews without Israeli citizenship (those "entitled to immigrate to Israel under the Law of Return") and foreigners (tourists, but not Palestinian residents of the West Bank with dual citizenship), are permitted to enter the Seam Zone freely, without the need for a permit (B'TSELEM 2012).

Official sources acknowledge that the permit regime harms the ability of Palestinians to carry on with their regular lives. According to B'Tselem report, it was posted on the Ministry of Defense web site that the Coordinator of Government Activities in the Territories (COGAT) is aware of the need to enable Palestinians living in the Seam Zone to preserve their *"connections in terms of employment, agriculture, trade, education, health, and family ties to the West Bank area on the one hand, and enable the Palestinian Authority and the residents of the West Bank to provide services and maintain contact with residents of the 'Seam Zone' on the other hand*". (B'TSELEM 2012).

Regarding the opening hours, these gates cannot be opened before 6:30 AM and close before the sunset for safety and security reasons(B'TSELEM 2012). Even though, the High Court justices acknowledged that the permit regime *"makes things extremely difficult for the Palestinian residents and severely damages their rights*" and makes it difficult *"to conduct a normal lifestyle for residents of the Seam Zone and their brothers who live in the rest of the surrounding area"*, the justices ruled that, the permit regime is legal and meets the test of proportionality (B'TSELEM 2012).

There are different types of permits, such as permanent resident permit, year-round and seasonal farmers' permits, commercial and business activities permit, and permit for the passage of private, commercial or agricultural vehicles.

A Critique of the Permit Regime

It is recognized that the permit regime limits the possibilities for residents of the West Bank to be in the Seam Zone or to cross freely from one side of the Wall to the other. The direct impact of this permit regime is a reduction in the agricultural activities on the Seam Zone land, fewer employment options, and a chilling effect on the potential for any meaningful economic activity.

According to B'Tselem not all the submitted permits issued for the Palestinians. For example in the year of 2005, of the total of 9,777 permits requested 86% were issued. In 2006, there were 1,285 permits issued, comprising 88% of the number requested. In 2009, the year the Seam Zone area was expanded, 713 permits were issued, comprising 33% of the total requests. In 2010, there were 1,200 permits issued, comprising 49% of the requests (2,446 in all). Additional damage is caused by restricting access to the land to the opening hours for the agricultural gates hours that were set to suit the needs and the convenience of the security forces, not the needs of the farmers (B'TSELEM 2012).

In practice, however, such access is increasingly limited; the gates open for very short periods at irregular times, passage has been subject to the caprices of Israeli soldiers, and even when farmers obtain permission to pass they have been prevented from taking their agricultural equipment with them. Leaving their fields unattended causes damages and losses of seasons, which carry stark economic, social, and political implications for the Palestinian farmers (Lagerquist 2004; (MAS) 2005; Trottier 2007; Harker 2010; Pallister-Wilkins 2011).

2.10 The Study Area

Tulkarem is located in the northwest of the West Bank of Palestine, about 160 m above the sea level. Figure 2.12 shows a map for the location of the study area within the West Bank.

Figure 2.12: Location of the study area, the city of Tulkarem**.**

The city population was affected by the political situation, such as during the 1948 war, which caused migration of a high number of people to Tulkarem from other cities inside the 1948 area of the historical Palestine and caused large increase of the city population in a brief period of time. In 1967, the total population has decreased because of the 1967 war. It increased again in the subsequent years. During the last intifada, which started in 2000, and because of the closure surrounding the city, the percentage of population increase fluctuated as many families

moved to other cities or abroad. Figure 2.13 shows the city population growth for the period of 1904 to 2012 and the predicted population up to 2016 (Statistics 2012).

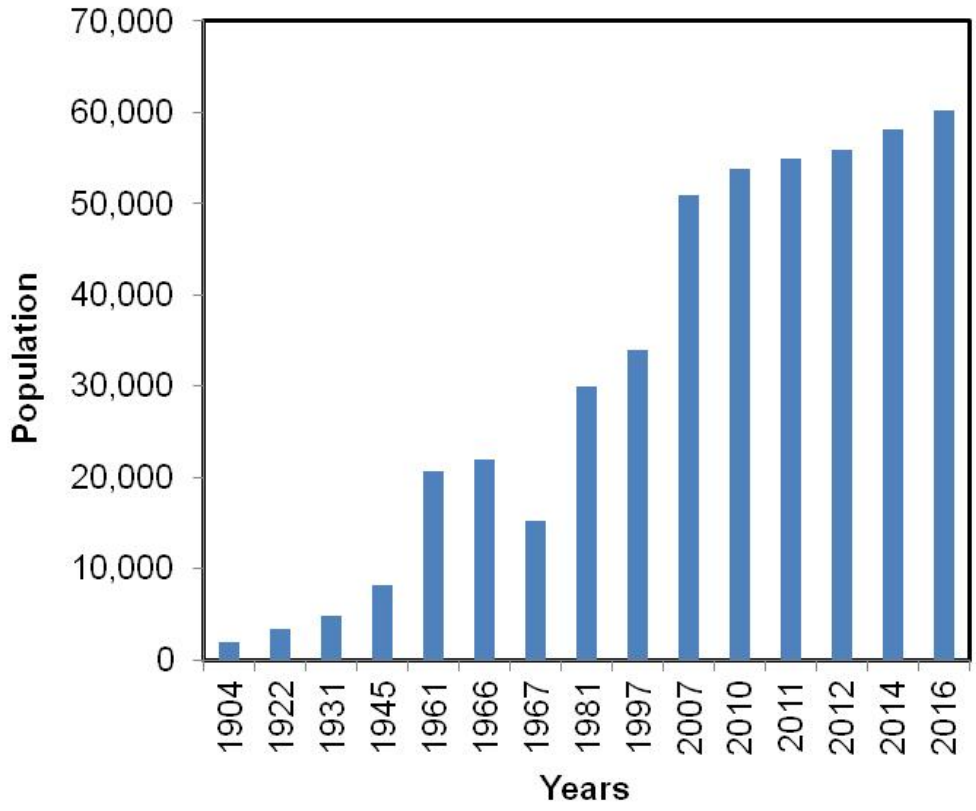

Figure 2.13: Population growth of Tulkarem between 1904 and 2012 and the prediction up to 2016(Planning Department 2011; Statistics 2012).

Clearly, population was increasing rapidly and started to slow down and level off by the year of 2007. The population of Tulkarem was 55,922 residents in the year of 2012, including those who are living in Thenaba, Irtah and Shweka. Residents who are living in the two refugee camps located within the city boarders, namely Tulkarem Camp and Nur-Shams Camp, which are home for 11,600 and 7,063 refugees, respectively(Statistics 2012), and those who are living in Iktaba village, which is located within the city boundaries and receives the municipality services, are not included. Hence, the total population within the city boundaries was 77,490 in the year of 2012. Figure 2.14 presents a map of Tulkarem with the suburbs and camps located

with the city boundaries. Figure 2.15 shows a histogram of Tulkarem and its suburbs population growth for the period of 2007-2012 and the predicted population up to 2016(Statistics 2014).

Figure 2. 14: A map of Tulkarem with the suburbs and refugee camps located within the city boundaries (prepared by the author, 2014).

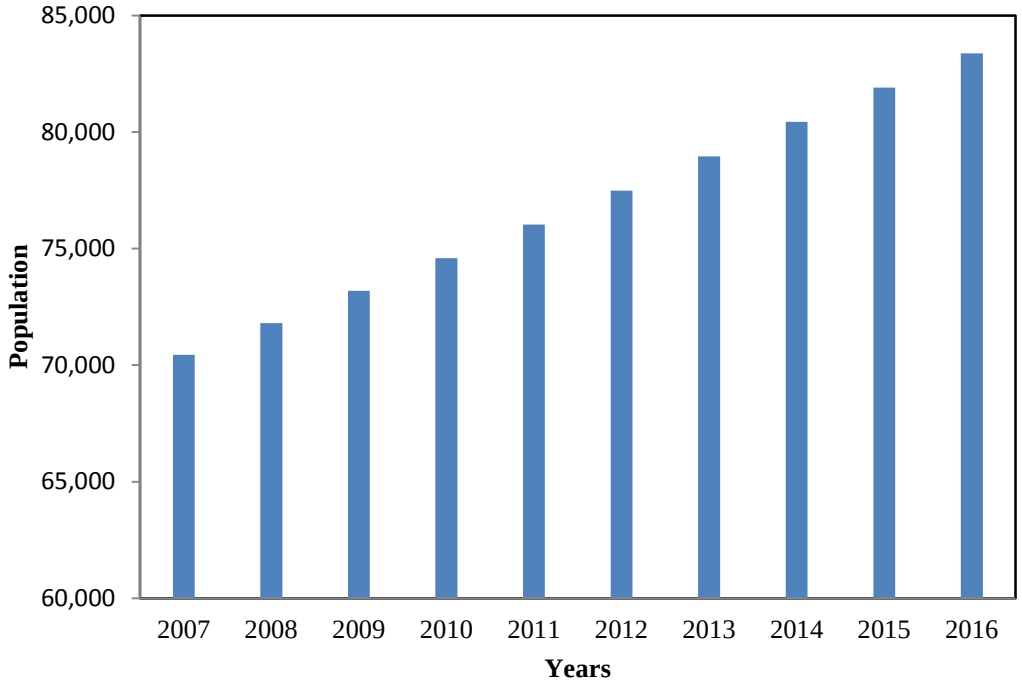

Figure 2. 15: A histogram of Tulkarem and its suburbs population growth for the period of 2007-2012 and the predicted population up to 2016 (Statistics 2014).

Obviously, the population is increasing gradually. This slowdown in population growth can be explained as a result of migration of many citizens as well as the decline in natural growth rate and family size average. According to the available data, the Palestinian natural growth in the West Bank was 3.2%, 2.7% and 2.6%in 2003, 2010 and 2013 (Statistics 2014). At the same time, family size declined from 6.1 persons in 1997 to 4.6 in 2007 and then to 5.3 in 2011 and 5.1 in 2012 (Statistics 2014). Further, according to the latest report published in 2013 by the Palestinian Central Bureau of Statistics, around 6.7% of the Palestinian families have at least one immigrant. The report estimated that about 5,205 immigrants left Palestine in 2006. While the number increased in 2008 to reach 7,390. The number one reason for the immigration is the education with a percentage reached 34.4% followed by economic reasons with 28.3% (Statistics 2014).

About 59.5% of Tulkarem population is more than 15 years of age, while the senior citizens (65 years or older) are estimated at 4.3% (Statistics 2012). The increase in youth categories may be due to the high fertility rate of Palestinian women. According to the Palestinian Central Bureau of Statistics, the fertility rate in the West Bank was 4.1births in 2007, 4 in the years 2008 and 2009, and 3.8 in the year of 2011 (Statistics 2014). Figure 2.16 illustrates a diagram of the demographic pyramid of Tulkarem's population. It is noted that the base of the pyramid is wide, which indicates that the society has a large proportion of young people. At the same time, the proportion of males is higher than females in base and this is normal because the number of male births is higher. However, life expectancy for females are longer than males and this explains the higher proportion of females in the age groups (65 +).

Tulkarem's soil was formed from flood coming from the hills in the eastern part of the city boundary. The soil contains a high percentage of organic materials and limestone that are very important for growing plants (Planning Department 2011). In addition, the city has an aquifer that feeds numerous wells and springs in the area. Tulkarem's arable land allows the city inhabitants to produce citrus fruits, melons, olives, olive oil, tomatoes, potatoes, wheat, peppers, green beans, guava, and other products. More than 36.8% of the population works in agriculture. This is one of the most important trades practiced by the residents of the city during its history, before the city was badly affected by the political situation ((MAS) 2005).

Up until the early 1900s, Tulkarem was a small village. Later Tulkarem emerged as a trading center because of its location at the junction of the coastal railroad from north of Haifa to Cairo and a branch of the narrow gauge Hejaz railway to Damascus (Thawaba 2009). Figure 2.17 shows a photo was taken in 1918 of the train station and railroads west of Tulkarem city (Department of Planning, Tulkarem municipality 2013).

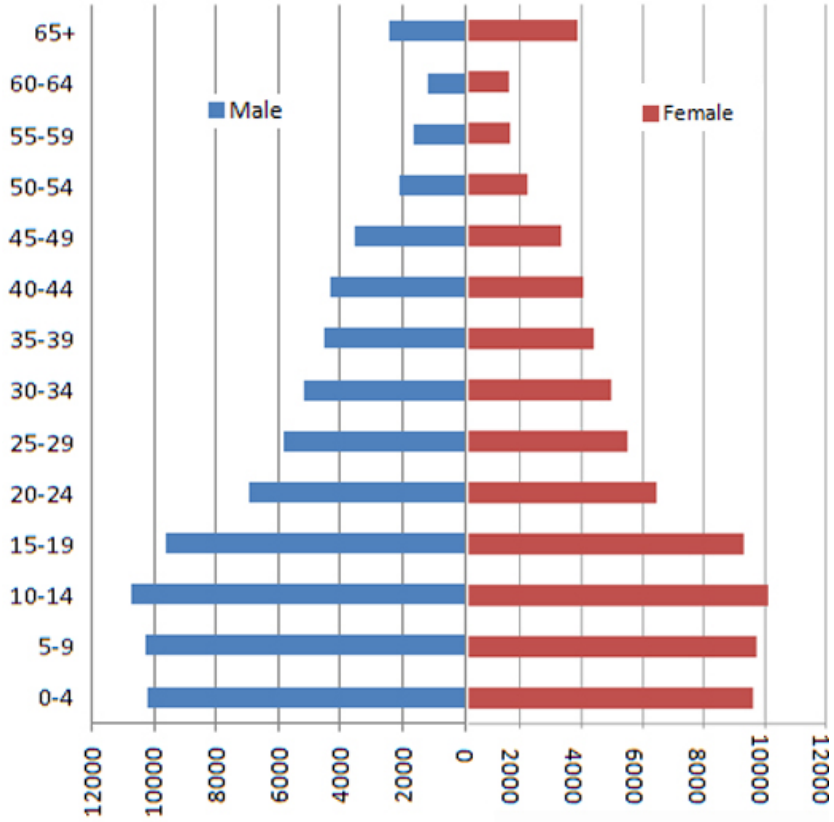

Figure 2. 16: The demographic pyramid of Tulkarem districts residence in 2007 (Statistics 2014).

Figure 2. 17: A Photo was taken in 1918 of the train station and railroads in the west of Tulkarem(Department of Planning, Tulkarem municipality 2013).

Tulkarem's growth during this period was more a function of expanding towards town concentration, which followed topography and road networks rather than due to any existing planning strategies. The city expanded through the years of the British mandate (1917-1948), the Jordanian rule (1948-1967), the Israeli occupation (1967-1994), to the Palestinian rule (1999-present) (Thawaba 2009). With the arrival of the Palestinian authority rule to the city in 1995, there was a short period of economic recovery and growth, which was clearly reflected in the development and expansion of the city. Figure 2.18 shows the city expansion development through these different periods. The following section provides information about the city expansion through these periods that was published by the city planning department in the city technical report (Planning Department 2011).

2.10.1 Tulkarem Planning and Development

Under the Ottoman rule, Tulkarem was a small village under the administration of Nablus district. In 1892, Tulkarem became a municipality and a center for the area, because of its central location at the junction of important transports routes, and its capability for growth and development (Planning Department 2011).

Before 1892, Tulkarem represented a typical Palestinian village of the period with a compact traditional structure focused on a crossroads-style layout. Tulkarem village was characterized with a very random road network, which represented a focal point for several roads radiating in all directions. After becoming a municipality, Tulkarem was affected by several changes which greatly influenced its surrounding communities. A governmental building, post office, hospital, school, and municipality offices were erected on the northern side of the town attracting considerable expansion of the town to this side. Tulkarem's growth during this period

was more a function of expanding toward town concentration that followed topography and road networks rather than due to any existing planning strategies (Planning Department 2011).

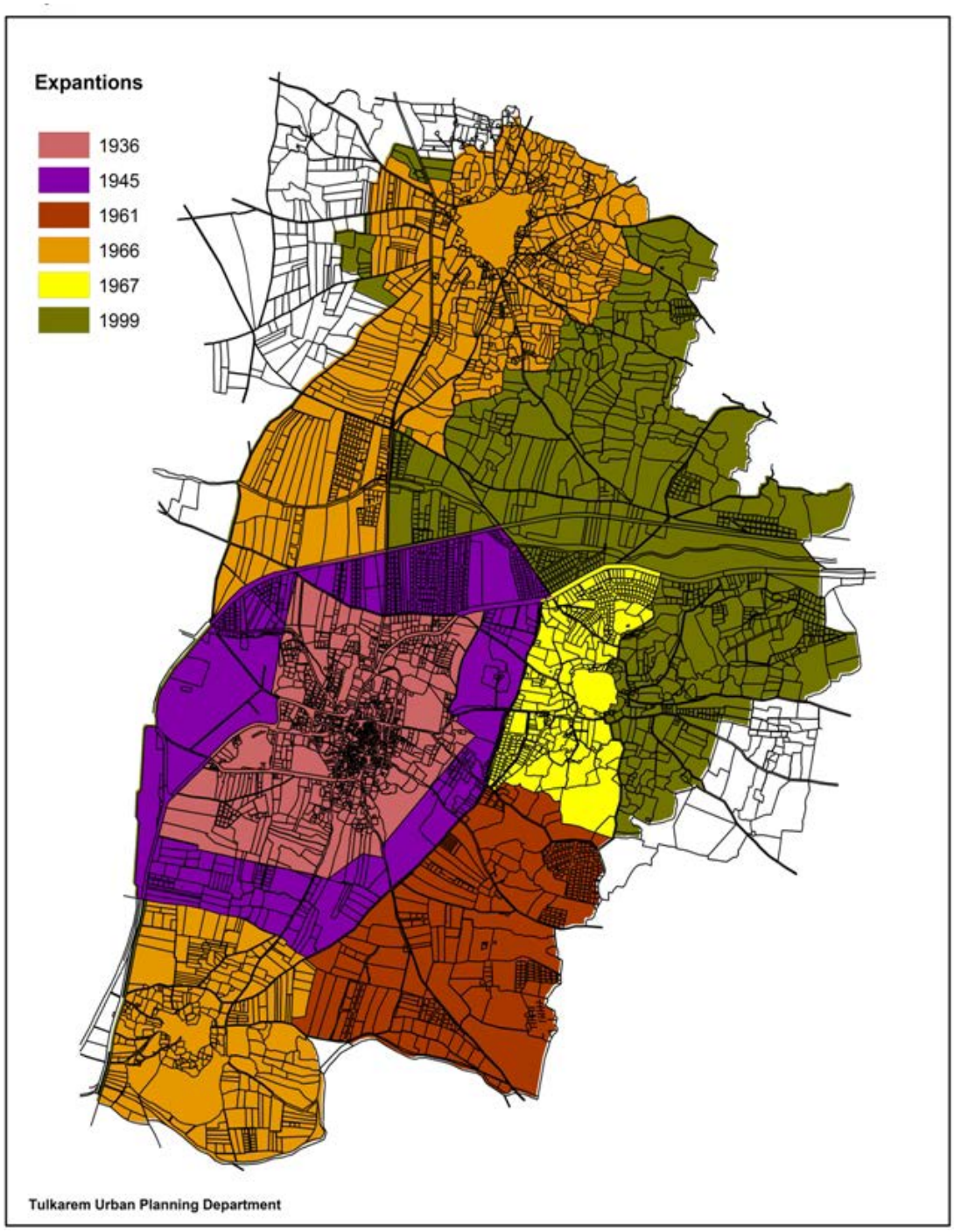

Figure 2.18: A Map for Tulkarem expansion development from 1936 to 1999 (Planning Department 2011).

The fringes of a typical Palestinian village consist of a semi-green area of orchards, vineyards, and olive trees in between and beyond the city center. After being a municipality, buildings of Tulkarem began to creep on these fringes, especially from the west. The green areas at the fringes were penetrated by the building sprawl pushing the limits of the fringe outwards. All the roads of Tulkarem followed natural tracks between agricultural land with no alignment since there were no surveys or mapping (Planning Department 2011).

Tulkarem under the British Mandate (1917-1947)

The physical structure of the Palestinian settlements in this period was affected by the establishment of new Jewish colonies, the improvement of accessibility due to improved road networks, new construction methods, land registration and land subdivision process, and planning efforts done by the authority. The Palestinians began to gather the inside existing towns and villages for security reasons, and consequently these towns witnessed a considerable growth (Planning Department 2011).

Since the early days of the British Mandate, the land pattern on Tulkarem's fringe continued to be characterized by building sprawl. No policy to control this sprawl or to preserve the green fringe around the town appeared until the Tulkarem's master plan of 1945 was prepared and implemented. This mandatory plan permitted the construction of buildings in agricultural areas without any policy to control and manage these buildings. Further, the development of the road system of Tulkarem progressed slowly during the first decade of the British Mandate. Tulkarem's area was 167 ha in the year of 1936, while in 1945 the area was expanded to be 362 ha. The city area stayed like this till the year of 1961 (Planning Department 2011).

Tulkarem under the Jordanian Rule (1948-1967)

By the end of the British Mandate and the establishment of "Israel" in 1948, 77% of the Palestinian land was occupied by "Israel". In the West Bank, where Jordanian rule was established, both rural and urban settlements experienced extensive changes; where the number of villages increased in size and several villages adopted a municipal status (Planning Department 2011).

The urban settlements experienced building sprawl and changes in the general layout and size according to the Jordanian policies. Tulkarem was one of the towns in the West Bank most affected by the Arab–Israeli War in 1948. The 1948 Armistice Line between Jordan and Israel cut through the greatest and most arable part of Tulkarem's land (Planning Department 2011).

During the Jordanian role, a master plan was prepared for Tulkarem in 1961. Several expansions of the boundaries of the town were also approved between 1961 and 1967. The neighborhood communities such as Thenaba, Shweka, and Irtah were annexed to the city between the years (1963-1967). The annexation of Shweka and Irtah in 1967 expanded the agricultural land to the north and south of Tulkarem. This expansion was done to compensate for some of the land losses and in response to the increasing demands of agricultural land as a source of food and work (Planning Department 2011).

With the new political circumstances after 1948, Tulkarem became a border town. Its main link was with the city of Nablus to the east and with the villages on its north and south. During this period, Tulkarem had no connections or relations with the Arab towns and villages on the western side of the Armistice Line (i.e., inside Israel) (Planning Department 2011).

Tulkarem under the Israeli Occupation (1967-1995)

In 1967, the Israeli occupation brought a new transformation to the system of the Palestinians in the West Bank. The physical, social, and cultural system began to display the effects of the Israeli administration. The only significant change during this period was the reduction in residential zone areas within the city core. In addition, the creation of Tulkarem's refugee camps (i.e., Tulkarem camp and Nur-Shames camp) has a significant impact on the physical spatial structure of the city, where a densely populated block was established at the eastern edge of the city. At the same time, the annexation of neighborhood communities (i.e. Shweka and Irtah) decreased the green areas of Tulkarem and badly damaged its fringe. This became clear in that period because people started to build their new houses outside the central area of Tulkarem. From 1966 till the year 1994 the total area of the urban area was increased inside the municipality borders to reach around 1935 ha (Planning Department 2011).

Tulkarem under the Palestinian Rule (1995-present)

After the Oslo Agreement in 1994, most of the urban areas came under Palestinian direct rule. When the Palestinian National Authority (PNA) assumed self-rule in Gaza and the West Bank, it was faced with the double task of planning for its future needs and at the same time having to accommodate the planning needs generated by donor projects. For the Palestinians, neither the existing regional planning schemes nor their attributed regulatory framework within the occupied territories constituted an appropriate and relevant approach for meeting the overall needs generated through the contemporary developments whether political, socioeconomic, and physical. Tulkarem did not witness any changes after the Palestinian Authority was created, except for preparing a master plan in 2002 that was approved by the authority. The plan proposed lands being annexed to the city to accommodate urgent needs, such as residential,

commercial, educational, health, and transportation uses. Unfortunately, this plan was not implemented because of the change in the political situation when the second Intifada erupted and the Israeli army reoccupied the Palestinian cities. In the year of 2005 a new master plan was established for the city that is used until today (Planning Department 2011).

In the year 1996 and after the arrival of the Palestinian National Authority, about 283 ha of the city land was classified as area C where Palestinians have no civil or security control. This means that the total area under the Palestinian authority within the city boundaries is 1652 ha and it is still the same to the year of writing this thesis.

So we can say here that the city development is continues through the years. The city and the suburbs within the city boundaries are continuously expand over the open areas around them. Due to the political limitations and restriction of the city urban development, the urban expansion in some suburbs became connected to the city core such as Irtah and Thenaba with no open areas in between. These open areas are mainly agricultural lands that produce food for the local population and income generating for one third of the city population. This indicates that if the city and its suburbs within its boundaries continue to grow within the same limited area, few years from the year of writing this thesis there will not be available lands for agricultural activities within the city boundaries.

2.10.2 The Structure of Planning Institutions

During the period 1994-2000, following the Oslo Agreements and the withdrawal process of Israel from the Palestinian urban areas in the West Bank, the Palestinian municipalities have been granted the responsibility of planning, organizing and issuing the building permits (Planning Department 2011).

Mainly, the ministry of local government and the planning departments take over the responsibility for planning of cities and villages with coordination with the civil sector institutions such as universities, and the private sector (i.e. engineering companies). At the national level, the ministry for planning and international cooperation took the responsibility to prepare the strategies for national planning and the preparation of regional plans for the districts in the West Bank and Gaza Strip (Planning Department 2011).

The physical planning department of Tulkarem's municipality consists of two staff members, while the strategic planning and cooperation unit consists of one staff. In the ministry of local government office, the planning department consists of two staff members only. These planning departments' tasks mainly focus on issuing building permissions. The master plan that is used by these institutions was prepared in 2005 as mentioned earlier, and was prepared by a private company. This master plan shall be updated to accommodate the growing population under the unpredicted political situation. It is worth mentioning here that conflicts over land ownership or property rights are solved by the general courts and the local police office. It is not the planning department's responsibility because landownership is registered in the courts. Further, the planning department in the municipality is not involved in any of the city's economic development plans as this is considered the responsibility of the ministry of economy and the chamber of commerce and industry. There cooperation but also miscommunication between the municipality's different departments and between the municipality and other organizations working in the city. This may affect the current and future city development and expansion.

In order to get permission or a license to build, the land owner shall provide plans of the construction site area done by a licensed surveyor in addition to proof of land ownership to the

planning department in the municipality. After that the owner submits architectural plans for the building that is done by a licensed architect to the local government office and the planning department in the municipality. It shall be noted here that even though there is a master plan for the city, the absence of laws; land use regulations; proper land use classification, and zoning in addition to the absence of punishments for building violations, makes it very easy for land owners to change the use of their land according to their interests and benefits. This explains seeing mixed use and industrial facilities in residential areas, which may cause several problems such as noise, health and environmental hazards.

2.10.3 The Impact of the Separation Wall

After the beginning of the second Intifada (uprising) in 2000 and the resultant new political situation, the Israeli government took the decision of constructing the Separation Wall affecting the development of the city, where large portions of its land (mostly land devoted for future expansion in addition to agricultural land) were extracted for the purpose of constructing the Wall. The 8 m height concrete wall was completed along the west edge of the city, in addition to a fence on the northwest side of the city by 2003. Figure 2.19 shows photos for different sections of the Separation Wall around Tulkarem.

As discussed earlier in Section 2.9.4, Tulkarem is amongst the cities most affected by the Separation Wall, owing to its proximity to Israeli cities and markets that gave the city distinct advantages and greater income-earning opportunities in the years prior to the Separation Wall construction. Concerning the city expansion, the existence of the Separation Wall and the surrounding C area around the city forced the city to expand to the east surrounding agricultural lands and natural landscapes. The bulk of lands annexed are developed for residential purposes,

especially in the north side of the city. Such uncontrolled city expansion obviously put stress on urban services, besides the loss of agricultural land, natural vegetation and hydrological systems.

Unfortunately, the data about the effect of the Separation Wall on the city itself is not available. Therefore, the following section provides the available data about Tulkarem district, which includes 40 communities. The district's land area is 26,800 ha with a population of 172,800 inhabitants.

Figure 2.19: Photographs of the Separation Wall sections in Tulkarem (Photo by AbuHafeetha, June 2013).

2.10.4 The impact of the Separation Wall on Tulkarem District

The Separation Wall runs 41 km along the western side of Tulkarem district next to the green line or sometimes goes to a distance reaching 6 km into the district's lands. The Separation Wall passes 17 villages, destroys 604 ha of their lands, and isolates 2,836 ha located behind it in the Seam Zone. The existence of the Separation Wall caused many losses to Tulkarem residents, which are:

1. The impact on Agriculture

According to the last published report of the ministry of agriculture in the Tulkarem district, it was estimated that about 80% of Tulkarem district's land is suitable for agricultural purposes. However, the actual cultivated land did not exceed 55% of the land in 2004 (MAS 2005). The fruit trees have the largest share; this is distributed between rain-fed olive trees and irrigated citrus trees. Irrigated open- or protected-area vegetables are one of the most popular types of crops in the area. There are about 6,642 plastic houses and 1,375 high-rise tunnels in the Tulkarem area. Cucumber is the most commonly cultivated type of protected-area vegetable; the total area cultivated is estimated at 150 ha. Tomatoes, Jew's mallow and peppers are also cultivated in the district (MAS 2005).

Wheat and barley represent the main types of rain-fed grains, with the total area cultivated reaching 689 and 134 ha respectively. Citrus trees represent the most common type of irrigated trees, with the total area cultivated (most commonly orange and clementine) reaching about 370 ha. Olive trees dominated the rain-fed trees, covering over 11,479 ha of land (Tulkarem Department of Agriculture, 2003/2004).

The Separation Wall has a significant impact on the agricultural sector in the district. The first impact is the damages resulting from the dredging of land, infrastructure and water sources

and agricultural facilities, and the second is, isolating agricultural land, and putting restrictions on entry via gates and permit system, as well as isolating the sources of water (UNRWA 2003). Around 62,300 fruit trees were uprooted, water lines and wells, infrastructure and agricultural facilities were destroyed. Accordingly, at least 600 farmers lost their source of income in those areas. Table 2.1 presents the damage in agricultural lands during the dredging of land for the Separation Wall construction i.e. the damage of lands where the Separation Wall was built on (Statistics 2012).

Around 2,836 ha of Tulkarem's district were isolated. This situation affected the life of 70,000 residents distributed in 17 communities. Although the Israelis have opened about 13 gates in the wall, only 4 of them are accessible for Palestinians. To complicate matters, Israeli authorities deny tractors access to the land, rendering it very difficult to cultivate. The total agricultural land in the Tulkarem area shrank after construction of the Separation Wall, particularly protected area vegetable-cultivated land. Open area vegetable-grown land, planted with cucumbers, tomatoes, squashes and leafy vegetables also experienced a decrease in total land area available for cultivation. Olive-cultivated land also experienced a decline. Table 2.2 presents the isolated agricultural lands in the Seam Zone in Tulkarem district (Statistics 2012).

The uncertainty about the future and a consequent dampening of investment in economic activities including agriculture poses particular dilemmas for agricultural producers; these include questions of whether to plant at all, the choice of crops to plant, the amount of investment to make in agricultural activities, and how to market the output in the face of movement restrictions (Planning Department 2011).

Table 2.1: The damage in agricultural lands during the dredging for the Separation Wall construction (Statistics 2012).

Type of agriculture in dredged areas	Area in ha
Areas planted with olives	184.6
Areas planted with almonds	58.3
Open agricultural areas	221
Green houses	1.1
Areas planted with field-crops	135
Areas planted with citrus	200 trees
Water tanks	10 tanks
Irrigation system	27,260 m

Table 2.2: The isolated agricultural lands in the Seam Zone in Tulkarem district (Statistics 2012).

Type of agriculture in Seam zone	Area in ha
Areas planted with olives	1,996
Areas planted with almonds	266
Open agricultural areas	221
Green houses	13
Areas planted with field-crops	277
Areas planted with citrus	277
Pastures	42
Others	86
Ground water wells	5 wells
Water tanks	57 tanks

2. The Impact on Industry and Commerce

Palestinian businesses are generally characterized by their relatively small size. There are 5,361 businesses operating in Tulkarem, of which 91% employ less than 5 workers and the businesses which employ more than 20 workers do not surpass 1% (MAS 2005). The local business include textile, clothing, furniture, metal industry, except machinery and other industries such as paper, printing and publishing, rubber and plastics.

The existence of the Separation Wall restricted the mobility of people and vehicles, and subsequently made the Israeli labor and commodity markets considerably less accessible. This also prevented thousands of laborers from attending their jobs inside Israel. According to the Palestinian Central Bureau of Statistics, in the year of 2000 the number of Tulkarem's laborers working inside Israel with permission reached 2500 workers. Total daily wages reached 80,000 USD. In addition another 8,000 laborers work without permission. After the construction of the Separation Wall, this number decreased to only 900 in the year 2002 (Statistics 2012).

At the same time, the commercial sector was affected in three different aspects: first, the number of dealers allowed to enter Israel decreased significantly after the construction of the Separation Wall, which affected the goods quality and increased their transferring cost by 20%. Second, the commercial traffic between Tulkarem and other districts was limited due to the Israeli closure, which added more transferring cost and limited the transferring goods' amount. Third, the costumers' movement was affected too. According to the Chamber of Commerce, more than 5,000 Arabs who live inside Israel used to shop daily in Tulkarem, spending between 90,000-110,000 USD/day (UNRWA 2003; (MAS) 2005). After the construction of the Separation Wall the number decreased by 80% and the commercial movement and sales decreased by 70%. This led to shutting down 450 industrial and commercial facilities, 80 of

which were located in one street close to the Separation Wall on the west side of Tulkarem. These facilities include cleaning, metals, sewing workshops, crushers, concrete, marble, bricks, food, and agricultural industries (UNRWA 2003; (MAS) 2005). Figure 2.20 shows selected photos of closed stores and commercial facilities in Tayba Street in the west side of Tulkarem.

Furthermore, the construction of the Separation Wall caused a 56% reduction in commercial and industrial productivity that consequently caused a decline in the wages of their workers and employees between 10-40%, which led to a decline in the workers purchasing power. At the same time, 94% of the affected facilities increased the production cost between 30-79 percent ((PCBS) 2008).

All these factors played roles in increasing the unemployment rate in the district. The percentage was 13.8% in the year 1999, reached 24.9% in the year 2003, 20.5% in the year 2007 and 22.2% in the year 2011(Statistics 2012). Figure 2.21 shows a histogram of the unemployment rate of the district residents.

Figure 2.20: Selected photos of the closed stores in the Tayba Street in the west side of Tulkarem after the construction of the Separation Wall (Photos by AbuHafeetha, July 2013).

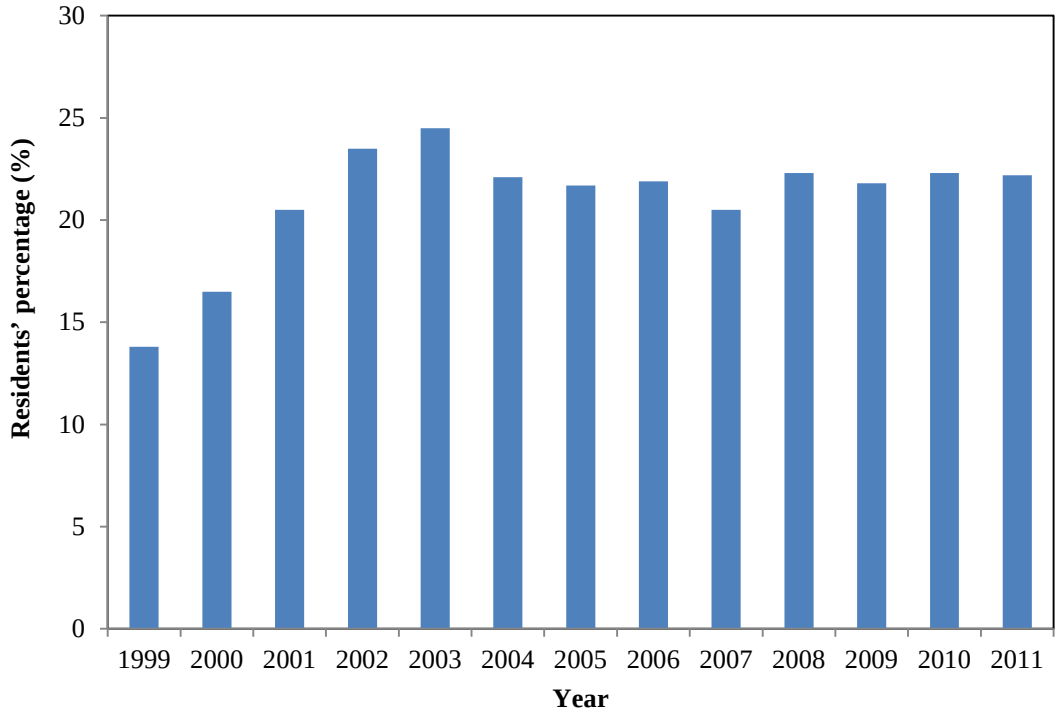

Figure 2.21: A Histogram of the unemployment rate of Tulkarem residents (Statistics 2012).

Based on the literature provided in this chapter, it is obvious that the total agricultural land in the Tulkarem area shrank after construction of the wall, particularly protected area vegetable-cultivated land, which declined by 45% of the original area. Open area vegetable-grown land, also experienced a decrease in total land area available for cultivation. Olive-cultivated land also experienced a decline.

Further, due to the limited access to water in the West Bank, the only source for irrigation in the Tulkarem is the ground water. The available wells are small in size, old in age and privately owned and operated. Farmers in Tulkarem deliver water to their fields by means of plastic or metal pipes from the groundwater wells. The water is conveyed and distributed without any storage facility because farmers irrigated from wells use pressurized irrigation systems. Therefore, farmers have to use the pressure head applied by turbine pumps at the well to supply

their irrigation system with the needed pressure. The pipes are usually laid on the ground surface to minimize the cost. Changing to use pressurized irrigation techniques (drip and sprinkler systems) can reduce the water losses by other irrigation systems. These techniques are not used due to a good management or to sustain and reduce the use of water, but mainly due to reduce the production cost that is increasing constantly.

The application of pressurized irrigation techniques on vegetable farms is much more common than it is in tree orchards. Drip irrigation is used mainly on vegetable crops and green houses, while sprinklers are common in orchards especially leafy vegetables such as cabbage, onion, spinach and on field crops. Farmers own small land areas due to some factors, such as the Islamic law of inheritance where the land is divided between sons and daughters when the father dies. Consequently, the irrigation; planting; and harvesting of the fields are done by the farmers themselves and temporary workers.

As a final statement we can say that agricultural land use and activity in the urban environment has an essential role in sustainable urban development, because it supports the urban food security, urban economy especially in the urban poor environment, and protect the environment of the cities. The loss of agricultural land to other land uses occasioned by urban growth is an issue of growing concern worldwide. The loss of prime agricultural land in urban areas is an unavoidable impact of urbanization on urban agriculture. Its subsequent effects on food security, local development, poverty alleviation and the environment cannot be fully anticipated. As such, realistic, long-term planning goals that take the benefits and drawbacks of agriculture into account are of paramount importance. Thus, this study intended to build consensus on the need for agricultural land protection in the context of urbanization and to investigate the factors (illustrated in this chapter) leading to the loss of agricultural lands.

Chapter Three- Research Methodology

3.1 Introduction

The research methodology can be described as a master plan, which indicates the strategies for conducting a research project and the procedures that should be used to collect and analyze the data needed by the researcher. This chapter discusses the methodology that was used in this study, the adapted research strategy and data analysis.

3.2 Research Design

A starting point in trying to understand the collection of information for research purposes is that there are broadly two approaches: quantitative research and qualitative research. Early forms of research originated in the natural sciences such as biology, chemistry, physics and geology, and were concerned with investigating things which could be observed and measured in some way. Such observations and measurements can be made objectively and repeated by other researchers. This process is referred to as 'quantitative' research (Polit 2008).

Much later, along came researchers working in the social sciences: psychology, sociology, anthropology, etc. They were interested in studying human behavior and the social world inhabited by human beings. They found increasing difficulty in trying to explain human behavior in simply measurable terms. Measurements tell us how often or how many people behave in a certain way but they do not adequately answer the question 'why?'. Research which attempts to increase our understanding of why things are the way they are in our social world and why people act the ways they do is 'qualitative' research (Creswell 2009). Table 3.1 shows a comparison between quantitative and qualitative research methods (Peters 2004).

Table 3. 1: A comparison between quantitative and qualitative research methods (Peters 2004).

Variables	Quantitative	Qualitative
Focus of research	Quantity (how many, how much)	Quality (nature, essence)
Group Studied	Larger, randomly selected	Smaller, not randomly selected
Associated phrases	Experimental, empirical, statistical	Fieldwork, ethnographic, naturalistic, grounded, subjective
Purpose	To test hypotheses, look at cause and effect, make predictions.	To understand and interpret social interactions.
Relation between researcher and study	Researcher is independent from that being researched	Researcher interacts with that being researched
Language of researcher	Formal, based on set definition	Informal, evolving decisions
Data analysis	Measurable	Interpretive
Instrument for data collection	Various computer programs	Researcher is the key instrument
Form of Data Collected	Quantitative data based on precise measurements using structured and validated data-collection instruments	Qualitative data such as open-ended responses, interviews, participant observations, field notes, and reflections

Each of the various features of qualitative and quantitative research may be viewed as strength or as a weakness. This depends on the original purpose of the research (Creswell 2009).

3.3 Qualitative Research Methodology

Qualitative research is a field of inquiry that crosscuts disciplines and subject matters (Creswell 2009). Qualitative researchers aim to gather an in-depth understanding of human behaviors and the reasons behind various aspects of these behaviors (Denzin and Lincoln 2005). It investigates

the *why* and *how* of decision making, not just *what*, *where*, and *when*. Hence, the need is for smaller but focused samples rather than large random samples, which qualitative research categorizes into patterns as the primary basis for organizing and reporting results (Marshall and Rossman 1998).

Qualitative researchers typically rely on four methods for gathering information, which are participation in the setting, direct observation, in depth interviews, and analysis of documents and materials. There are different types of qualitative methodologies, which include phenomenology, ethnography, grounded theory and case study.

3.3.1 Case Study Research Methodology

After a deep investigation on the different types of the qualitative research methodologies, the most appropriate approach for this study was the case study methodology. The case study method is well suited when a researcher's aim is to "*investigate activities or complex processes*" to retain the holistic and meaningful characteristics of real life events (Hentz 2007). It is used to understand phenomena with the belief that the research approach needs to explore the contextual conditions related to the phenomena.

As a research design, the case study claims to offer a richness and depth of information not usually offered by other methods. By attempting to capture as many variables as possible, case studies can identify how a complex set of circumstances come together to produce a particular manifestation (Yin 2009). It is a highly versatile research method and employs any and all methods of data collection. Yin (2009) presented six common sources of data in the case study methodology, which include: documents, archival records, interviews, direct observations, participant's observations and physical artifacts (Yin 2009).

Case study research ranges in complexity. The most simple is an illustrative description of a single event or occurrence. More complex is the analysis of a social situation over a period of time. The most complex is the extended case study, which traces events involving the same actors over a period of time enabling the analysis to reflect changes and adjustments (Hentz 2007). Case study research can be descriptive, explorative and explanatory (Creswell 2009; Yin 2009). Briefly, descriptive case studies describe the phenomenon. Explorative case studies explore situations where there is little known about a phenomenon and explanatory case studies explain causal relationships (Yin 2009). In the end, data are collected from multiple sources to provide an 'in depth' picture of the case. Furthermore, case study is one of those research approaches, which can take a qualitative or quantitative stance that makes it the most suitable methodology for this study.

3.3.2 Adopted Research Strategy

Since the case study approach was adopted for this study, a preliminary review of the literature on LUCC was conducted to assist in narrowing down the researcher's area of interest. After focusing on the topic of urbanization and its impact on changing the land use especially agricultural lands, a preliminary review of the literature on urbanization was conducted to verify the need for such a study and recognize any prior work in the field. I found several studies investigated this issue, (Wingo 1967; Winoto and Schultink 1996; Antrop 2000; Alphan 2003; Xiao, Shen et al. 2006; Long, Tang et al. 2007; Abu Hammad and Tumeizi 2010; Biggs, Atkinson et al. 2010; Lu, Liang et al. 2011; Kanagalakshmi and Nagan 2013), none in Palestine, especially from a political ecology point of view. Therefore, this study was conducted to investigate the impact of urbanization on agricultural land sustainability after the construction of the Separation Wall. Subsequently, the core research objectives and questions were developed.

Based on those core research questions, questionnaires were constructed and criteria for choosing participants established.

I reviewed the available literature and census data, collected information from farmers and conducted interviews with key experts from the cooperatives and farmers' unions and planning team in the municipality and the local government. By using the case study research methodology, a synergy and strength can be built between quantitative and qualitative methods in order to more fully understand a given phenomenon than using either quantitative or qualitative methods alone. Figure 3.1 shows a flowchart for the adapted strategy in this study.

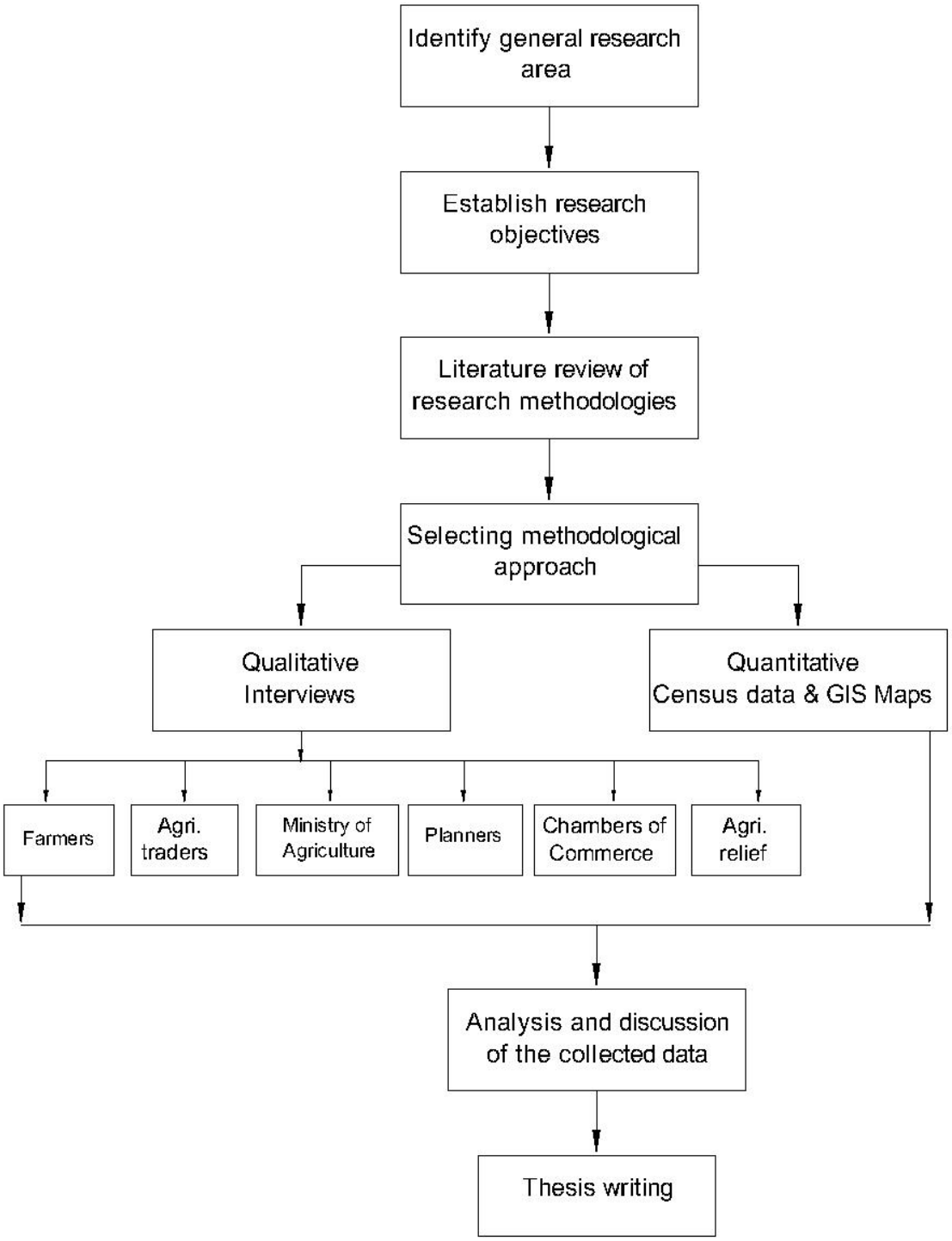

Figure 3.1: A Flowchart represents the implemented strategy in this study.

3.4 Data Collection Strategies

To meet the research objectives and answer the research questions the following approaches were used:

3.4.1 GIS Application

Q1: Explore and analyze the current spatial impacts of urbanization on agricultural land in the study area since 2003, i.e., after the construction of the Separation Wall.

To address the first question, I studied the landscape from a spatial perspective and time scale, using Geographic Information System (ArcGIS 10) and Remote Sensing (RS) data, which helped to measure the changes that have occurred, and predict the impact of change.

In Palestine, there is a limitation for using Landsat images because it is hard to obtain ground truth (reference) points, as the Palestinians do not have access to all parts of the West Bank. Further, the available Landsat images are at 30m spatial resolution, which makes it hard to identify the land cover of the study area. At the same time, there are restrictions on obtaining aerial photos at fairly frequent levels due to security reasons (Abu Kubi 2005). Accordingly, I used the available aerial photographs for the study area that were acquired in 1999 and 2009. Fortunately, these two aerial photos obviously show the situations of the city before and after the construction of the Separation Wall. These high resolution colored digital aerial photographs may offer the best platform for obtaining an accurate estimate of the urban fabric (Akbari, Shea Rose et al. 2003), as they give the closest rendition of a scene as viewed by the human eye.

It should be noted here that the 1999 aerial photo was obtained from the Applied Research Institute-Jerusalem (ARIJ), while the 2009 was obtained from the Urban and Regional Planning Center at An Najah National University in Nablus, Palestine. The ArcGIS 10 program package was used in processing and classifying the acquired photographs.

Image Analysis Process

To achieve the goals set out for this research, several technical steps in the aerial photos and GIS framework were employed. Figure 3.2 shows a schematic representation of the change detection procedure used in this study. The resultant output was used to synthesize the observed trend of urbanization and LUCC in the city. The considered technical steps include the followings:

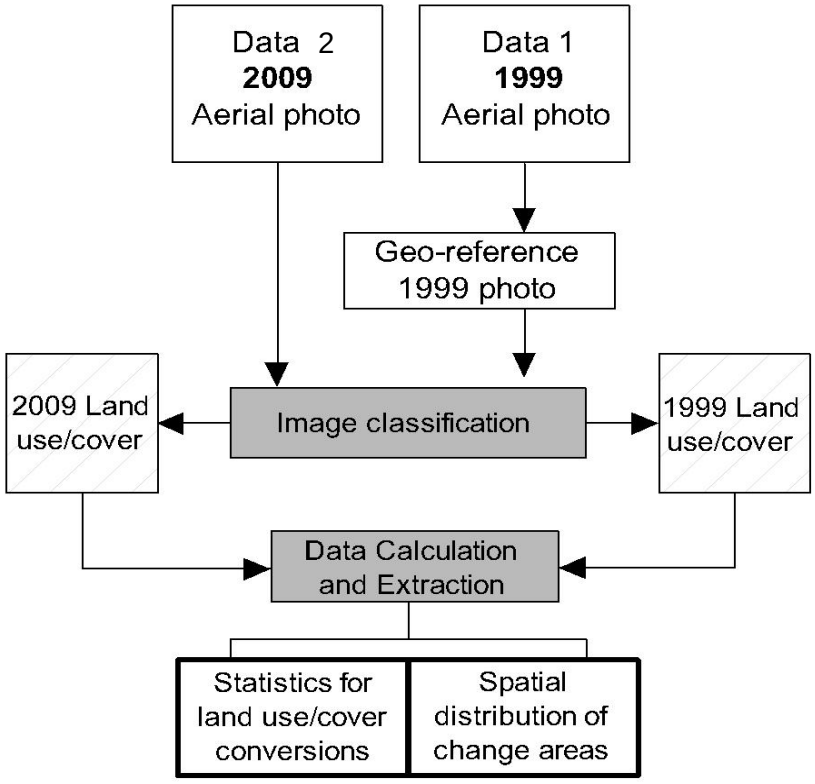

Figure 3.2:A Schematic representation of the change detection procedure used in this study.

1. Image Pre-Processing

For the purpose of LUCC, measurement of the ground features and maps are required. Therefore, using the aerial photos will not give an accurate measurements between points unless it is geometrically corrected (Abu Kubi 2005). Once the images have been aligned, or "registered",

with known real-world coordinates, they can be widely deployed (Sonaike 1988). The aerial photo for the year of 2009 was geo-referenced and projected to the Israel-TM-grid from the source. The 1999 photo was geo-referenced, using ArcGIS 10 program tools. As both photos have the same scale, they are perfectly matching. The 2009 photo has a resolution of 0.5 m pixel, while the 1999 photo has a 1.5m pixel resolution.

2. Image Analysis

The analysis was based on visual interpretations and onscreen digitizing using ArcGIS 10. For this study, Level 1 of the U.S Geological Survey (USGS) LUCC classification system was used (Rozenstein and Karnieli 2011). In addition, two new categories for Israeli structure and Seam Zone have been added to the classification scheme. The different land uses included in the five classes used by this study are detailed in Table 3.2.

3. Implementing the GIS Database

The classified urban development and land cover classes were created using ArcGIS system as coverage's and shape-files. These types of data are compatible with other ArcGIS data and can be presented in ArcGIS as layers for further analysis.

4. Data Validation

The validation of the digital data, which was a result of the onscreen digitizing in the GIS platform, was carried out as an auxiliary step to check the reliability of the extracted figures. The validation of the classified LUCC layers was based on my personal skills with interpreting the high-resolution aerial photos and field trip photos to random places in the city. These sources gave me a prior knowledge about the nature of the study area in order to determine qualitatively all surface types and land covers that could be identified at the resolution of the data.

Table 3.2: Land use classes used in the study classification.

Land use class	Land uses and land covers included in the class
Urban or built up land	Approximately (80-100%) coverage of construction materials. Structure of all types: residential, industrial, commercial and services. Transportation and utilities. Mixed urban or built up land.
Agricultural field	Crops, orchards, greenhouses, olive fields, nurseries and other agricultural land.
Semi natural	Herbaceous, shrub and bush and mixed rangeland.
Forest	Deciduous, evergreen, and mixed forests.
Barren land	Areas with sparse vegetation cover (less than 20%) that are likely to change or be converted to other uses in the near future, including bare exposed rock, quarries and dirt road.
Israeli structure	Checkpoints, Separation Wall, settlements, and bypass roads.
Seam zone	The lands that are located behind the Separation Wall, where Palestinians do not have access to the lands.

3.4.2 Study Participants' Interviews

Q2: Identify and highlight the major driving forces that lead to urbanization and the loss of agricultural land in Tulkarem, and describe the impacts of urbanization on agricultural development. To analyze the driving forces of urban expansion over the agricultural land, it is necessary to choose the appropriate driving forces. The appropriate driving forces can be obtained in terms of available information or prior knowledge, as illustrated in Figure3.3. Then, the driving forces data should be described in details and relationships as presented in Figure 3.4. As mentioned earlier in Section 2.2.1 there are always factors behind the ones that directly contribute a certain change. According, it is important to differentiate between main and the minor factors. At the same time these factors are connected to each other, which mean that these driving forces characteristically have to be interpreted in nested scales of explanations (Bürgi, Hersperger et al. 2004; Serra, Pons et al. 2008; Ge and Cao 2009).

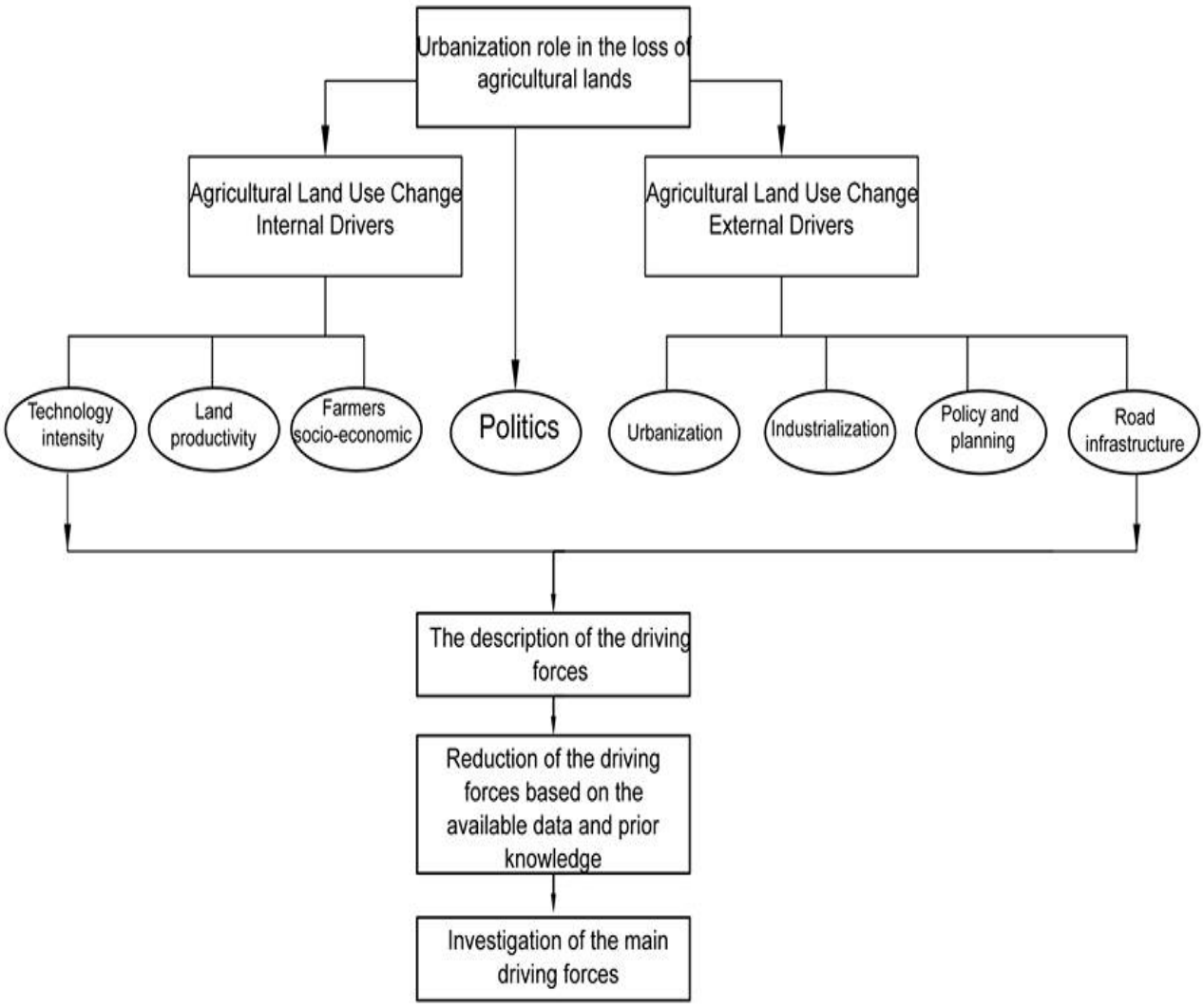

Figure 3.3: A Flow chart representing the urbanization driving forces extraction process.

The main data source in this part of the study is the interviews with the selected participants. The qualitative approach includes questionnaires designed to survey a representative sample of individuals and professionals who are involved in the agricultural and planning sectors, such as farmers, planners, and agricultural cooperatives and relief agencies and representatives of the Chambers of Commerce in Tulkarem.

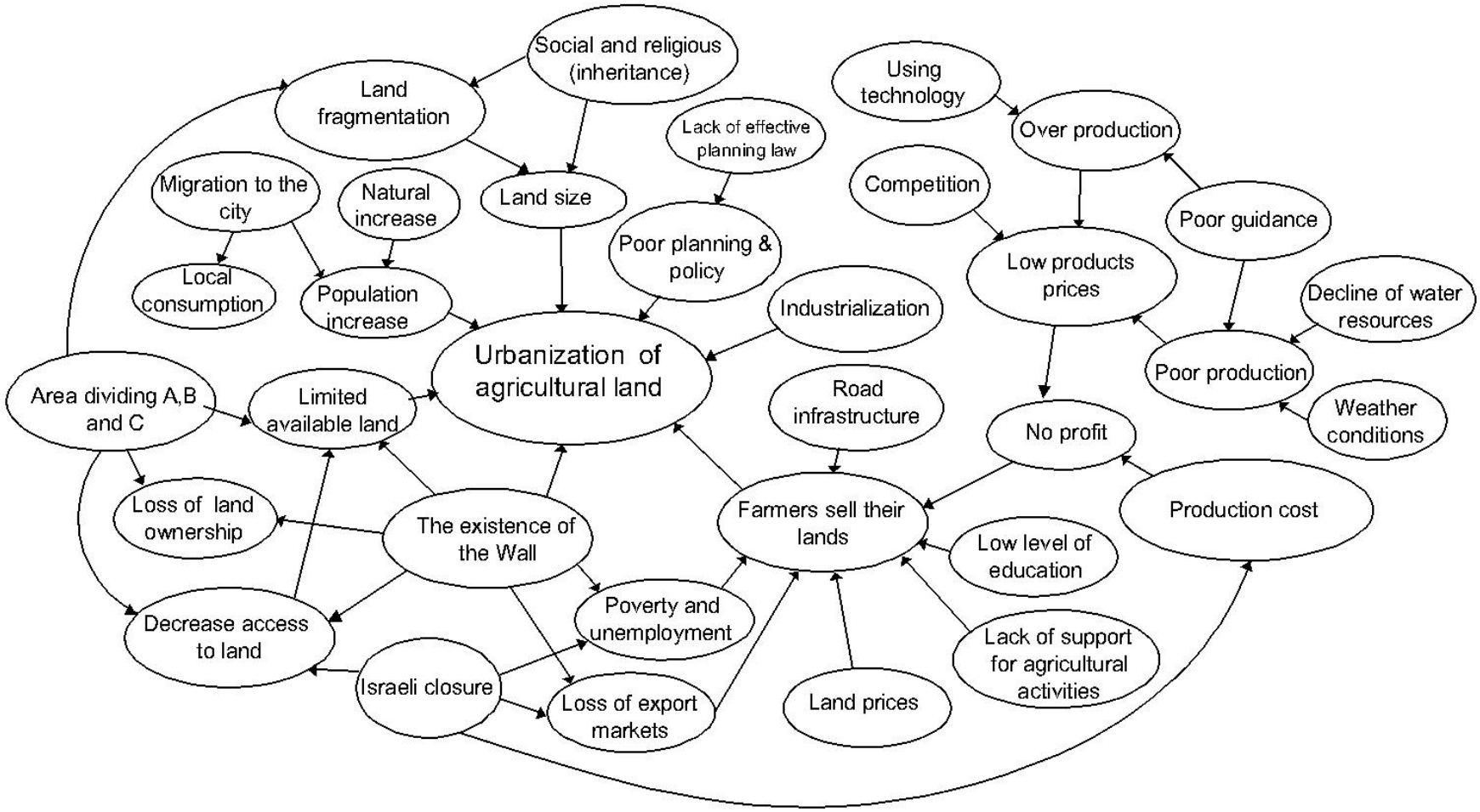

Figure 3. 4: A Schematic representation of preliminary political ecological mapping of agricultural land loss to urbanization.

The designed questionnaires investigated the main factors that play a role in urbanizing the agricultural lands provided by the literature. The questionnaires vary based on the participants' experiences and work-field. Therefore, there are questionnaires for:

1. Planners in the municipality and local government office, questionnaire type 1 (presented in Appendix 2).
2. Agricultural cooperatives and relief agencies and representatives of the Chambers of Commerce in Tulkarem questionnaire type 2 (presented in Appendix 3).
3. Farmers around the city and traders of agricultural support and complementary products (seeds, agro-machines and other equipment) and agricultural nurseries that produce seedlings for farmers, questionnaire type 3 (presented in Appendix 4).

All questionnaires were translated to Arabic, the participants' language, to make the interviews easier and convenient for the participants. The questions presented in the questionnaires involve a series of open-ended questions cover all the driving forces that can contribute in the loss of agricultural land for urbanization purposes. The open-ended nature of the question defines the topic under investigation but provides opportunities for both the researcher and the participant to discuss some topics in more detail. If the participant had difficulty answering a question or providing only a brief response, the researcher tried to use cues or prompts to encourage the participant to consider the question further. This method guaranteed the participants' understanding of the questions and encouraged them to provide all requested information.

The average time an interview required was about fifty minutes. All the interviews were fairly informal. The study participants felt as if they were participating in a conversation or discussion rather than in a formal question and answer situation.

Questionnaire Pilot Study

Conducting the pilot study is very important because no matter how much the researcher does to prepare an appropriate questionnaire, the participants in the pilot study provided feedback and significant information the researcher had forgotten to include. Accordingly, before conducting the interviews with the selected participants, I conducted a pilot study for each questionnaire to make sure the questions are clear to participants and not confusing or annoying. Five questionnaires were distributed to participants and experts in the field to receive their feedback.

Sample Selection

Sample selection for this study was not a problem as study participants are known and their contact information is available in the public domain. The planners and decision-makers participants sample was not random for the questionnaire type 1 and 2. The study included only individuals who have experience in planning, agriculture and marketing. At the beginning, personal networking (e.g. friends and co-workers) was used to introduce me to the planners, agricultural cooperatives and relief agencies and representatives of the Chambers of Commerce in Tulkarem. The majority of potential participants were contacted via phone. Ifthey were interested in the study, an appointment was scheduled with them in order to conduct the interview and get data and information needed for this study. In total three interviews were conducted for each type.

The third type was conducted with random farmers who are directly and indirectly affected by the Separation Wall in different locations around Tulkarem until saturation was

achieved with a total of thirty interviews. Saturation is reached once the researcher is convinced that the data hold no new surprises, as evidenced by the same recurring code in new data (Yin 2009).

Data Analysis Procedures

Data analysis is the core stage of any qualitative research methodology. Because of the diversity of case study research, each study can incorporate a range of approaches (Hentz 2007). In this study, I chose a qualitative descriptive analysis approach to analyze the data collected from the team members. All data were first identified in categories of experiences, and then the interviews were transcribed. Understanding these transcripts as a whole is a key for analyzing the data. Codes from the transcripts were developed to create units of meaning to form themes from the participants' perspective.

Q3: Construct a database and information about the agricultural land use in Tulkarem that will be useful for the planners and organizations to prepare future visual studies, maps, policies and laws.

As it is known that ArcGIS can act as a tool in helping the decision-makers evaluate alternatives, visualize choices and explore certain alternatives because ArcGIS provides an added 'where' dimension that helps everyone understand the problem by seeing the information visually, which will lead to proper decision-making (Logsdon, Bell et al. 1996; Pickett, Cadenasso et al. 2004; Huxhold 2008). A map presents information in a completely different way than tables, charts, and reports that have been used in the past, and provides a completely new picture of information to decision-makers, which allows comparisons and the validation of theories.

Accordingly, the prepared maps and data obtained from using the GIS in this study are used as a database and information about the agricultural land use in Tulkarem that will be useful

for the planners and organizations to prepare future visual studies, maps, policies and laws and make the most suitable decisions.

Q4: Highlight the importance of agricultural lands for local society and provide suggestions and recommendations for urban plans, policies and laws that emphasize agricultural land protection and sustain its use.

On the basis of an analysis of the interviews with the key stakeholders and the collection of all the relevant statistics and GIS data, I was able to provide practical suggestions and recommendations for planners and decision-makers to prepare policies and laws that manage and protect the remaining agricultural lands and sustain their uses.

3.5 Case Study Reliability and Validity

Checking the reliability and validity are processes used to ensure the rigor of any qualitative study (Mays and Pope 1995). Rigorous research is defined as a research that applies the appropriate tools to meet the stated objectives of the investigation (Shenton 2004). Several researchers substitute the reliability and validity with the parallel concept of trustworthiness (Koch 1994; Mays and Pope 1995; Shenton 2004; Oliver 2011; Houghton, Casey et al. 2013). Trustworthiness indicates the quality of the findings and increases the reader's confidence about these findings (Shenton 2004). This requires that there shall be a logical connections among the various steps in the research process from the purpose of the study through to the analyses and interpretation (Houghton, Casey et al. 2013). The four components of trustworthiness that are provided by the literature are (Lincoln and Guba 1985; Leininger 1994; Morse, Barrett et al. 2002; Shenton 2004; Houghton, Casey et al. 2013):

A. **Credibility:** refers to the value and believability of the findings (Merriam 2009). Researchers argued that ensuring credibility is one of most important factors in establishing trustworthiness (Shenton 2004; Houghton, Casey et al. 2013). The following provisions were considered in this study to promote the confidence that the author have accurately recorded the phenomena under investigation (Becker 1970; Lincoln and Guba 1985; Koch 1994; Leininger 1994; Mays and Pope 1995; Morse, Barrett et al. 2002; Shenton 2004; Oliver 2011; Houghton, Casey et al. 2013):

1. Collecting the data over a prolonged period of time and from a range of participants. This required the author to spend sufficient time in the field. Both long-term observation and intensive interviews enabled the author to collect "rich" data that are detailed and varied enough and to connect the consistent study findings together. At the same time, these rich data provided a full and revealing picture of what is going on. A total of 36 interviews with different study participants' perspectives were conducted. The lack of any new emerging data was evidence that saturation had been achieved (Yin 2009). The average time of an interview required about 50 minutes in addition to 20 minutes spent in the participants' farms for observation and photography.
2. Random sampling of individuals to serve as study participants. Although qualitative research involves the use of purposive sampling, a random approach may negate charges of researcher bias in the selection of participants (Shenton 2004). Although, the sample of the questionnaires type 1 and 2 was not random, the farmer participants for the questionnaire type 3 were selected randomly. In order to cover most of the city's agricultural lands, the first step was to divide the city into areas. Then, the water suppliers in these areas were contacted to provide some potential names for farmers who may be

interested in participating in this study. Further, the snowballing approach was used in this study, the interviewed farmers were asked to provide some names in their area. In addition, some farmers were interviewed by stopping by their farms without previous connection.

The random sampling helped to ensure that any "unknown influences" are distributed evenly within the sample (Shenton 2004). According to Bouma and Atkinson (1995), "*A random sampling procedure provides the greatest assurance that those selected are a representative sample of the larger group*" (Bouma and Atkinson 1995). A significant disadvantage of the random method, however, stems from the fact that, since the researcher has no control over the choice of participants, it is possible that quiet, uncooperative or inarticulate individuals may be selected (Shenton 2004). In this study, of all the interviews one interview was canceled because the participant was hesitant to answer questions.

3. Triangulation, which is a strategy used to enhance trustworthiness and to reduce systematic bias through the use of multiple sources and perspectives (Daly and Lumley 2002). This strategy reduces the risk of chance associations and of systematic biases due to a specific method and allows a better assessment of the generality of the explanations that one develops (Shenton 2004). The main types of triangulation are: by sources (people, resources); by methods (interviews, observations, focus groups); by researchers (team of researchers versus single researcher) (Houghton, Casey et al. 2013). The two key purposes of triangulation are to 'confirm' data and to ensure data are 'complete' (Oliver 2011). In the context of case-study research that was implemented for this study, a major strength of the design was the opportunity to use different sources of evidence

through triangulation. Both quantitative and qualitative methods were used. For confirmation, data gathered using different methods were compared to determine the extent to which findings could be confirmed. For example, statistical data and map analysis, which was produced using the GIS program, showed that urban growth is happening over the agricultural lands mainly in the north side of the core. The interviews with the participants in addition to the author's observation during the field-work confirmed this fact. The similarities and consistency of the results obtained from these methods confirmed the study findings. The completeness of data was concerned primarily with gathering multiple perspectives from various study participants. Here participants' viewpoints and experiences were verified and ultimately a rich picture of the study was highlighted.

4. Tactics to help ensure honesty of the study participants when contributing data (Polit 2008). In particular, each person who was approached was given opportunities to refuse to participate in the study to ensure that the data collection sessions involved only those who are genuinely willing to take part and prepared to offer data freely. The interviews were fairly informal. Further, participants were encouraged to be frank from the outset of each interview and they felt that they were participating in a conversation rather than in a formal interview. Where appropriate, the author's independent status was emphasized and therefore participants had the chance to contribute ideas and talk about their experiences without any fear. In addition, participants received a copy of the consent form, which clearly gave the study participants the right to withdraw from the study at any point, and they should not even be required to disclose an explanation.

B. **Transferability:** this determines the extent to which the findings of a study can be applied to other situations (Mays and Pope 1995; Merriam 2009). To achieve transferability, the context of this study was adequately described including examples of raw data. A rich and vigorous presentation of the findings, with appropriate participants' quotations was illustrated under the created themes. Therefore, readers can consider their interpretations and decide whether the findings are transferable to another context or not.

C. **Dependability:** which relates to the consistency between the data and the findings. Koch (1994) believed that while readers may not share a researcher's interpretation, they should nonetheless be able to distinguish the means by which it has been reached. So, it is necessary to examine the process by which the end-product has been achieved and present faithful descriptions that are recognizable to the readers (Koch 1994). To achieve dependability, in this study the process of the research including methods of data collection, analyses and interpretation were reported in detail.

D. **Confirmability:** which involves the strategies used to limit bias in the research (Shenton 2004). The issue of bias in qualitative research is an important one, and demands special attention and discussion in any qualitative research methods (Daly and Lumley 2002; Merriam 2009; Oliver 2011). There are steps that must be taken to help ensure as far as possible that the work's findings are the result of the experiences and ideas of participants, rather than the characteristics and preferences of the researcher (Morse, Barrett et al. 2002; Houghton, Casey et al. 2013).

In this study, confirmability was enhanced by being reflective and through peer review. An expert colleague was asked to review the decision points throughout the process and to check the ideas and interpretation of data. Further, a selected participant was asked to check the data collected and to read her interview transcript. The participant emphasized that the transcript matched what she actually intended. Furthermore, using triangulation, as discussed earlier, helped to reduce the effect of author bias.

Another technique used in this study to eliminate bias and to keep the author honest was to record the interviews, using audiotapes instead of just taking field notes. Then extensive sequences from the original data (participants' quotations) were presented, following a detailed commentary.

3.6 Researcher Position

Going to Palestine to conduct the study fieldwork was by no means returning home. The field site was the city I lived and grew up in, which made me feel very familiar with the culture, economic and social settings of the study area. At the same time, spending long time for observation and conducting the fieldwork generated a rich knowledge and information about the study under investigation.

Furthermore, knowing the language of the study participants reduced the loss of meaning and thereby enhanced the validity of the qualitative research. The prior knowledge about the situation and the culture in Palestine was very important for increasing the confidence in the participants' responses and enhancing the validity of the study. My nationality, gender, ethnicity, attire, ability to engage in regular conversation in the local dialect enabled me to bridge the gaps and become more accepted. Moreover, the way I interacted with people helped in forming the relations of trust that are important in the fieldwork. This experience was gained from previous

studies I conducted in the recent years. It is worth mentioning here that having my father accompanying me on the interviews was a good strategy as he was a teacher in the city and knows most of the study participants or/and their families. This made the study participants to feel more comfortable, more cooperative and to show respect and real interest in participating in this study.

The acceptance of my presence, despite the curiosity of why I was there and where I was coming from, resulted in a collective positioning of me generally as an acceptable researcher doing a "useful" research for Tulkarem. Some frequent sentiments of acceptance like "*Your research might be useful to us, so it is good that you are here*"…. "*I hope that you will provide us with solutions for urban sustainability in conflict areas…..*".

3.7 Ethical Considerations

According to University of Calgary policy regarding ethics in human studies, approval from the Ethics Board Committee was obtained before the start of the study. A completed ethics form in addition to the consent form was submitted to the committee for approval. The participants received a copy of the consent form when they agreed to participate in this study. The consent form contained a description of the goal of this study and a participant privacy section. In addition, the participants could withdraw from the study anytime. The collected data will be stored for two years after completion of the study and successful defense of the thesis.

Chapter Four- Results and Discussion

4.1 Introduction

This chapter presents the major findings based on the analysis of the data collected for this study. According to the case study qualitative data analysis, data were classified into categories that identify the study themes. This chapter is structured based on the research questions related to the urbanization and agricultural LUCC as discussed in Chapter 2. Further, the chapter analyzes the results obtained from the GIS maps and connects them with the data obtained from the questionnaires responses.

4.2 GIS Data

Different data were extracted from the GIS database using the computational functionalities available in GIS. These included; the total amount of Palestinian built-up area (in ha) in the city boundary in the two time periods, total area of land occupied by Israeli structure and the total areas of the LUCC classes derived from classifying the aerial photos in the same periods, as illustrated in Figures 4.1 and 4.2. Further, identification of the change area was conducted by comparing the two classified photos as presented in Figure 4.3. The area changes in the corresponding classifications are also summarized in Table 4.1.

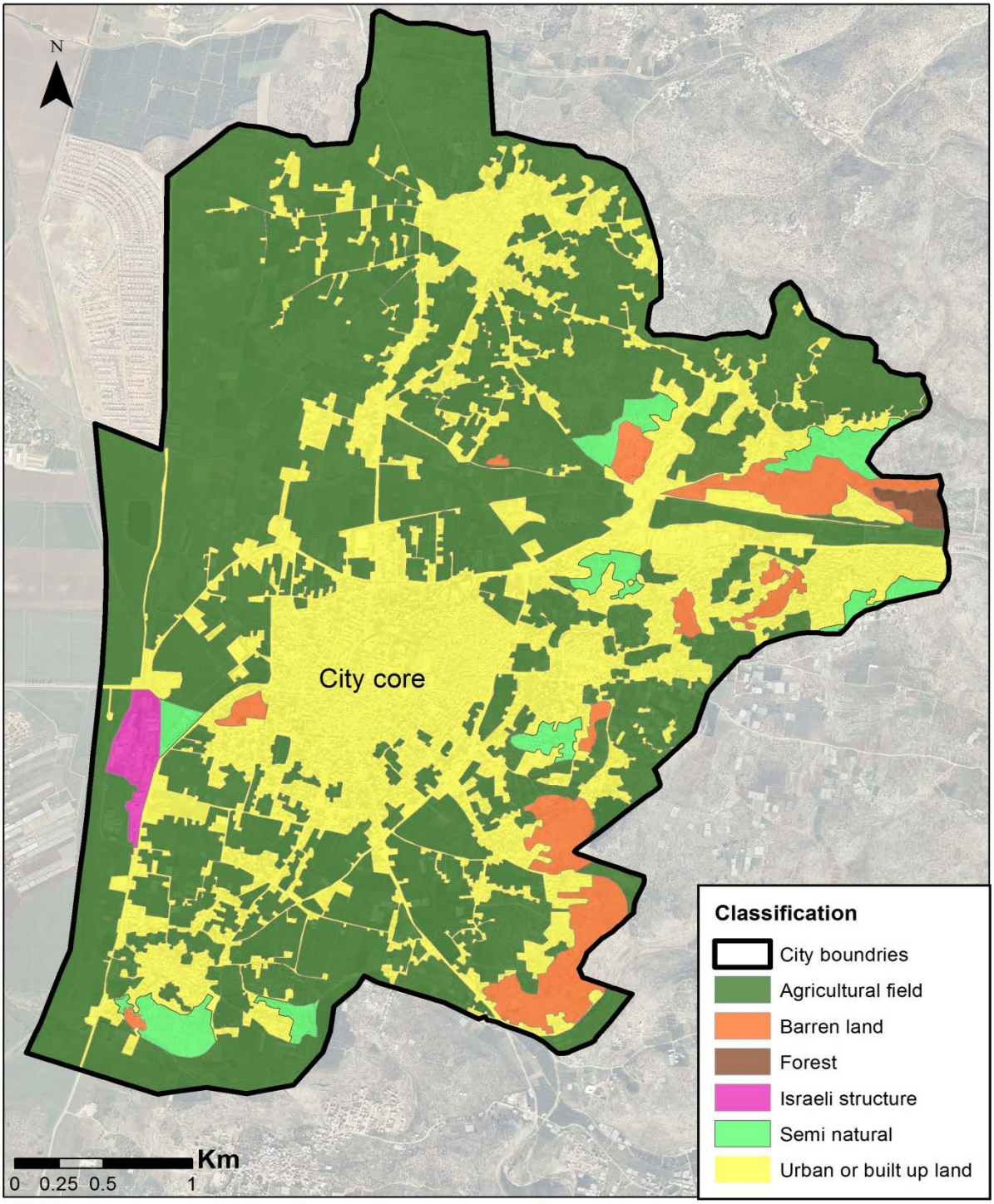

Figure 4. 1: A Classified image showing LUCC categories of Tulkarem in the year 1999.

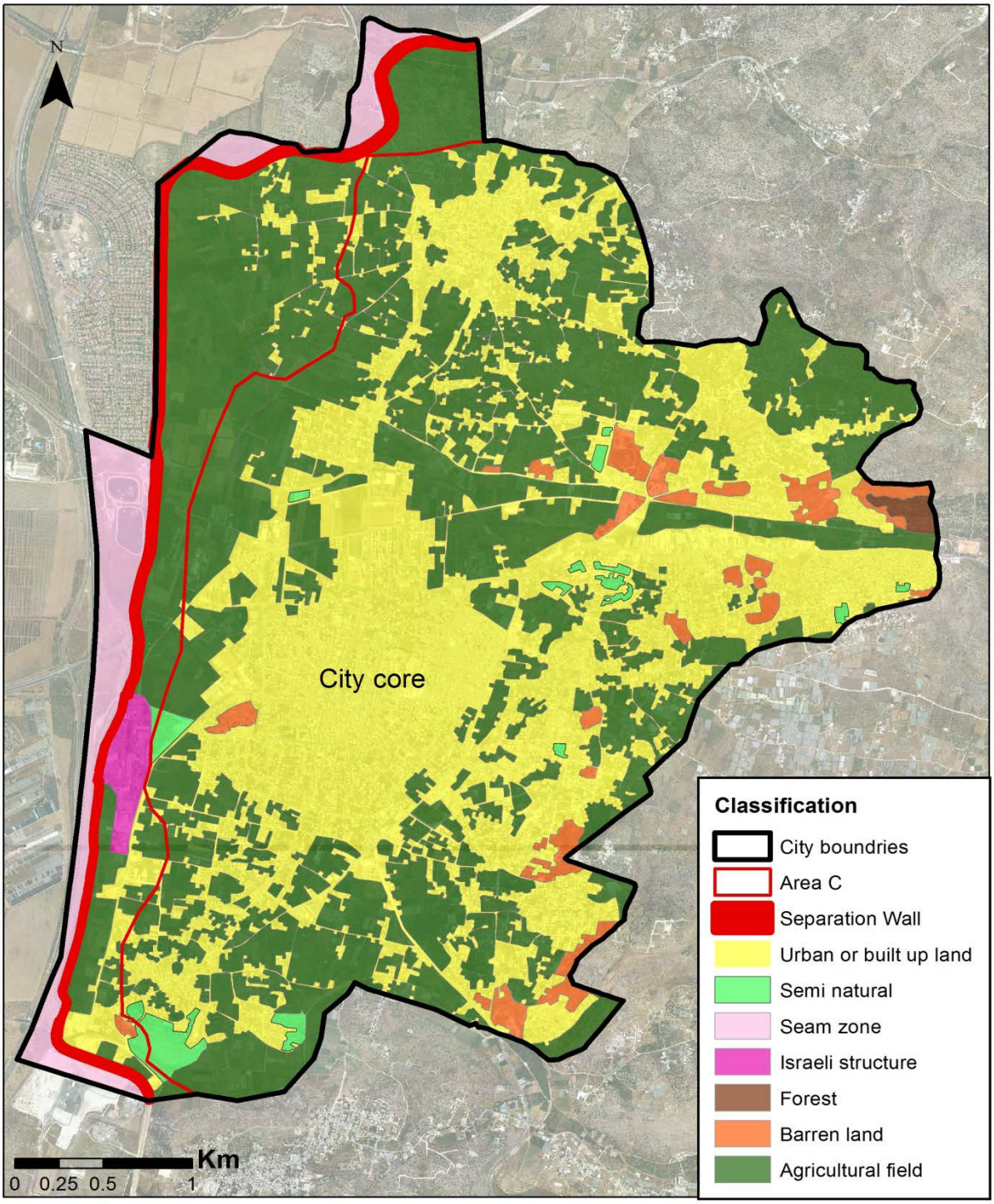

Figure 4.1: A Classified image showing LUCC categories of Tulkarem in the year 2009.

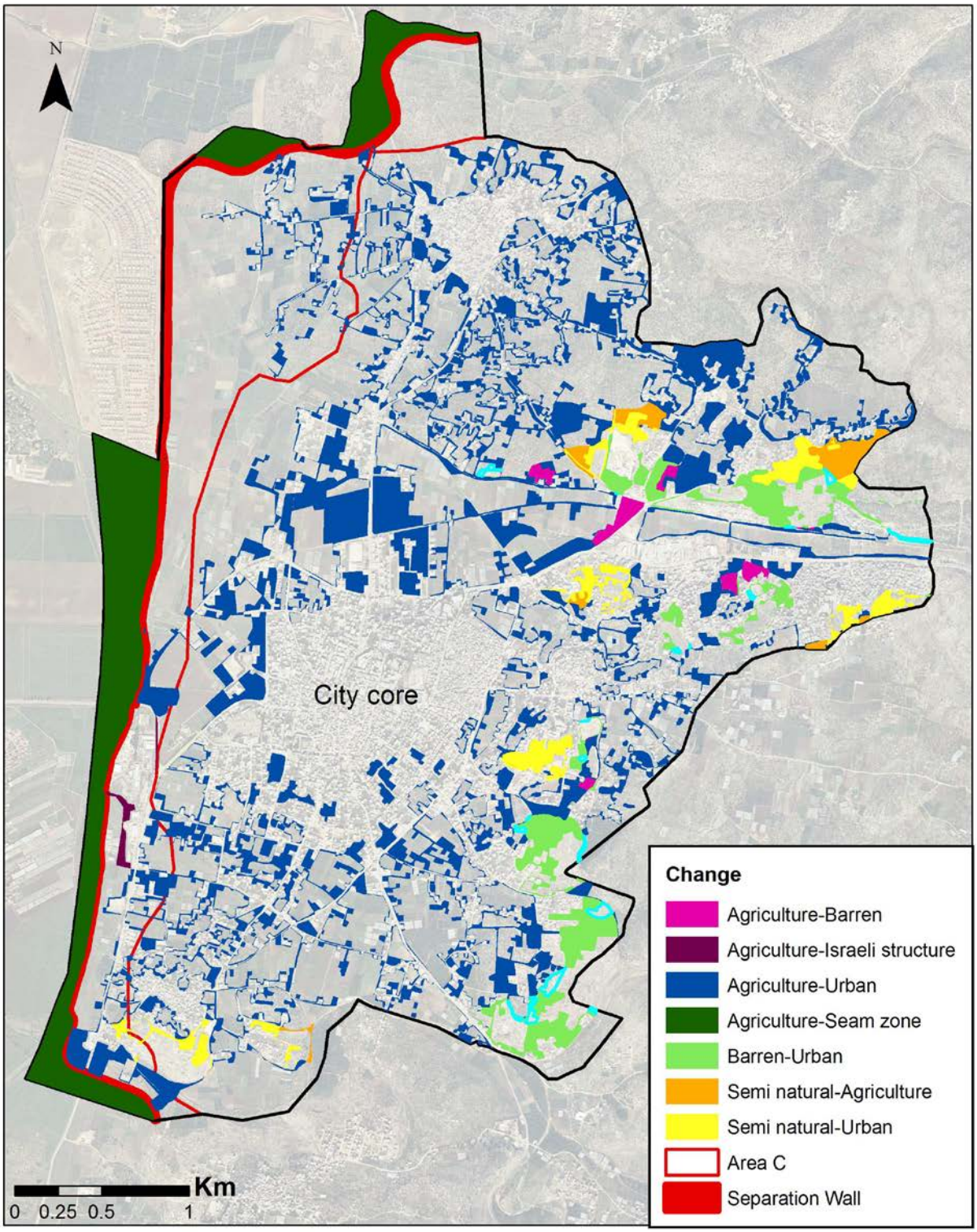

Figure 4.2: From-to change map shows the changes in the different classifications between the years 1999 and 2009 in Tulkarem.

Table 4.1: Changes of LUCC between 1999 and 2009.

Land use classification	Year 1999 (ha)	Year 2009 (ha)	Change (ha)	Change percentage (%)
Urban or built up land	561.66	865.74	304.08	54%
Forest	5.94	5.54	-0.40	-7%
Barren land	85.64	49.82	-35.82	-42%
Semi natural	56.79	24.81	-31.98	-56%
Israeli structure	14.68	16.91	2.23	15%
Agricultural field	1210.39	878.13	-332.26	-27%
Seam zone	0.00	94.15	94.15	100%
Total area (ha)	**1935.1**	**1935.1**		

GIS Results and Discussion

The conversion can be seen by visual interpretation of the maps (Figures 4.1, 4.2 and 4.3) as well as from Table 4.1. The analysis of the data showed that the development of the urban and built up area took place primarily on the agricultural lands especially in the northern part of the city core that decreased the agricultural land from 62% of total area in 1999 to 45% in the year 2009. Further, the urban area grew by 304 ha between 1999 and 2009, or nearly by 30haper year on average. The urban area increased by 54%, whereas barren land, semi-natural, and agricultural areas decreased by 42%, 56% and 27%, respectively. It is worth noting that an area of 283ha, in the west side of the city boundary, is considered as an area C (outlined in red color in Figure 4.2), which is under the Israeli military and civil control. Construction is prohibited for Palestinians and agricultural land covers 71% of this area. At the same time, all areas around the city boundaries are also classified as area C, which restrict the growth of the city and direct the expansion of new urban development onto agricultural lands and the semi-natural areas within the city boundaries, which are decreasing as illustrated in Table 4.1 and Figure 4.3.

Approximately 80% of the newly urbanized area in 2009 was reclaimed from agricultural land, about 245 ha. At the same time, about 10.89 ha and 3.11 ha were converted to agricultural land during this period from semi-natural and barren lands, respectively, as presented in Table 4-2. The area classified as forest was not changed because it is considered as reserves for recreation and wild life conservation and most of its area is located outside the city boundary within the area C. The seam zone appeared in the 2009 map only because it classifies the area of land that is located behind the Separation Wall, which explains the lack of change to other types of classifications. At the same time, the Israeli structure had increased from 14.68 in the year 1999 to 16.91 in the year of 2009. This change happened mainly at the cost of the agricultural fields with about 1.76ha. Built-up urban areas are generally expected not to change to other land use change types such as agriculture and semi natural. However, due to overlaying map errors, misleading classification may result. This may be the case for changes shown in Table 4.2 from urban to semi-natural or barren land (0.96 and 0.88 respectively).

Table 4. 2: Land use/land cover change conversion matrix (area in ha)

From 1999 To 2009	Semi natural	Barren land	Agricultural field	Urban or built up area	Forest	Seam zone	Israeli structure	Total (1999)
Semi natural	**20.53**	1.32	10.89	23.74	0.08	0.00	0.23	**56.79**
Barren land	0.00	**43.15**	3.11	39.38	0.00	0.00	0.00	**85.64**
Agricultural field	3.30	3.99	**864.13**	245.04	0.00	92.17	1.76	**1210.39**
Urban or built up area	0.96	0.88	0.00	**557.58**	0.00	1.85	0.39	**561.66**
Forest	0.00	0.48	0.00	0.00	**5.46**	0.00	0.00	**5.94**
Seam zone	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	**0.00**
Israeli structure	0.02	0.00	0.00	0.00	0.00	0.13	**14.53**	**14.68**
Total 2009	**24.81**	**49.82**	**878.13**	**865.74**	**5.54**	**94.15**	**16.91**	**1935.1**

The total population occupies a land of 1540 ha. The land under city jurisdiction is supposed to be 1935 ha, but due to the political situation that resulted in the construction of the Separation Wall and the division of land into areas A, B and C, an area of about 394ha was extracted from the city land. Based on the available census data about Tulkarem's population, which was presented in Figure 2.15 and the natural growth rate, it can be estimated that the population of Tulkarem (within the city boundaries) will be 96,644 in 2025 and 111,378 in 2035. Of course, this estimation is based on the normal growth of population that might change significantly due to the migration and conditions of political instability. Further, around 5.1 persons live in a housing unit in the West Bank with an average area 119 m^2 in the year 2011(Statistics 2012). This means that about 18,950 residential units are needed by 2025 to accommodate this growing population with an area reaches 226 ha and 21,839 units by the year 2035 with an area 260ha. It is worth mentioning here that this estimated area is for the residential units required. Other built up areas such as commercial, industrial, transportation and communication services shall be needed to serve the growing population, which means more pressure on the available lands within the city boundaries. From the results obtained from the map and calculation of the residential units, the ratio of the residential area to the total built up area was estimated to be 0.20. This ratio was used to predict the built up area for the year of 2025 and 2035 assuming the same unit size (i.e., 119 m^2/ family- 5.1persons). The estimated build up area will be 1143 ha for the year of 2025 and 1317 ha for the year 2035.

From the GIS maps presented in this section and the information provided in Section 2.10 about the city expansion over years, it is obvious that the city continue to expand over the agricultural lands in the surrounding areas. The maps and the data collected shows that the urban growth is a process where influences through history can be monitored and investigated.

Consecutive occupations and mandates in the study areas affected the urban growth in many ways with their different laws and regulations, which were issued mostly for the benefit of these authorities and the impose of their power and control over land (Thawaba 2009). In addition, these various mandates have affected the current building and planning in the Palestinian system. The existing laws, regulations, and orders are mixture or composition of different previous laws and orders. Tulkarem is one of the cities in the area faced many challenges and was shaped through history by these forces. Moreover, Tulkarem as a border city, where the Armistice Line in 1949 penetrated the fabric of the city and cut the city from its fertile farm land to the west was affected in a profound way. The city started to grow toward the east, north and south sides. After the Also agreements in 1994 and the construction of the Separation Wall in 2002, the urban growth of the city become limited. The urban growth of Tulkarem started to increase obviously over the agricultural lands within the city boundaries as no construction is allowed for the Palestinians in area C outside the city boundaries and the Wall existence in the west side force the residents to move to the north and the east side of the city.

4.3 Qualitative Data Analysis- Participants Interviews

The interviews with study participants were conducted via face-to-face meetings. Three interviews were conducted with the heads of Planning Department in the municipality of Tulkarem and the local government office using the first type of questionnaires (Appendix 2). Another three interviews were conducted with the director of the Agricultural Relief Agency, the manager of the Agricultural Ministry Office and president of the Chamber of Commerce in Tulkarem, using the second type of questionnaires. The third type was conducted with random farmers who are directly and indirectly affected by the Separation Wall in different locations around Tulkarem, with traders of agricultural support and complementary products and

agricultural nurseries that produce seedlings for farmers. During the selection of the farmers, the author ensured that the samples cover the whole city of Tulkarem until saturation was achieved with a total of 30 interviews. Figure 4.4 shows farmer participants' locations map.

All the interviews were recorded using Galaxy Note 2 and the author took notes as well. After recording all the interviews, they were transcribed into text before analyses. Accordingly, the transcripts were written in Arabic language first, the language of the participants, and then were translated to English by the author. On average, each interview took about 8 hours to be transcribed. All of the transcripts required critical examination, careful interpretation, and challenging synthesis.

The first step in the analysis started with reasonable codes or patterns. One code is usually assigned to many pieces of text, and one piece of text can be assigned more than one code. These codes represent a certain theme. Then, these themes cluster new ideas that answer the research questions.

The layout of the data analysis follows the structure of the questionnaires, which covered all the driving forces that can contribute to the loss of agricultural land for urbanization purpose provided by the literature, as presented in Chapter 2. The results integrate quotations from study participants in support of the analysis. All quotations are referenced by the respondent position as follows: the planner (questionnaire type 1) was given (P); the manager (questionnaire type 2) was given (M); and the farmer (questionnaire type 3) was given (F); followed by his/her number and then followed by the quotation number. For example (F:8:25) means farmer participant number 8 stated quotation number 25. This is done to maintain the confidentiality of the study participants and to avoid confusion for the author and readers.

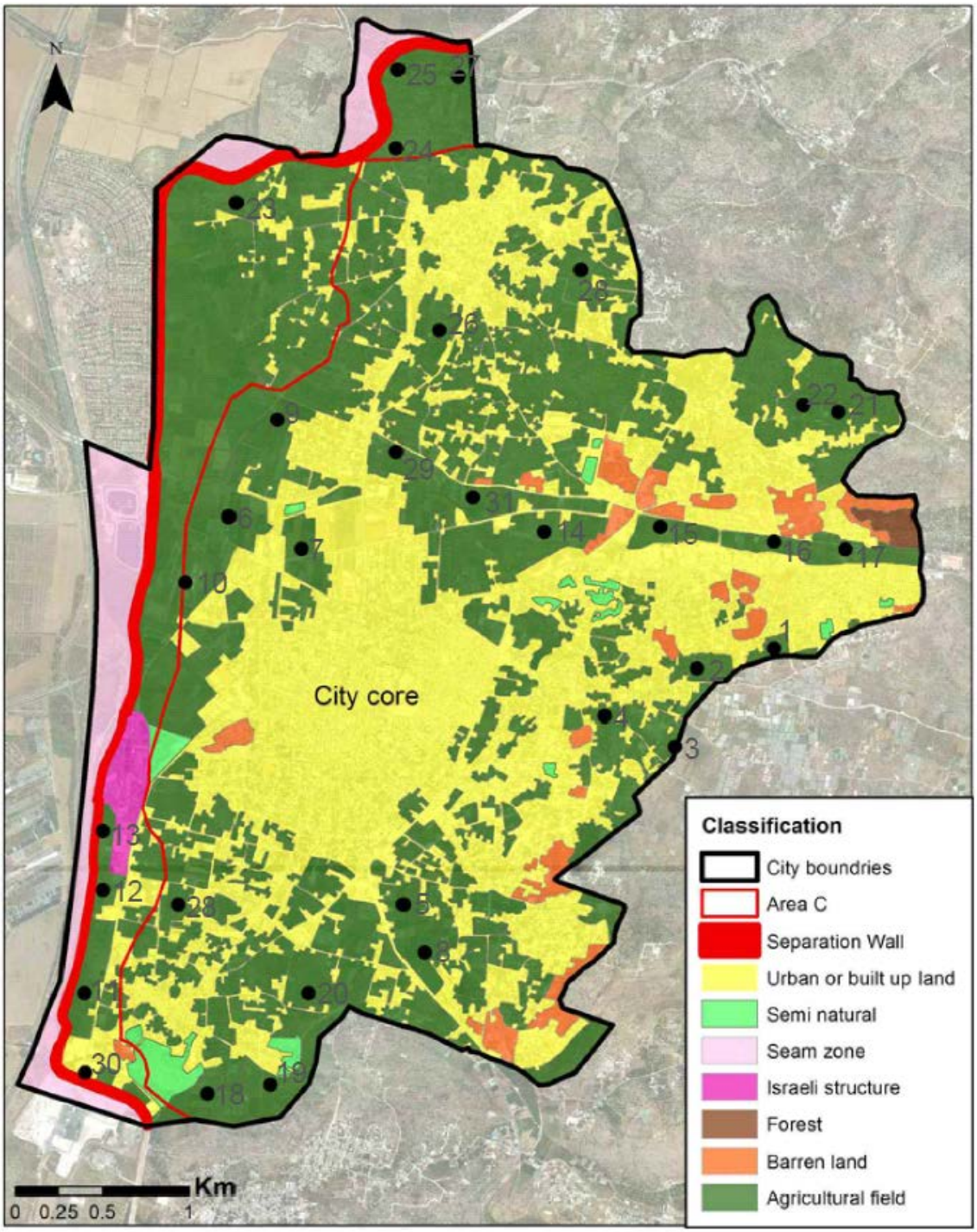

Figure 4.3: A Map for the farmer participants' locations around Tulkarem and their numbers.

The following sections provide analysis and discussion of the collected data from the interviewees.

4.3.1 Planners' Data Analysis- Questionnaire Type 1

Governmental Policy and Planning Factor

1. According to the interviewed planners, unprofessional planning and the political situation are the major factors that led to LUCC in Tulkarem.

   "Plans do not match the real situation and when practiced it is too slow..for example, there is not enough services for the areas where there is a rapid urban expansion. At the same time, there are no possibilities to do it because of many reasons…. The most important ones are the limited budget and the political situation (P:2:13)".
   "The city plan encourages the urban expansion over the agricultural lands. When the master plan classifies the agricultural lands as agricultural housing or sometimes gives it a name (agricultural facility), will not protect the agricultural lands…. Protection means prevent the construction entirely on the agricultural lands (P:1:1)".
   "Urbanization is happening over the agricultural lands…there is no action or law to stop this… there is a clear ignorance from the local organizations toward the importance of agricultural lands in the city (P:3:14)".

2. Lack of communication and coordination between the different planning departments in the municipality and the local government is another factor that led to LUCC.

   "Every organization works alone. There is no communications between the different organizations or even the different departments of an organization. Again every one works separately (P:1:7)".
   "Everyone is saying agricultural lands should be protected without decisions, we never discussed the agricultural sustainability in our meetings (P:2:9)".
   "During the 17 years serving in this department, we never met to discuss planning issues and agricultural sustainability with other organizations (P:3:30)".

3. Because of the absence of law and punishments, even though there is a master plan for the city, there are irregularities such as industrial and commercial buildings in residential areas.

   "The municipality does not do anything for the irregularities. For example, there are industrial facilities within the residential areas..Also, poultry farming is allowed within

the city boundaries; however, the law prevents this… I would say, there is no clear policy for the local institutions (P:1:3)".

4. The interviewed planners mentioned that the city has limited available land and at the same time the population is increasing. The master plan should be expanded and the building regulation should be changed to allow the city to expand vertically.

   "Buildings now according to the rules should not exceed 4 floors; this should be changed to 8 floors, for example. In the past, the vertical expansion was not allowed due to political situation. The local government encouraged people to expand horizontally to prevent land's confiscation… now the boundaries are clear and the land is limited… this law, I mean the building regulation, should be changed(P:1:4)".
   "The local institutions shall work together and start thinking of housing projects, in order to accommodate the growing population (P:3:6)".
   "We do not have any plan to address this issue. The master plan should be modified and updated to meet the current and future needs(P:2:5)".

5. All interviewed planners agreed that there are no clear regulations to protect the agricultural lands from urban expansion. At the same time, planners are not involved in any plans to enhance the agricultural production.

   "We always talk about agricultural lands protection, but there is no real action (P:1:6)".
   "No service or roads are available for the agricultural lands. (P:1:9)".
   "Agricultural lands were not considered in the master plan of the city, the agricultural lands are classified as farming houses… in other words, you still can build over it… this plan should be changed (P:2:10)".

6. Building regulations and rules within the city boundaries do not protect or avoid the agricultural lands.

   "Any land in the master plan classified as residential even though it is fertile agricultural land. This means the owner of the land has the right to ask for service to his land… in the north part of the city where the land is classified as farming residential, the municipality provides services(P:3:19)".

Urbanization Factor

1. The north and east part of the city witnesses the largest rapid urbanization because of land availability there.

   "The urban development is going toward the north and east part of the city, while, he west side of the city is less urbanized due to the existence of the Wall, the Israeli industrial zone and Area C (P:1:5)".
   "The urban expansion is happening now in the east and north parts of the city. In the east, the development is happening outside the city boundaries at the cost of the agricultural lands, of course. (P:2:2)".

2. Migration to the city plays an important role in the city development and expansion in the last few years. The greater population means an expansion of built areas to provide more housing and employment opportunities. This urban expansion is happening at the cost of fertile agricultural lands.

   "People are moving to the city seeking for jobs, services and better standard of living (P:2:11)".
   "As far as I know, not really sure about the number, the natural population growth was 5.5 in the year 2010 but the urbanization growth is 6-6.5% which means that there is migration to the city… in any case, there is an obvious migration to the city (P:1:10)".

Political Factor

1. The interviewed planners related the rapid urban expansion near the city core to the following factors:

   a. Political division of lands as most of the area out of the city boundaries is area C.

   b. The availability of service.

   c. The sense of security because of unstable political condition.

   "The economic situation is worse in the rural areas than the city…. Working in agriculture is not worth it for rural citizens… At the same time, it is easier and more convenient for the employees and workers in Tulkarem to live in the city as the transportation is costly between the villages and the city. Also, the availability of

services in the city that is not provided in the villages such as the hospitals and health centers (P:1:14)".
"People feel safer when they are closer to the city and its services especially when the political situation is not stable (P:2:12)".

2. The Israeli closure and the existence of the Separation Wall affected the availability of agricultural lands and their production.

   "The citizens of Tulkarem own lands that are now located behind the Wall, I mean in the Israeli side. Now these lands are unplanted because farmers cannot reach them…. There are restrictions from the Israeli military for their access (P:2:17)".

3. The existence of the Separation Wall forces farmers to sell their lands.

   "The Israeli closure affected the market of the agricultural products… farmers sell their products in the local market for cheap prices… they find that working in agriculture is not worth it and is not economically feasible… of course, this leads farmers to look for other jobs and leave the agricultural sector and consequently sell their lands to developers (P:1:12)".

4. Oslo division of land affected the city expansion and the loss of the agricultural lands as it limited the urban areas and negatively impacted the city development.

   "The division of land to A,B and C affected the city expansion and restricted its growth. The areas within the city boundaries are classified as area A and B. There is no room for expansion as the city is surrounded by area C…this causes random or not organized urban expansion of the city (P:2:5)".

5. Ninety percent of the urban expansion and commercial activities stopped in the west part of the city due to the existence of the Separation Wall according to the interviewed planners. Palestinians are not allowed to build any structure within 500m along the Separation Wall.

   "The west part of the city was active before the Wall construction because it is close to the borders and many Israeli citizens, Jewish and Arabs, used to come to that area.… oh, lots of coffee shops, restaurants and shops used to be full of customers… Now the area is abandoned (P:2:19)".

6. Tulkarem used to be the biggest agricultural city in the West Bank. Now due to the urban development restrictions and the bad planning policies most of the agricultural lands are transferred to urban areas.

   "I would say that 36.8% of the city's residents worked in the agricultural field. Now the percentage does not exceed 7%.... this means there is a decline in working in agriculture (P:1:13)".

Farmers Socio-economic Factor

1. According to the interviewed planners, the poor economic situation of the farmers is the major factor lead to the sale of agricultural lands for urban purposes.

   "Farmers leave working in agriculture and sell their lands because of the bad economic situation and low standard of living for their families…. We see that (P:1:8)".
   "The farmers do not make a good profit from agriculture due to different reasons….For example, the expensive production costs, the Israeli competition and the surplus local production of some crops…. A national plan should be developed to solve this problem (P:2:20)".

2. The expensive production costs, the lack of support and guidance, the bad marketing for the local agricultural production, and the Israeli competition for these products are factors that led to poor economic situation of the farmers and consequently losing agricultural lands.

   "The low products prices, at the same time the high production costs meanthat farmers do not make good profit from working in agriculture. This of course will lead to bad economic situation for the farmers (P:1:3)".
   "The farmer stands alone when there is a natural disaster. No guidance or financial support from the government or the agricultural agencies (P:2:4)".
   "Watermelon, oranges and potato are some of the Israeli products that are available in the Palestinian markets for cheap prices…. This competition seriously affects the future of the agricultural sector in Palestine (P:3:38)".

3. Land prices also affect their uses. The interviewed planners mentioned that the higher the land price, the higher the likelihood that it will be sold for urban usage.

   "The land price is an important factor… the land price determines its use. We noticed that the highest price land goes for urban uses…. of course, when the price of 1 dunam[1] of land reaches $150,000, the farmer will not think to plant it to get only some money at the end of the year (P:2:37)".

4. Land fragmentation and Islamic law of inheritance play an essential role in selling the land for urban uses. Small lands more easily sold for immediate benefits to counter farmers' low standard of living.

   "Inheritance distributes the land between sons and daughters into small pieces that leads to urban expansion due to selling the small pieces of land… with the respect to our religion, but the land fragmentation due to the inheritance plays anessential role in losing the lands…(P:1:11)".

Land Productivity Factor

1. According to the interviewed planners, the expensive production materials such as fertilizers, seeds and pesticides affect the production cost and farmer's profit and consequently lead to selling of the land for urban uses.

   "The production cost is very high. Fertilizers and seeds are expensive…at the same time farmers sell the products for cheap prices…. farmers make low profit or sometimes nothing (P:2:29)."

[1]**A Dunam:** was a unit of land area used in the Ottoman Empire and representing the amount of land that can be plowed in a day. The unit is still in use in many areas previously under Ottoman influence. It is now defined as exactly one decare (1000 m^2) (Thawaba 2009).

4.3.2 Agricultural and Marketing Organizations' Data Analysis- Questionnaire Type 2

Governmental Policy and Planning Factor

1. There is no control over the agricultural products prices nor the amount of products imported through the crossing points.

   "There are no fixed prices or at least minimum prices that protect the farmers from profit loss….The prices in the central market is based on the supply and demand(M:1:2)".
   "There is no control over the products coming from Israel, if you ask how? Most of the time smuggling through the check points or from the settlements' production that is easier to reach the Palestinian markets through dealers….. These products most of the time badly affect the Palestinian production (M:2:19)".

2. The interviewed managers mentioned that the agricultural organizations are not involved in the planning process. Further, they highlighted that there is no real action to protect the agricultural lands from being urbanized.

   "Planning is the municipality's responsibility, it is not our responsibility…also, the protection of the agricultural land is the municipality's job…. Now there are no agricultural lands to protect…. You should know something, we are not involved in the planning process and preparing the master plan of the city (M:1:3)".

3. Responses regarding the guidance and workshops were different from one manager to another. For instance, M3 mentioned that they provide guidance to the farmers while M2 denied it.

   "Of course, agricultural organizations provide guidance and workshops for the interested farmers (M:3:23)".
   "In the city of Tulkarem, farmers rely on their experience in planting their lands (M:2:22)".

4. There is no financial support for the farmers. However, the Relief Agency provides seedlings and production materials to the farmers, such as water tubes, fertilizers pesticides, etc. In addition, the Relief Agency helps other farmers in land reclamation,

opening service and farming roads. It should be noted here that these kinds of aid are concentrated in the rural areas.

"The agricultural agencies and ministry of agriculture concentrate their activities in the rural areas… as these areas are considered as the food basket of the district… helping the farmers in land reclamation, roads opening and connecting water pipes.(M:2:2)".

5. According to the interviewed managers, the agricultural budget does not exceed 1% of the governmental budget for the West Bank, while security consumes 40% of the budget.

   "Although, security is important, agriculture enhances the Palestinians resilience and fortitude on the land… the budget for the agriculture is very limited… this happens every year in the governmental budget meeting. The budget for agriculture should be bigger than 1% in order to support the farmers and provide aid programs (M:1:19)".

6. There are no future visions or plans from the ministries or local offices if the political situation changes.

   "We do not have plans if the political situation changes or how we will deal with the current and future problems that we face or will face (M:3:17)".

Urbanization Factor

1. Due to the poor economic situation, people are moving to the city seeking jobs and a better life.

   "The population of the city increased noticeably because of the rural- city migration … it is noticeable that people move from the rural areas to the city looking for jobs and better standard of living at the same time there is migration from the north districts to Ramallah as there is lots of jobs opportunities(M:2:11)".

Political Factor

1. According to the interviewed managers, governmental policies and master plans are not the only factors contributing to the loss of agricultural lands. The political situation plays a role in restricting the urban development and contributes to the change of agricultural lands to urban uses.

   "There is an urban expansion over the agricultural lands not only because of the local governmental policy. The political situation and Israeli control over the land limits the development of the Palestinian areas…. this is obvious (M:2:23)".

2. The existence of the Separation Wall cut a huge portion of land that was used for agricultural activities.

   "The Wall construction is an essential factor that led to the loss of agricultural lands and consequently causes reluctance for people to work in the agricultural sector… thousands of lands were confiscated for its construction, while others located now behind it, in the Israeli part… (M:1:1)".

3. Agricultural lands located behind the Separation Wall are not accessible by the farmers. This leads to loss in the production as these lands are left unplanted and/or uncultivated.

   "The existence of the Wall prevented farmers from accessing their lands…. Leaving the lands unplanted and unable to cultivate the output such as olives (M:3:5)".

4. Oslo agreements affected the urban expansion as it put restrictions and prevented Palestinian communities' development in area C.

   "This division… destroyed the communities, lands…. destroyed everything…. Oslo affected the communities and prevented creating a plan for the whole Palestinian areas because the Palestinian areas are fragmented… between any two A areas there is an area C where there is no control (M:2:20)".

5. The urban development in the west side of the city has been stopped after the Wall construction.

"Residential buildings, shops, coffee-shops and restaurants were active in the west side of the city… many people moved to that area because of it is a vital site… Now, go and check, you will see that there are even residential buildings empty of their residents, and there are closed shops and restaurants (M:2:1)".

6. As Tulkarem is a border city most of its products such as fruits, vegetables and olives were sold to the Israeli markets. After the Wall construction, farmers moved their sales to the local markets, which means low profit and surplus products.

   "After the Wall construction, people started selling their products in the local market through the central market (M:3:1)"
   "Farmers sell their products in the central market, where the prices are low and where they make less money or no profit after all their invested effort (M:2:10)".

7. Furthermore, due to the uncertainty of the political situation, farmers plant the products that can be sold in the local market, such as cucumber, tomato and pepper. This action creates a surplus of these products in the local market.

   "Because farmers are always afraid of the unstable political situation, they plant products that can be sold in the local market… for example; they do not plant the uncommon crops such as "the outstanding zucchini" even if this product is preferred by the Israeli market. …Imagine if the border closed for a sudden… the farmer will dispose his crops as this type of product is not common to be used or to be sold in the local market..other products such as cucumber and tomato, which can be sold in the local market are planted by many farmers… this leads to dispose or sell the products for really low prices, that is not fair for the farmer's effort (M:2:12)".

8. The crossing points and the Separation Wall affected the customers, laborers, and products' movement between both sides (the Palestinian and the Israeli), which badly influenced the commercial and agricultural marketing sectors.

   "Customers and dealers used to come and take the products directly from farmers… now this is impossible due to the existence of the Wall… this Wall affected the movement of everything (M:1:21)".

9. The Israeli competition affects the local agricultural products. Cheaper Israeli products, which means low profit for the Palestinian farmers, as they have to sell their products for low prices that sometimes do not cover the production costs.

   "Israeli agricultural products are cheaper than the local ones because they are less quality and are not sold in the Israeli markets (M:1:8)".
   "The entry of these products is not controlled…..through dealers sometimes or from the settlements in the West Bank…. these products come into the local markets… they are cheaper than the Palestinian products (M:2:21)".
   "The Israeli competition is a fatal reason for the bad situation of the local agriculture. What is happening is destroying the agricultural sector….. It is not about a competition. (M:3:8)".

Farmers Socio-Economic Factor

1. According to the interviewed managers, a negative financial and economic situation is considered an important factor contribute to LUCC and loss of agricultural lands.

   "Land cover change and the loss of agricultural lands are happening obviously in the area of Tulkarem… of course, the bad economic situation of the farmers plays an essential role in selling their lands for urban development… farmers sometimes have only one choice which is selling their lands to survive in this tough and expensive life (M:2:14)."

2. Land fragmentation plays a role in land sizes and farmers leaving the agricultural sectors.

   "When the land is fragmented into small pieces farmer sell his/her land because he/she cannot make good profit on this small land (M:3:7)".

3. According to the interviewed managers, the reasons behind selling the agricultural lands for urban uses are:

   a. High land prices and limited lands availability.

   b. Availability of services.

   c. Land fragmentation.

4. Tulkarem relies on three sectors for its economy:

a. Agriculture, which was affected negatively and directly through the existence of the Separation Wall, as well as by the urbanization of the city.

"The Wall badly affected the agricultural sector in the city….As you know, thousands of dunams were confiscated for the Wall construction. others are located behind it… also, the Wall affected the movement of the farmers and products between the both sides(M:3:2)".
"The urban expansion of the city is taking over the agricultural lands within the city boundaries… few years from now there will be no agricultural lands to plant (M:1:11)".

b. Palestinian workers inside Israel. This sector was affected seriously with the existence of the Separation Wall as it put restriction on the peoples' movements, as Palestinian laborers are not allowed to go to Israel without special permission from the Israeli's authority.

"Farmers left working in agriculture and looked for other jobs, such as working in the construction sector…..those workers cannot enter Israel without a special permission and security check from the Israeli military (M:1:5)".

c. The third sector is the commercial markets, which also is affected by the economic situation and the purchasing power of the city residents' as well as the Separation Wall.

"After the Wall construction the commercial and industrial movement of the city slowed down, which negatively affected the city's economic situation (M:2:11)".

d. Even though the local market is affected by the aforementioned factors, still it is considered the most secure economic sector in the city. Accordingly, many people migrated from their villages to the city seeking jobs.

"The Wall restricted the work in agriculture and inside Israel that made people move to the city seeking jobs and opening shops (M:1:6)".

Land Productivity Factor

1. Seeds, fertilizers, and other production materials are expensive, which affects the production costs and farmer's profit.

   "Fertilizers and seeds are expensive. This badly impacted the production cost (M:2:23)."

2. There is no water problem in Tulkarem. According to the Ministry of Agriculture, there are 64 water wells in the whole district, 40 of them are for agricultural uses. The production of these wells is limited to 10 million meter cube/year since the year of1970. Currently, most of these wells do not produce more than 7 million meter cube/year, due to the limited agricultural lands and the urban expansion.

   "There is no water problem for agriculture. The output of the groundwater wells do not reach their capacity because the agricultural lands are declining in the district ….some wells used to work 24 hours now they work only 3 or 4 hours only(M:2:14)".

4.3.3 Farmers' Data Analysis- Questionnaire Type 3

Governmental Policy

1. Poor planning and governmental policy led to urban expansion over the agricultural land.

   "Valley is changing to urban while the hills are left unimproved… what planning you are talking about (F:2:18)".
   "It is the municipality's responsibility to give the permissions for building construction… why to give permissions in the agricultural lands..if there is planning these areas should be left green(F:14:19)".
   "I expect the agricultural land around the city will disappear in the next 5 years (F:6:18)".
   "The municipality should stop giving permissions for building construction in the agricultural lands… it is their responsibility to stop this disaster (F:9:10)".
   "Agricultural lands should be red-line for building construction (F:16:15)".

2. All the interviewed farmers agreed that they do not receive any financial aid from the government or agricultural agencies. Further, they did not receive any financial compensation when they lose their crops due to natural disasters.

   "The government did not compensate me when I lost all my crop after last winter's storm (F:17:19)".
   "I and my neighbors did not receive any support from the government… you witnessed the last two storms… I lost everything, the crops, seeds and pipelines… no compensation for that…. What can I say (F:30:5)".

3. Twenty six percent of the farmers mentioned that they received some planting materials such as nylon sheets for green-houses, seedlings, fertilizers, etc. This type of support happens only when there is a natural disaster like flooding or severe storms. However, typically the support is not enough to offset the losses.

   "The support is rare and only covers 10% of our losses especially when there is a natural disaster that destroys all the crops like last year's storm…. I received some nylon sheets for the green house… some pipes… sometimes we got seeds and fertilizers… but again, this is happening rarely and few (F:3:16)".

4. There is a lack of coordination and guidance from the government and agricultural agencies. None of the farmers mentioned that the Ministry of Agricultural or the Relief Agency give any direction to the farmers about what to plant and how much.

   "I never saw a person from the Agricultural Ministry who came to my farm or provided any advice… I and the farmers I know rely on our experience which I consider better than the Agronomists' experience (F:14:24)".

5. There is no protection or insurance for local farmers, which put them and their products under risk all the time.

   "We may sell the vegetable box which costs us 20 shekels for 2 or 40 shekels. It all depends on the market… our business is risky and depends on [luck](F:7:13)".

"There is no insurance or backup plan for farmers if they lose the season… if there is insurance or support from the government, farmers will be confident to plant and practice this important job(F:28:23)".

Urbanization Factor

1. The growing urban areas around the city affect the remaining agricultural lands. This situation forces the farmers to leave and look for other lands away from urban areas, which may be difficult to plant.

   "The green-houses suffer from bad ventilation, garbage and sewage from the surrounding buildings, which pollute the surrounded lands (F:4:26)".
   "Of course, the green-houses between the buildings, affects the production…. Boys from the neighborhood destroy the watering pipelines… sometimes damage the plants… Yes, this affects the land production (F:5:19)".
   "I know farmers who left the area seeking other lands to plant because of the urban expansion (F:16:29).

2. Population growth especially in the two refugee camps near the city contribute to rapid urbanization of the city.

   "Iktaba and Thenaba suburbs are rapidly urbanized because of their location near the refugee camps… dwellers of the two camps bought lands and started to get out of the camps (F:21:4)".

Political Factor

1. The crossing points on the Separation Wall between the Palestinian side and the Israeli side badly hinder the agricultural products marketing. Due to the long waiting time on these crossing points, many products get damaged.

   "Sometimes we wait all the day to get our products through the borders, with hot weather most of the products get damaged…. Which means a big loss for the farmers (F:4:17)".

1. The Separation Wall cuts a huge portion of the agricultural land. Trees, plants and water wells were confiscated for the Wall construction.

   "The Wall cuts a huge area of agricultural lands, we should protect the rest. (F:6:29)".
   "We used to plant and water these lands…. now they are gone (F:9:4)".

2. The south part of the city in Irtah suburb lost 200hafrom its agricultural lands behind the Separation Wall. For example:

   i. Farmer 11 owned 1.3 ha. After the Wall construction he now has only 0.2 ha.

   ii. Farmer 13 owned 3.2 ha. Without any warning or notice, 60% of his planted land was destroyed when the Israeli military started the construction of the Separation Wall. Now he only owns 1.3ha.

   iii. Farmer 18 lost 14 ha of olive trees behind the Separation Wall.

   iv. Farmer 30 lost all of his land (18 ha) for the crossing point and Separation Wall construction.

   v. Farmer 23's land is adjacent to the Separation Wall. Sometimes, he is not allowed to enter his land for security reasons.

3. The existence of the Separation Wall affected land prices and construction movement in the west and south parts of the city. It also affected the commercial and industrial activities in the area.

   "The land price was $150,000/dunam before the Wall. Now it is worth only $15,000. (F:11:31)".
   "All the shops and restaurants closed after the construction of the Separation Wall … what I can say… the construction of the Wall is a disaster with every sense of the word (F:12:21)".

4. The Separation Wall works as a barrier that prevents storm water drainage for the adjacent agricultural land, which means loss of the products when there are storms, flooding or severe rainfalls.

   "In the winter the wall prevents water drainage that makes our land as a swamp and sometimes we lose the crop (F:11:13)".

5. The existence of the Separation Wall inhibits the Palestinian laborers' movement between the two sides. This leads to an increase in unemployment, and consequently a declining economic situation.

   "The wall restricted the movement of everything…. Before, laborers used to go freely to Israel to work in construction or any other jobs… now this is forbidden…of course then, with the bad economic situation… people are forced to sell their lands to survive (F:4:24)".

6. The existence of the Separation Wall prevents the dealers' movement between both sides that makes agricultural products marketing difficult and affects the farmer's profit.

   "Dealers used to come take the products directly from us with the price we want. Now we have to sell the products to a dealer who has the permission to sell the product inside Israel… with the price he wants which is usually unfair to us… (F:10:15)"."We all sell our products either in the local central market or to dealers who take the products with the price they want to market these products in the Israeli markets…in both cases the prices are not fair, but we do not have a choice….(F:5:22").

7. Further, more restrictions are put on the production materials, seeds and fertilizers, due to the existence of the Separation Wall. This means more transfer costs to be added to the original high costs.

   "How are we going to make a good profit when the fertilizers, treatments and seeds are very expensive, and got more expensive and limited after the construction of the Separation Wall? (F:3:18)".

8. The Separation Wall affected the city expansion. More people are moving toward the east and the north sides of the city core. The limited available land for urban expansion, results in encroachment on available agricultural land.

   "People's movements toward the east create a competition between agricultural lands and urban expansion as lands are limited (F:4:5)".
   "The expansion of the city is happening in the north and east side of the city…..Consequently, the land prices increase due to limited available lands (F:8:32)".

9. Farmers are not allowed to access their lands located behind the Separation Wall at the time they prefer. Permissions are given to the farmers to access their lands only at specific hours and on specific days.

   "Farmers got permissions for specific time in the year… many restrictions face them when they think to enter their lands. They are not allowed to enter at anytime they want… sometimes their permission is denied for claimed security reasons… the farmers are not allowed to bring agricultural equipment with them… how they are going to cultivate their crops… this makes them lose the crops of course and leave their lands un-planted (F:10:18)".

10. If there had been no Wall, farmers would not have lost their lands and crops. Further, they could easily access their lands.

    "I never could access my land for the last 10 years because of the Wall existence (F:8:12)".
    "The production is really bad because of the lack of care… we do not access our land normally… many restrictions face the farmers when they think to visit their lands behind the Wall (F:18:22)".

11. Oslo areas division affected land prices. There is a huge difference between land prices in area A, which is the most expensive and area C that is the cheapest.

    "While land in area C is around five thousand dollars, the price of lands in the same area but under the category A may reach thirty thousand dollars (F:29:20)".
    "The high land prices of areas A and B tempt their owners to sell them for building purposes (F:4:25)".

12. The lands' prices near the Separation Wall declined after its construction.

"Land is threatened to be confiscated any time in the area near the Separation Wall… so it is not worth much money… people afraid to buy or to invest these lands (F:26:2)".

13. There is limited access to lands in area C due to military orders. As area C is under full Israeli control, sometimes farmers are forbidden to enter or cultivate their lands.

    "We cannot reach our land when there is a closure and all the time we are afraid it will be confiscated (F:1:17)
    "The Israeli patrol jeep comes almost every day to our land, sometimes the soldiers prevent us from reaching our land (F:4:24)
    "It is not easy to access our land because it is in area C (F:10:21)".

14. Three of the interviewed farmers mentioned that area C division protected the agricultural lands from being urbanized, as there are no Palestinian laws and regulation to restrict urbanization over the valuable agricultural lands.

    "Even though the Oslo division badly affected the Palestinian communities' growth, area C where Palestinians are not allowed to build, protected the agricultural lands from being urbanized (F:13:20)".

15. All the interviewed farmers agreed that they are affected by the Israeli competition.

    "Tulkarem is the primary city for citrus production. Now the market is full of Israeli oranges and lemons… this situation led farmers to cut their citrus trees as they did not make any profit from them (F:20:11)".
    "Most of the Palestinian crops were eliminated and destroyed by the Israeli competition (F:19:15)".

16. The Israeli products enter the Palestinian markets without control or test for its quality.

    "Most of the time the Israeli products are poor quality…. There is no control or check for these products before they enter the local market (F:12:23)".
    "The Israeli products are damaged and cheap…. Because they are cheap, people buy them… you know the poor economic situation of most families here (F:27:20)".

Farmers Socio-economic Factor

1. However, 60% of the interviewed farmers have high school or higher degrees in education. None of them is thinking of selling his land. This means that education is not a major factor for selling agricultural lands in city of Tulkarem.

   "After the construction of the Separation Wall, all the Palestinian workers inside Israel moved to the agriculture sectors. Teachers, employees, people with high degrees all work in agriculture (F: 4: 5)".

2. The interviewed farmers rely on their experience in planting and pest control. They have extensive experience in agriculture for at least 10 years.

   "We have good experience that we built year after year… no one from the agricultural organizations or the ministry of agriculture came to give an advice… I always rely on my judgment (F:11:13)".

3. All the farmers show interest in continuing work in agriculture as long as there are lands left to plant.

   "Agriculture is my life; I will not stop as long as I am alive. Not sure about the second generation though…. (F:8:26)".
   "I will continue working in agriculture as long as I am in a good health (F:22:23)".
   "I will not sell my land and will continue working in agriculture…. (F:30:24)".
   "No matter what happens…. I will not stop working in agriculture…. (F:25:21)".
   "Nothing will stop me working in agriculture as long as I am breathing….. (F:5:26)".

4. Fifty four percent of the interviewed farmers mentioned that their families do not work with them in agriculture. Seventy five percent of those farmers' families are not interested in working in agriculture.

   "Due to the stress and difficulties we are facing as farmers we are not encouraging our kids to work in agriculture (F:30:17)
   "… but at the same time we wonder who will protect the land from devastation and confiscation? This is bothering me, should they work in agriculture?? But I suffered a lot from this job and do not want my kids to suffer too… or they should work in agriculture to protected their father's and forefathers' land? Do not know the answer yet…(F:13:13)".

5. Agriculture is the only income source for 86% of the interviewed farmers. This directly affects their annual income through any changes in the local market and political situation.
6. All the interviewed farmers mentioned that their income is enough only to cover their basic needs, as they do not make a good profit from working in agriculture.
7. All farmers agreed that they either they sell their products in the central market of the city, or to dealers who sell the products inside Israel with permission.
8. Fifty six percent of the interviewed farmers who own their cultivated lands said that they take care of their lands better as owner than being tenants. At the same time, 63% of the tenants stated that they would take care of the land if they owned it.

   "Usually, tenants deplete the land to get the best financial return (F:25: 12)".
   " I am always concerned that the land will be sold because of the urbanization… that is why I take care of it only when I plant it (F:30:13)".

9. The Islamic law of inheritance plays an essential role in losing agricultural lands in Tulkarem to urban purposes. According to the Palestinian Central Bureau of Statistics 2010, the average agricultural holding in Tulkarem district is 1.4 ha. Forty-two percent of the holds are between 0.3ha to 1 ha. The interviewed farmers who won their farm land, own between 0.3-1.2 ha out of an original area of 2-7 ha for their fathers. Of course, this depends also on the number of sons and daughters.

   "Land fragmentation plays a role… If I have 1 or 2 dunams I will not work in agriculture as there will not be a good income (F:5:23)".
   "I own only 12 dunams out of 75 were for my father….imagine if I own the whole land? The situation will be better than now… now I am just providing the basic needs for my family (F:21:5)".

10. Small land size is more attractive for development. Farmers with small land areas are more likely to sell their lands than those with large areas because they cannot get a good financial return.

    "Small size land is sold for urban uses for two reasons.... first, there is no good return from farming this land… second, the developers target this land because they cannot afford to buy large areas.. Land is too expensive in area A and B (F:6:16)".

Land Productivity

1. Land productivity is getting worse due to application of intensive agriculture (i.e., more than two cycles/year). The reason for this type of depleting agriculture is to get the best financial output.

    "Instead of two cycles a year we do three cycles that make the land drained and less productive, year after year (F:29:19)".
    "The only way to get a good return from agriculture is to do three cycles a year… this of course affects the land productivity in the long term, but what can I do… (F:11:15)".

2. Weather conditions also play a minor role in the change of land productivity. Thirty percent of the interviewed farmers mentioned this factor. They related to a storm that hit the area in the wintersof2013 and 2014. This type of weather condition does not occur often in the area.
3. Farmers mentioned that another reason for low quality production is that good fertilizers and production materials are prohibited due to Israeli security reasons. The locally available materials, fertilizers and treatments are not as effective in pest control.

    "There are new pests and viruses that need a good treatment… otherwise we lose the crop (F:6:10)".
    "The fertilizers we have here do not contain useful elements, which affects the production and the profits (F:22:15)".
    "Lots of fertilizers are forbidden to enter the West Bank such as 20/20 and $Ca(NO_3)_2$ the fertilizers we have in the local market are not effective and are expensive at the same time(F:10:17)".

4. Sixty percent of the interviewed farmers plant cucumbers and tomatoes because they are favored in the Israeli market.

   "This type of product…. I mean cucumber and tomato consumes labor, effort and water… the Israelis pay low prices and let their farmers focus on other products such as fruits and flowers (F:6:18)".
   "The Israelis buy products cheap while they sell us their products, especially fruits,for high prices (F:5:5)".

5. All the farmers agreed that there is surplus in agricultural production in the local market. This is happening due to the following:

   a. Bad planning and instructions from the Agricultural Ministry given to the farmers. None of the interviewed farmers mentioned that they have received instructions on what to plant and how much.

      "All farmers plant the same products and at the same time… there is no direction for the government what and how much to plant… everything is done randomly and based on the season (F:3:21)".

   b. Bad marketing for the agricultural output in the local markets and the obstacles in transferring them to other cities in the West Bank with high transfer costs. At the same time, there is limited access to Israeli markets.

      "I do not take the risk to transfer the products to other cities' markets because I might not be able to sell them and I will lose not only the products but also the transfer costs (F:4:18)".

   c. No control over the borders prevents Palestinian farmers from exporting their products to international markets.

      "If we could export our product this would help farmers to keep working in agriculture… but the situation is difficult…. very difficult. We do not have

control over borders. Exporting our products is restricted due to the Israeli control (F:28:18)".

d. Import of cheap and low quality Israeli products.

"I produce good quality potatoes. When the time comes to cultivate the crop, we find the local market is full and saturated with Israeli low quality potatoes at lower prices…. People prefer the Israeli products even it is worse than ours, because it is cheaper (F:11:21)".
"I used to plant strawberry. This type of crop is not common to be planted in the West Bank… the farmers started to plant strawberry and the business was perfect.. Last year before the cultivating time…. see what happened…… We found that the local market was full of Israeli strawberry that was cheaper than ours… because of that I stopped looking after my field as it was not worth it… I would not compensate the production costs…I cannot blame people who buy these low quality products….because of the bad economic situation (F:12:21)".

6. Fertilizers, seeds, pesticides and treatment prices increase while the product prices decrease or stay the same, which lead to low or no profit for the farmers.

"The production costs are going up day after day (F:8:8)"
"fertilizers, seeds and other production materials are going up continuously, while the crop prices remain the same… I do not make good money from farming (F:2:19).

4.3.4 General Questions to the Study Participants

At the end of each interview, the 36 participants of this study were asked to fill out a questionnaire. The questionnaire contains questions pertaining to the factors that may have a direct effect on the loss of agricultural land in Tulkarem. The participants were asked to rank those factors from 1 to 5, where 1 is the least important and 5 is the most important. Figure 4.5 shows a histogram of the participant responses. The results highlighted that the political, economic and planning and policy factors are considered the most important factors, with 63%, 54% and 54%, respectively. While, the natural factor is considered as not important factor with only 3% of the participants consider it very important.

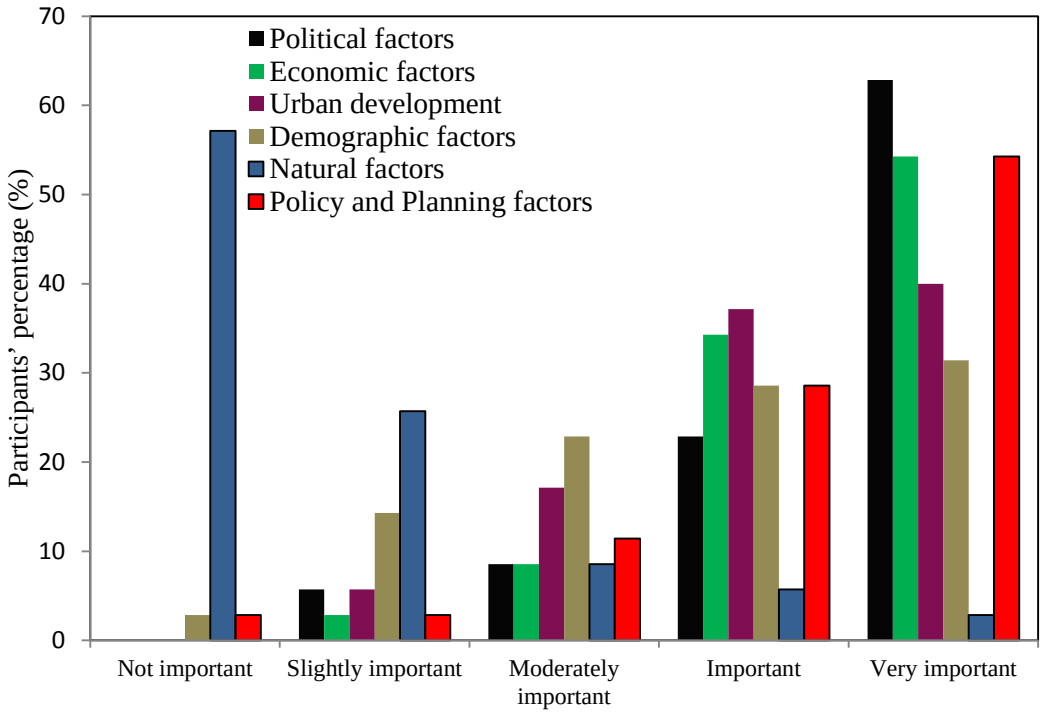

Figure 4.4: Participants' responses about the factors that lead to loss of agricultural lands in Tulkarem.

The participants were also asked to rank the impact of the Separation Wall from 1 to 5 on the living of Tulkarem's residents. Clearly, as seen in Figure 4.6, the very important impact was on agricultural lands with 74% of the participants' response.

Furthermore, the participants were asked to rank the factors that contribute to the sale of agricultural lands for urban uses. The result pertaining to the participant's responses are presented in Table 4.3. The followings observations can be drawn:

a) Poor economic situation of the farmers resulting from low products prices, lack of support and guidance and Israeli competition play an important role in losing the agricultural lands for urban uses as more than 60% of the interviewed participants considered these factors important and very important.

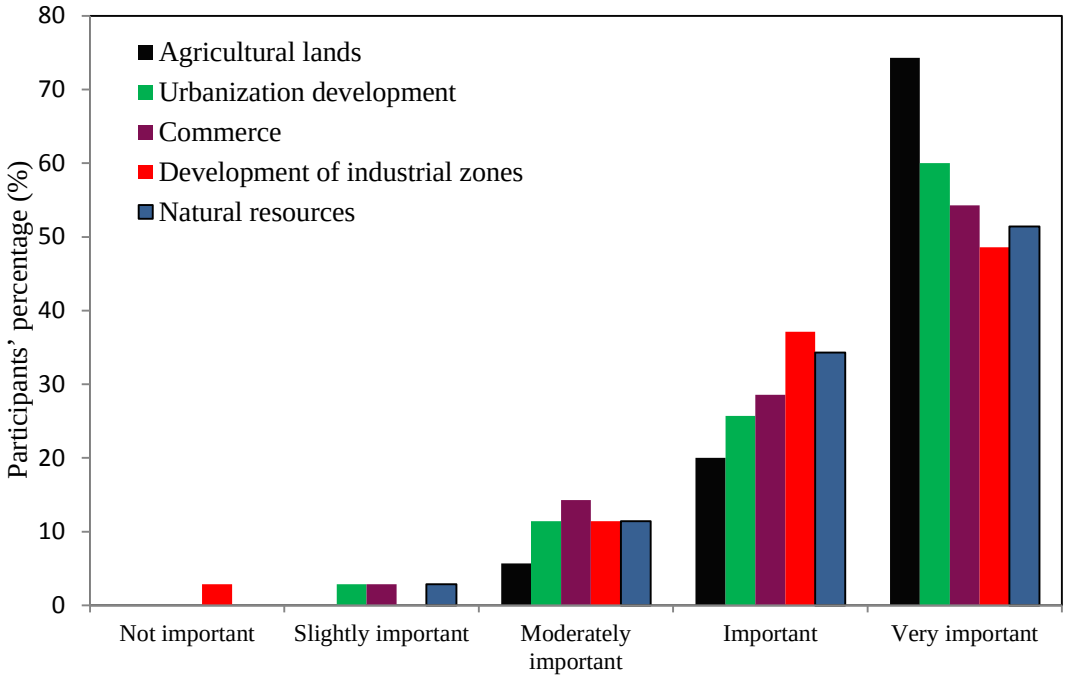

Figure 4.5: Participants' response about the impact of the Separation Wall on the living conditions of Tulkarem residents.

b) Further, the political situation including the Separation Wall, Israeli closure and area division to A, B, and C, considered as important and very important factors for losing the agricultural lands for urban uses.

c) Land prices, land fragmentation and increase in population are also significant factors.

d) Interestingly, participants consider the poor planning and lack of laws to protect the agricultural lands the most important factors that led to agricultural land loss with 78% and 83% respectively.

e) At the same time, factors such as using technology in agriculture, scarcity of water and low level of farmers' education were considered as minor factors. 43%, 49% and 46%respectively of the participants consider these factors not important.

Table 4. 3: Participants ranking for the factors leading to loss of agricultural lands to urban uses in Tulkarem.

Factors stand behind changing the agricultural land to Urban areas	Not important (%)	Slightly important (%)	Moderately important (%)	Important (%)	Very important (%)	Combined important and very important (%)
Poor farmers' income comparing with other jobs	0	11	17	37	34	71
The price of the land	0	9	23	31	37	68
Size of land/ land fragmentation	0	6	20	26	49	75
Interested in working in agriculture sector	6	20	29	14	31	45
Increase in population	3	11	26	29	31	60
Scarcity of water	49	31	11	6	3	9
Low level of education	46	34	14	6	0	6
Population migration to the city	33	29	17	15	6	21
Low product prices	0	11	26	26	37	63
The existence of the Separation Wall	9	14	11	37	29	66
Israeli closure	6	6	20	29	40	69
The dividing of land to A,B and C areas	11	6	29	14	40	54
Lack of financial support for the agricultural activities	3	6	17	14	60	74
Competition from Israeli products	3	6	17	43	31	74
Using technology in agriculture	43	40	9	6	3	9
Poor planning policy	3	6	14	29	49	78
Lack of guidance	3	14	14	23	46	69
Lack of planning law to protect agricultural land	3	3	11	26	57	83

4.4 Questionnaires Data Discussion

The findings in the study questionnaires can be summarized as follows:

1. All the interviewed planners admitted that unprofessional planning, lack of experience and lack of communication and coordination between the different planning organizations are considered major factors contribute to the loss of agricultural lands for urban uses in Tulkarem.
2. The limited available lands, migration to the city and natural population increase lead to rapid urbanization, especially in the north side of the city. This situation forces farmers either to leave looking for other lands to plant away from urban areas, or to quit their jobs in agriculture and seek other better jobs.
3. The Islamic law of inheritance, in which the fathers' land is divided among siblings once the father dies, plays an essential role in land fragmentation and the consequent sale of land to urban uses. Small lands are more easily sold for immediate benefits, as they are uneconomical for farmers to plant and more attractive to the developers. According to the Palestinian Central Bureau of Statistics (2010), the number of land holdings with an area less than 0.3 ha represents 33.9% of the total agricultural lands in Palestine. While, the lands more than 2ha represents only 14.1% of the total holdings. Table 4.4 shows the number of land holdings in Palestine (PCBS 2010). Figure 4.7 shows the available map of land fragmentation in Tulkarem (Planning Department 2005). It should be noted here that this map shows the blocks and large pieces (called Ahwad in Arabic), as the land ownership system is not computerized. Using the GIS application with detailed computerized land ownership system, land fragmentation factor and its impact on agricultural lands can be identified.

Table 4. 4: The number of land holdings in Palestine and their percentage to the total number of agricultural land holdings (PCBS 2010).

Land area (ha)	Percentage (%)
Less than 0.3	33.9
0.3-0.5	17.7
0.5-10	20.1
10-20	14.2
20+	14.1
Total	100

4. Industrialization, road infrastructure and using technology in agriculture are LUCC factors. These factors are considered as minor factors leading to urbanization in Tulkarem.
5. The agricultural organizations' managers agreed that there is no control over the local market and the agricultural product prices, which affect the farmers' profit and consequently their economic situation. Furthermore, these organizations are not involved in the planning process. Involving these organizations in the planning process is very important, as they are aware of the agricultural situation and the impact of planning on the sustainability of the agricultural lands.
6. The agricultural organizations are not taking real steps to support the agricultural sector in the city, or at least to protect the rest of the agricultural lands.

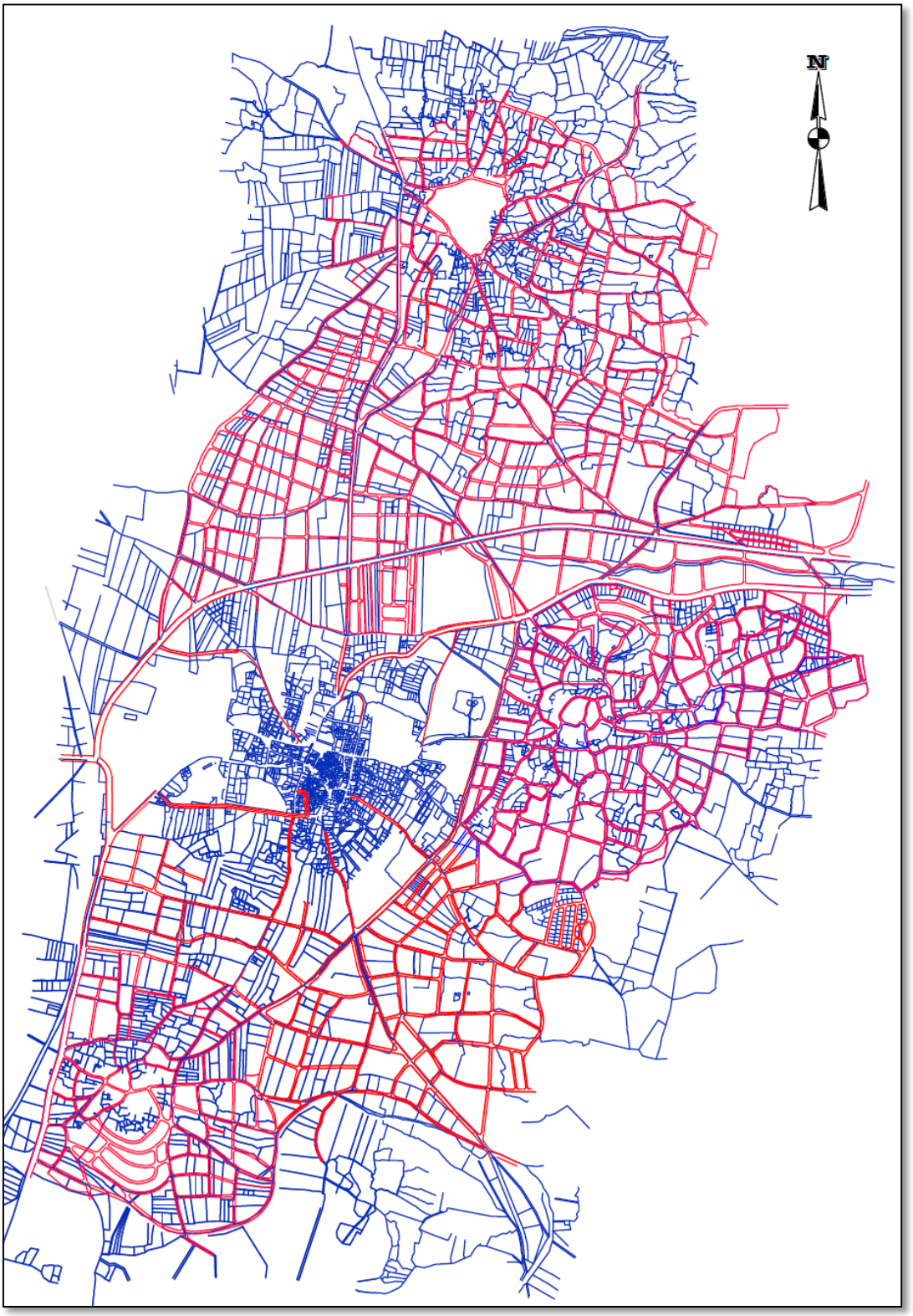

Figure 4. 6: A Map of land fragmentation in Tulkarem(Planning Department 2005).

7. The government and the agricultural organizations provide limited financial support to the farmers. The support is limited to some seedlings and production materials, such as water tubes, fertilizers, pesticides, etc. This aid is not enough to either help the farmer or compensate them for their losses when there is a natural disaster.
8. The interviewed planners and managers stated that poor economic conditions of the farmers and high land prices are considered the major factors behind the sale of agricultural lands for urban purposes.
9. In agreement with the planners, managers stated that governmental policies and city's master plan are not the only factors contribute to the loss of agricultural lands. The political situation plays a role in restricting the urban development and causing the change of agricultural lands to urban uses.
10. Due to uncertainty of the political situation and the absence of guidance and coordination, farmers plant the products that can be sold in the local markets, such as cucumber, tomato and pepper. This action creates surplus of these products in the local markets and forces the farmers to sell their products for lower prices.
11. At the same time, the Israeli competition affects the local market. Israeli agricultural production is cheaper and faster with the use of genetically modified seeds and chemical fertilizers. At the same time, the Israeli products that are transferred to the Palestinian markets are typically being rejected from the Israeli markets, as they did not meet the market standards. The cheaper Israeli products, even though they have lower quality than the local product, and the poor economic situation in general, tempt the consumers

to buy these products. This means low profit for the Palestinian farmers, as they have to sell their products for low prices that sometimes do not cover the production costs.

12. The limited access to Israeli markets, the Israeli closures and checkpoints and high transfer costs between the Palestinian cities also lead to surplus of the local products in the local markets. At the same time, the absence of Palestinian authority over the borders prevents Palestinian farmers from exporting their products to international markets. Figure 4.8 shows a map that illustrates the location of the central market for agricultural products in Tulkarem and the transportation routes to the Israeli market and the other West Bank cities. At the same time, Table 4.5 presents the distance between Tulkarem's central markets and the other West Bank cities, where the local products can be sold with the number of the Israeli fixed checkpoints in these routes. It is worth noting here and according to B'Tselem, in the month of February 2014, the number of fixed checkpoints erected in the West Bank is 99, including 42 located inside the West Bank and between its cities. This number does not include the hundreds of sudden mobile checkpoints that hinder the mobility of Palestinians and their products (B'TSELEM 2014).
13. Highly educated people seek employment but due to the poor economic situation and high level of unemployment rates after the construction of the Separation Wall, they look for other alternatives. Farmers interviewed in this study were educated and none of them is interested in selling his land. These results contradict the finding of (Abu Hammad and Tumeizi 2010) who found that highly educated people sell agricultural lands for immediate benefits and for future investment more than people with a low level of education.

Table 4. 5: The distance between Tulkarem and other West Bank cities with the number of the Israeli fixed checkpoints in these routes (B'TSELEM 2014).

City Name	Distance in km	Number of Checkpoints
Jerusalem	99	6
Hebron	134	4
Jericho	99	4
Ramallah	80	5
Nablus	29	2
Bethlehem	111	5
Jenin	52	2

14. Natural factors, such as rainfall characteristics and water availability for agriculture and land slope play an indirect role in agricultural LUCC, as they affect land productivity. In other words, less productive land is easier to change to urban uses (Abu Kubi 2005; Abu Hammad and Børresen 2006; Abu Hammad and Tumeizi 2010). This factor is disregarded because there is no water or topographical problem in Tulkarem according to the interviewed participant. According to the Ministry of Agriculture, there are 15 underground water wells managed by the municipality with a production capacity reaching 3,345,000 m^3, as well as 49 private wells producing 9,367,000 m^3. Most of these wells do not exceed 70% of capacity these days. At the same time, land conversion is occurring in the most productive and fertile lands in the city (Ministry of Agriculture 2013).

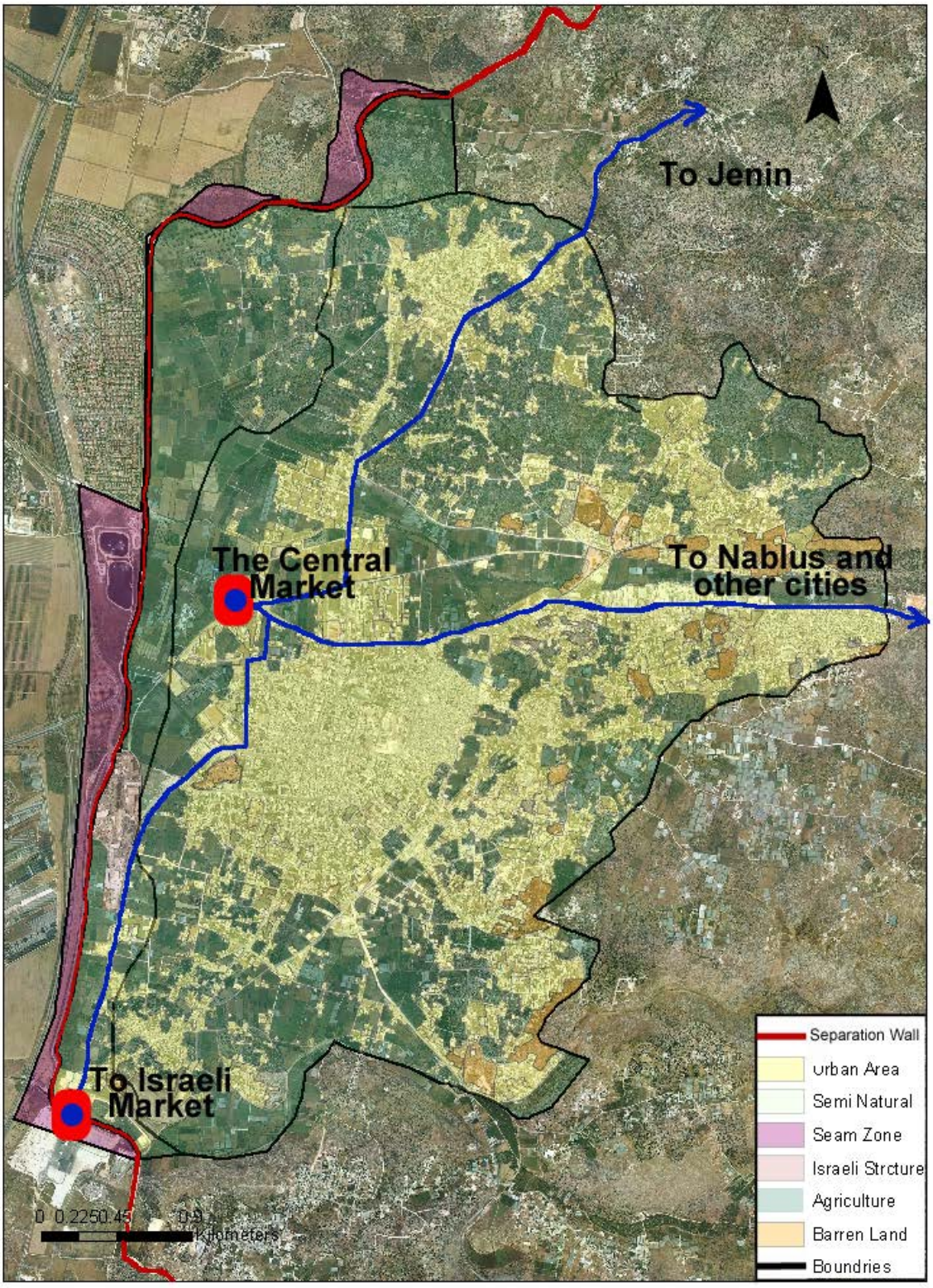

Figure 4. 7: A Map of the location of the central market for agricultural products in Tulkarem and the transportation routes to the Israeli market and the other West Bank cities (Prepared by the author 2014).

15. Thirty percent of the interviewed farmers mentioned that land productivity is getting worse due to application of intensive agriculture, and bad weather conditions. This result cannot be generalized as these kinds of weather conditions do not occur often in the area. In addition, not all the farmers practice drained intensive agriculture.
16. Farmers pointed out that many good fertilizers and production materials are prohibited for Israeli security reasons, and the available materials in the local market are often not effective, and very expensive. In order to compensate for this shortcoming, farmers use composting materials as an alternative to the artificial expensive fertilizers.
17. Political factors, such as the Separation Wall and Oslo division of land to area A, B, and C, have an impact on the loss of agricultural lands and affect the availability of lands for agriculture and urban expansion.
18. The existence of the Separation Wall has the following impacts on Tulkarem development:
    a. Large portion of agricultural lands were confiscated for the purpose of the Separation Wall construction. Other lands are located behind the Separation Wall, in the Seam Zone, where Palestinians have limited or no access. This situation means leaving these lands uncultivated and losing their production. Figure 4.9 shows selected photos of different sections of the Separation Wall near Tulkarem.
    b. The urban development in the west side of the city has been stopped after the Separation Wall construction. The commercial and residential projects stopped in that area. Table 4.6 presents the commercial losses of Tulkarem after the Wall construction. Figure 4.10 shows selected photos of the closed and evacuated buildings in the west side of the city after the construction of the Separation Wall.

Table 4.6: The commercial losses of Tulkarem after the Separation Wall construction(UNRWA 2003; (MAS) 2005).

Type of commercial losses in the city of Tulkarem	Amount (USD)
Number of closed stores	80 stores
Total expected profit losses	2,428,600 USD
Total municipality's losses due to failure to comply the stores duties	57,200 USD
Investors' losses in residential buildings	700,000 USD
Losses in workers' wages	2,140,000 USD
Total losses	**5,325,800 USD**

c. Further, Palestinians are not allowed to build any structure within 500 m of the Separation Wall, which adds more restrictions to urban expansion of the city and the suburbs.

d. Tulkarem relies on agriculture, work inside Israel, and commercial sectors for its economy. These were directly affected by the existence of the Separation Wall. The crossing points and the Separation Wall itself affected the customers, farmers, laborers, and product movement between both sides (the Palestinian and the Israeli), which led to increasing unemployment and negatively affected the commercial and agricultural market sectors in the city. Figure 4.11 shows a photo of a crossing point on the Separation Wall.

Figure 4.8: Selected photos of different sections of the Separation Wall near Tulkarem(Photos by M. AbuHafeetha July 2013).

Figure 4.9: Selected photos show the closed and evacuated buildings in the west side of the city after the construction of the Separation Wall along that area (Photo by M. AbuHafeetha, December 2012, June 2013).

Figure 4.10: A Photo of a crossing point on the Separation Wall (Photo by M. AbuHafeetha, June 2013).

e. The Separation Wall works as a barrier that prevents storm water drainage for the adjacent agricultural land, which means loss of products when there are storms or rainfall. Figure 4.12 shows a photo of a section of the Separation Wall in the west side of the city. It is obvious how the Wall prevented water drainage and cause floods.

f. The existence of the Separation Wall affected land prices and building construction movement in the city. The land is cheap in the west and south parts of the city, while the east and the north parts are rapidly developed with an increase in their land prices. Figure 4.13 shows selected photos of the developed areas in the north and east side of the city.

Figure 4. 11: A Photo of a section of the Separation Wall in the west side of the city. (MAAN, Jan 2013).

Figure 4. 12: Different photos of the developed areas in the north and east side of the city. (Photos by M. AbuHafeetha, June 2013).

19. All the farmers stated that the situation would be better if there were no Separation Wall, easy marketing, easy access to markets, people and products, and better economic conditions.
20. The other political factor that is considered important by the study participants is the Oslo division of land to area A,B, and C. The participants pointed out the following:
    a. The division affected land prices; as lands in area A, where Palestinian communities can expand, are much more expensive than land in area C.

b. Oslo agreement affected the urban expansion as it put restrictions and prevented Palestinian communities' development in area C.

c. As area C is under full Israeli control, there is access limitation to lands in area C due to military orders. Sometimes, farmers are forbidden to enter or cultivate their crops like the land presented in Figure 4.14.

Figure 4. 13: A Photo of an agricultural land in area C and near the Separation Wall where the farmers sometimes are forbidden to enter their lands (Photo by M. AbuHafeetha, June 2013).

21. All farmers agreed that the following factors have a major impact on the agricultural sector in Tulkarem:

    a. The poor economic conditions of the farmers,

    b. The lack and high prices of seeds, fertilizers and other production material,

    c. The lack of support and financial aid to the farmers,

    d. The unorganized marketing of the local products and the Israeli competition.

e. The unplanned urban expansion.

f. The existence of the Separation Wall, which has direct impact on the above mentioned factors.

23. All farmers stated that the following factors contribute to the sale of lands for urban uses:

a. The most important factor is the poor economic conditions of the farmers.

b. The Islamic law of inheritance/ land fragmentation and the high land prices.

c. Poor planning and guidance.

d. Expatriate, landowners who live outside the country, and cannot come back or stay in Palestine due to the political and economic situation in Palestine.

23. The results of the general questions agreed with the findings from the qualitative interviews, which supports that the economic situation, politics, planning, and policies are the major factors that contribute to the loss of agricultural lands in Tulkarem.

4.5 The Compatibility between Quantitative and Qualitative Data

It was clear from the GIS maps that the development of the urban and built up areas took place on the agricultural lands, especially in the northern part of the city core. Further, the maps showed that political factors restrict the growth of the city and directs its urban expansion. The city expansion is limited within the city boundaries in areas A and B. A portion of the Palestinian land in the west side of the city was converted to Israeli structures, especially for the Separation Wall. At the same time, there are about 283 ha, in the west side of the city boundary, labeled area C where construction is prohibited for Palestinians. Moreover, all areas around the city boundaries are also classified as area C, which adds more restriction to the urban growth of the city.

At the same time, all the study participants in the qualitative interviews agreed that most of the city expansion is happening in the north side of the city at the cost of the agricultural lands there. Further, the participants emphasized that the political factor has a major impact on the availability of lands for agriculture and urban expansion. Therefore, there is an excellent agreement between the GIS results and the qualitative interview results. As mentioned earlier in Section 3.5, the similarities and consistency of the results obtained from different implemented methods confirm the study findings, which increased the reliability and validity of the study.

It is worth mentioning here that the maps showed that the city expansion is not controlled or organized, i.e., it represents random expansion. An explanation of this situation was provided by the interviewed planners who admitted that unprofessional planning, lack of experience and lack of communication and coordination between the different planning organizations is considered a major factor that led this direction of city growth. At the same time, the absence of laws and enforcement, even with the presence of a master plan for the city, cause irregularities such as industrial and commercial buildings in residential areas. Gathering multiple data from various sources increases the completeness of data and ultimately, a rich picture about the study area was highlighted. That again increases the reliability and validity of the study findings.

Although, the questionnaires of the qualitative study(i.e., planners, managers and farmers surveys) were constructed based on fieldwork and the participants' experience, all the participants' responses were combined under general themes (urbanization and agricultural land use change factors),such as governmental policy and planning factors, urbanization factor, political factor, farmers socio-economic factor and land productivity factor). The following points highlight the similarities and differences between different participants under the aforementioned study themes:

1. Governmental Policy and Planning Factor

The planners, managers and farmers agreed that unprofessional planning is considered as a major factor contributes to agricultural land use change in Tulkarem. There is a lack of communication and coordination between the different local organizations. For example, the agricultural organizations are not involved in the planning process and the planning departments in the municipality and the local government are not involved in any plans to improve the agricultural sector in the city.

Furthermore, responses regarding the guidance and workshops varied between the participants. While, some managers mentioned that there is guidance to the farmers, all the interviewed farmers stressed that neither the Ministry of Agricultural nor the Relief Agency give any direction to the farmers about what to plant and how much. The reason for this disparity between participants' points of view might be the lack of communication between the farmers and the agricultural organization, or because most workshops and most guidance are targeting the farmers in the rural areas or the interviewed farmers in this study rely on their own experience that leads them to not attend these workshops.

Farmers and managers agreed that there is little financial support for the farmers. Some support is provided to the city's farmers when there is a natural disaster like flooding or severe storms. However, the support is not enough to offset the losses. Farmers receive only some planting materials such as nylon sheets for green houses, seeds, fertilizers, etc. The interviewed farmers who do not have greenhouses (i.e., practice exposed agriculture) do not receive this kind of compensation, even if they lose their crops in such circumstances, due to the agricultural organization policies as farmers explained.

2. Urbanization Factors

All the study participants stressed that migration to the city and the natural growth of the city and its two refugee camps play a role in the city development and expansion in the last few years. The north side of the city witnesses the largest rapid urbanization because of land availability there at the cost of agricultural lands.

3. Political Factors

According to all interviewed planners; managers; and farmers, the political situation plays an important role in restricting the urban development and causing the change of agricultural lands to urban uses. All the participants agreed that the existence of the Separation Wall affected the living conditions of the city residents.

The Separation Wall damaged the city's labor market, economic activities, the environment and family and social ties. Further, a huge portion of land in the west part of the city, which was used for agricultural activities, was confiscated for its construction. Other lands became inaccessible in the Seam zone adding more losses to the Palestinian farmers' production as these lands are left unplanted and/or uncultivated. Moreover, the urban development in the west side of the city has been stopped after the Wall construction. At the same time, more people are moving toward the areas east and the north of the city core.

All the participants agreed that the Oslo division of land affected the city expansion and put restrictions on the city's growth. In area A and B the urban development was rapidly increased in conjunction with increasing land prices, whereas exactly the opposite was true in C areas.

4. Farmers' Socio-economic Factors

According to the interviewed planners, managers, and farmers, the poor economic conditions of the farmers are the major factor contributing to the sale of agricultural lands for urban purposes. The cost of production materials, the lack of support and financial aid for the farmers, the poorly organized markets for local products and the Israeli competition are factors that led to poor economic conditions for the farmers. All the interviewed participants pinpointed that the political situation in general and the existence of the Separation Wall in particular, has a direct impact on the aforementioned factors.

However, there was no available data about the land ownership and fragmentation of the city's land, because the registration is done in paper records through the court, the study found that land fragmentation and the Islamic law of inheritance play an essential role in selling the land for urban uses as all the study participants pointed out. The small land parcels are easily sold for immediate benefits to counter farmers' low standards of living. Using the GIS and updated RS data application with a detailed computerized and updated land ownership and registration system, the issue of land fragmentation can be identified in more details and more understanding about the impact of this factor on agricultural lands can be achieved.

Using the GIS to track the changes in land size and ownership can estimate the trend, the direction, and the amount of change that is happening for land use in general and the agricultural lands in particular. And of course this will help researchers and the local government to provide practical solutions to avoid the impact of fragmentation on the LUCC.

5. Land Productivity Factors

All the planners, managers and farmers participated in this study agreed that the high price of production materials such as fertilizers, seeds, and pesticides affect the production cost and consequently farmer's economic situation and standard of living.

The availability of water is a major factor for agricultural land use change worldwide (Winoto and Schultink 1996; Bryld 2003; Azadi, Ho et al. 2011; La Greca, La Rosa et al. 2011). Water is one of the main issue of conflict between Israel and Palestine (Kartin 2001; Haushofer, Biletzki et al. 2010).Palestinian entitlements for water is from the underground water of the West Bank aquifers (Schlutter 2005). These aquifers have been heavily utilized by Israel through increasing extractions and strict control (Hassan, McIntyre et al. 2010). Palestinians use only a fraction (~15%) of the water resources from the aquifers in the Palestinian areas, while Israel uses the remaining 85% (Assaf 2009). With a combination of political conflict, resource overuse and contaminated sources, freshwater scarcity will reach a critical level in the near future in the West Bank (Kartin 2001; Assaf 2009), if it has not done so already. Add to this scarcity, the Separation Wall around the West Bank has cut off the access of Palestinian villages to wells and water reservoirs (Schlutter 2005; Daoudi 2009). This would negatively affect the future demand for the Palestinian population fresh water consumption. Five ground wells and 76 water tanks were damaged because of the Separation Wall construction in Tulkarem district. Luckily, the city of Tulkarem did not lose any water wells. Despite the mentioned threats about the future of water in the Palestinian areas, the study participants including the managers, planners and farmers felt that there is no water problem in Tulkarem. The production of the agricultural wells is limited to 10 million m^3/year since 1970. Currently, most of these wells do not produce more than 7

million meter cube/year, and are continuously decreasing due to the decline of the agricultural lands.

4.6 Relation to the Political Ecology Theory

It was discussed earlier in section 1.2 that this study was conducted in an area that experiences political conflict. Accordingly, it focused through the "political ecology" lens to achieve the study objectives.

Political ecology is defined as the concept of putting politics first to understand how human environment interaction may cause environmental degradation (Bryant 1998). The unequal power relations were highlighted by the early writings in political ecology research as the main cause of the social and environmental conditions (Watts 1983; Peet and Watts 1996; Watts 2000; Watts and Peet 2000; Cadieux 2008; Gerber, Veuthey et al. 2009). The research in political ecology provides useful insights into the ways in which environmental problems and crises may be socially constructed. The objective, however, is rarely to suggest that problems and crises do not exist. Rather, it is to show how their selective identification and representation is a political process (Bryant 1998).

Through the analysis of the data obtained by this study, a clearer and a more detailed understanding of the Palestinian environment was identified. It was found how the unequal power relations are the reason for the conflict over the access to and the use of diverse environmental resources in the Palestinian environment. The power here is the one that was defined by (Rocheleau and Roth 2007) as "*power is reflected in the ability of one actor to control the environment of another*". Israel, as the occupying power that is granting limited autonomy to the Palestinian people, is in a position to apportion powers and responsibilities as it sees fit and in accordance with its interests. Such an abuse is evident by the study results that

showed the Israeli control over the Palestinian waters, natural resources, arable lands, movement and the macro-economic instruments that enable economic autonomy.

Further, in Palestine, the study found that the environmental threats could be categorized to: first, the domestic environmental threats, such as land misuse, land degradation, and lack of environmental legislation and enforcement. Second, the external environmental threats that include: Israeli military occupation, Israeli settlements, bypass roads and Israeli Separation Wall.

The systemic uprooting of trees, destruction and confiscation of agricultural land, and damage of the water supply is devastating. The building of the Separation Wall intensifies these problems in the surrounding areas and poses immediate and long-term destruction and degradation to the Palestinian environment and natural resources.

Clearly, there is a need for Palestinians to become more aware of the security dimensions of the environmental and ecological threat facing them in the near future. The discourse needs to be transformed from that of a ‘problem’ to that of a ‘threat’, from a mundane quality of life issue to one which, if not dealt with, can cause harm to the existing and future generation.

Of course, both Palestinian and Israeli authorities should move towards conflict resolution and an eventual peace agreement that can be used as a means of changing the environmental security discourse, probably with the assistance of international environmental agencies and foreign governments who are actively involved in attempting to reach a lasting political solution.

As a summery, from the city urban historical change, interviews, survey results, and the researcher observation, it can be highlighted that the political ecology factor (i.e. the existence of the Separation Wall and the control over the access to the land and natural resources) has a direct impact on the present and future existence of the agricultural lands in Tulkarem. Lands were

confiscated and changed to Israeli structures, while others are not accessible by their Palestinian owners due to military orders. Further, the political factor has an indirect contribution to the loss of agricultural lands in the study area. For example, the high production costs, the limited access to the market, the control over the production supplies, such as fertilizers and seeds and the restricted exportation caused a bad economic situation for the farmers. This situation forces the farmers to sell their lands to get a better standard of leveling life. The study revealed that the agricultural lands are disappearing in Tulkarem mainly for urban uses, where agriculture is not only a source of food. Agriculture is considered as a major employment and work sector for the city residents and a source of income generating, especially with the closure and limited access to other work sectors in the West Bank and inside Israel.

Several actions and strategies shall be implemented and enforced at the local and national level in order to prevent the loss of agricultural lands and sustain their uses. It is very important to integrate agriculture land use and activity in the sustainable urban development process, especially in the Palestinian urban environments because the population in these cities is living under threats and political instability conditions. Recommendations and suggestions based on the study findings are presented in Chapter 5.

Chapter Five- Conclusions and Recommendations

5.1 Introduction

The objectives of this study were to explore and analyze the current spatial impacts of urbanization on agricultural land in Tulkarem, highlight the major driving forces that lead to urbanization and the loss of agricultural land in the city after the construction of the Separation Wall and construct a database and information about the agricultural lands that should be useful for planners, decision makers and local society. These objectives have been achieved as discussed later in this chapter. In addition, the chapter introduces recommendations for urban plans, policies and laws that emphasize agricultural land protection and sustain its use, as well as recommendations for future research.

5.2 Conclusions

Information on changes and trends in urban environments make an important contribution to appropriate decision-making, which is essential to wise use of the resources and sustainable development. Monitoring of planned or unplanned expansion of urban areas is vital both to assure validation of land use plans and to prevent formation of new squatter settlements around cities. The following conclusions can be drawn from this study.

1. The GIS analysis revealed that the considered study area has been subjected to LUCC, especially those related to urban expansion that have caused serious threats to the available agricultural and natural land. The city extension of the urban areas indicates that planning and timely monitoring of this class is definitely 'problematic'. Urbanization is out of control in the area coverage as well as in its geographical distribution.
2. The GIS map supports claims by the interviewed participants that the city is facing rapid urbanization at the cost of agricultural lands, especially in the north side of the city. This

expansion is due to limited land availability, migration to the city, and natural population growth.

3. The weak planning system especially regarding agricultural issues played a critical role in loss of the agricultural lands and the uncontrolled urban expansion in the city. This study found that there is a lack of communications and collaborations between the different planning departments and organizations as well as lack of consideration of the agricultural organizations' role in the planning process.
4. The planning policies neglect the importance of preserving agricultural land, which is important for providing the basis for local consumption, especially with the current political situation. Further, there is a lack of laws and bylaws and enforcement to protect valuable agricultural lands from urban expansion. Even though the interviewed professionals are aware of the problem, none of them showed that there is concerted action from the involved organizations to stop the urban expansion into the agricultural lands.
5. Land fragmentation results from the Islamic traditional law of inheritance, in which the father's land is divided among siblings once the father dies. The study found that small land sizes are more attractive to developers and easier to be sold for immediate benefits, as they are uneconomical for farmers to plant.
6. Despite the fact that urbanization factors such as industrialization, road infrastructure and use of technology in agriculture are widely seen as an engine for economic growth and as important factors causing extensive agricultural land change worldwide (Lu, Liang et al. 2011), these factors are considered as minor factors leading to urbanization in Tulkarem.

7. The poor economic conditions of the farmers, and the high price offered for the land due to limited land availability are considered as major driving factors for farmers to sell their land for urban uses.
8. The high costs of production materials, the lack of support and financial aid to the farmers, the poorly organized markets for the local products and the Israeli competition are factors affecting the farmers' economic conditions in Tulkarem.
9. The impact of political factors on the LUCC in the Tulkarem has been shown. Lands have been converted into Israeli structures, Separation Wall, and C areas. At the same time, Palestinians are not allowed to access part or all of their land, crops, water resources, and business assets in the converted lands, which used to create wealth. Regarding the city expansion, the limited available land due to the political situation and city expansion restriction contribute to the loss of more agricultural lands for urban uses.
10. After reviewing all the transcripts, analyzing the data, discussing the results and finally finding compatibility between the results, the author was able to classify the leading factors for the loss of agricultural lands to urban uses, and the minor factors that are not important for this study case, which are summarized in Figure 5.1. It is worth noting that a new driving force came to the surface that was initially not included in the schematic diagram illustrated in Figure 3.4. This driving force is the expatriate (landowner who lives outside the country) who cannot come back or stay in Palestine due to the political and economic situation in Palestine. The relationships between the driving forces presented in Figure 5.1, which are leading to urbanization over the agricultural lands, are causal relations. For example, the existence of the Separation Wall causes poverty and increases the unemployment rate that forces people to sell their lands for urban uses.

These factors for agricultural land loss to urbanization are highlighted (shaded) based on the study participants' opinion, the factors in blue color are minor factors or were not important factors lead to urbanization over the agricultural lands in Tulkarem from the participants point of view. At the same time, the red shaded ones, which are the existence of the Separation Wall, the area division to A,B and C areas, and the Israeli closure, are especial or unique factors for the case of West Bank. While, the green one is a new factor that was found by this study. It should be noted here that the un-shaded factors are important factors according to the study participants and were provided by the literature, i.e. are not especial factors for this case only.

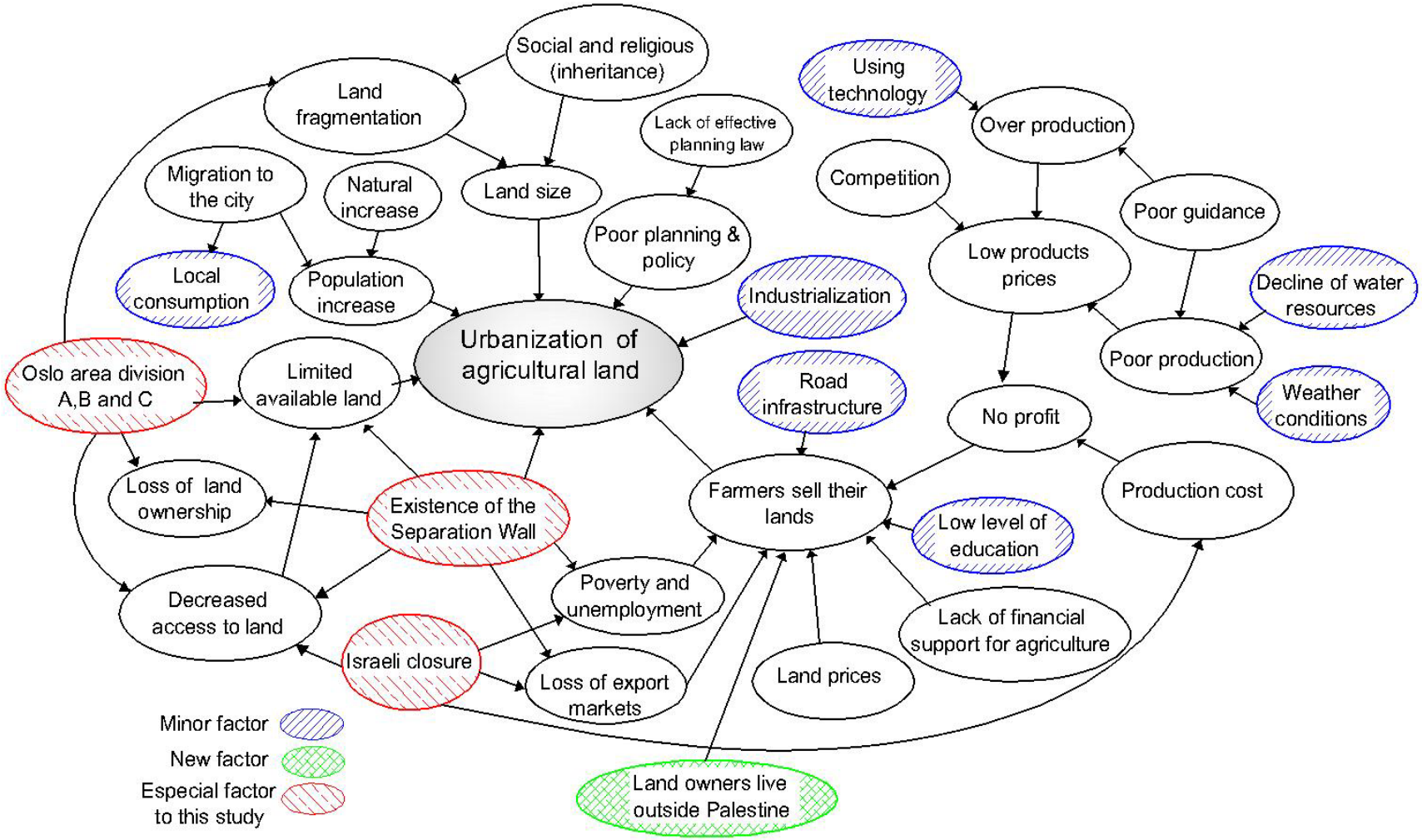

Figure 5.1: A Schematic representation of the driving forces for agricultural land loss to urbanization based on the study participants' opinion, the factors in blue color are minor factors, and the red ones are especial or unique factors for this study, while the green one is a new factor that was found by this study.

5.3 Contribution to the Body of Knowledge

This study was conducted to investigate and understand the factors that lead to urbanization and agricultural land use change in Tulkarem. It makes theoretical and methodological contributions in studying agricultural land use change to urban uses in areas of conflict. Some of these contributions are specific to the communities affected by the existence of the Separation Wall in the West Bank, while others are important for a better understanding of the drivers and the process of agricultural land use change to urban land use in general.

The literature has shown that the industrial and infrastructure development are widely seen as important factors causing extensive agricultural land use change and urbanization (Cervero 2001; Verburg, Schot et al. 2004; Abu Hammad and Børresen 2006; Cohen 2006; Alphan, Doygun et al. 2009; Ge and Cao 2009; Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010; Rana 2011; Kanagalakshmi and Nagan 2013). For example, Ge and Cao (2009)in their study, concluded that the rapid development of the economy is the main factor of urban expansion. At the same time, transportation is considered as an important driving force for the urban expansion because usually urban expansion is along the main roads or highways. Further, Kanagalakshmi and Nagan (2013) in their study concluded thatindustrialization, urbanization, population, and economic reform have commonly been considered the driving forces of LUCC. In addition, factors such as accessibility to transport are necessary for understanding the LUCC in some regions as they may be critical factors to consider for urbanization and LUCC.

The findings of these aforementioned papers can be wrapped up as follow *"urbanization can promote the development of the economy and transportation, and promote change of the environment and the land use pattern. In turn, the development of the economy and transportation also promotes the expansion of the urban area and LUCC"*. Though this notion

holds in most case studies, the results of this study did not support the significance of these factors in the Palestinian communities' expansion, particularly in Tulkarem.

Further, the biophysical factors such as land slope, rain characteristics and soil properties might lose at least part of their driving power to geopolitical factors in areas of conflict. In other words, these factors were not considered very important based on the study results. These results contradicted the findings of the study done by Raddad, Salleh et al. (2010), which showed that the scarcity of water for agriculture was found to be one of the main factors that affected the agricultural land use change in the Palestinian urban environments. Also, these findings disagreed with the results obtained by Abu Hammad and Tumeizi (2010), which found that the land degradation and loss of agricultural lands are happening because of natural factors (e.g. rainfall characteristics, geomorphology and soil properties) as well as socioeconomic factors (e.g. poverty, land fragmentation, decrease in standard of living, low level of education and poor health conditions). However, the study of Abu Hammad and Tumeizi (2010), and Raddad, Salleh et al. (2010) were conducted in the Palestinian environment and some of their findings agreed with this study results, other findings such as the biophysical factor were not in agreement with this study findings.

Further, the planner is not just a player in the land use change, but he/she is also a manger of the game. Therefore, this study found that the spatial development policy and the current housing regulations as well as the lack of urban planners' awareness and interests in the urban agricultural lands and issues significantly affected agricultural land use changes. These findings agree well with the literature (Alberti 2005; Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010). For example, (Raddad, Salleh et al. 2010) found in their study that the performance of the planners and policy makers at Palestinian municipalities is considered as a factor that leads to

loss of more agriculture lands in the Palestinian cities. In many cases, planners considered farmland as the land provision for the urban development project. Moreover, planners and policy makers in the Palestinian municipalities do not have sufficient knowledge and skills about the importance of agriculture as a land use and activity in urban suitability context. For example, planning laws to protect the agriculture lands in Palestinian cities do not exist. Furthermore, planning staff lack the knowledge about the role of the agricultural land use in sustainable urban development (Raddad, Salleh et al. 2010).

The literature provides a range of studies conducted in the field of agricultural land use change (Chen, Messing et al. 2003; Perner and Malt 2003; Long, Tang et al. 2007; Abelairas-Etxebarria and Astorkiza 2012; Barbero-Sierra, Marques et al. 2013).For example, the study conducted by Chen *etal.*(2003), highlighted that land degradation and soil erosion is happening because of the increase of human activity and population growth that made larger areas to be used for grain production and soil erosion was becoming more and more serious through the years. While, the study of Long *et al.*(2007), concluded that industrialization, urbanization (the growth of cities following urban economic development and population concentration, and rural urbanization based on the growth of smaller towns in rural areas), population growth and economic reforms are four major driving forces contributing to land use change in China. Abelairas-Etxebarria and Astorkiza (2012) pointed out in their paper that the increase in residential demand and the constrained land supply cause higher farmland prices which all are indicators of land-use change. The authors recommended that it is very important to conserve the biodiversity and the existing landscape by maintaining existing farming activities because converting land into residential, commercial and infrastructural uses causes irreversible

transformations that negatively affect the natural functions of soils and the biodiversity of species.

Other studies were conducted in Palestine, such as (Abu Kubi 2005; Abu Hammad and Børresen 2006; Abu Hammad and Tumeizi 2010; Raddad, Salleh et al. 2010). However, none has been done in Tulkarem or investigates the role of the Separation Wall in shaping the urban form. This study sought to fill this gap. This research makes an important contribution by studying the whole range of factors that led to urbanization and the change of agricultural lands from different perspectives and using different methods, where this change is not just a necessity for living or a result of the interactions of different drivers, but is a tool of political struggle. For example, the AbuHammad and Tumeizi (2010) study was conducted in the central Palestinian mountains to investigate the socioeconomic factors and causes of land degradation. The study revealed a significant LUCC from agricultural and natural vegetation to urbanized areas due to the high population increase during the last century and the high poverty rate. The study found that there is a significant correlation between holding size and the sale of land for urban uses. Small holder farmers sell their lands for immediate benefits to cope with poverty, which agrees with the results of this study. On the other hand, Abu Hammad and Tumeizi (2010) found that this relation was affected by the education level of the farmers, i.e. the higher education people sell their lands to look for other jobs, which did not agree with this study results, which showed that farmers interviewed in this study were educated and none of them is interested in selling his land.

Raddad *et al.*(2010), in their paper "*Determinants of agriculture land use change in Palestinian urban environment: Urban planners at local governments perspective"*investigated the agricultural land use change from the planners point of view in Palestine (Gaza and West

Bank). The study concluded that political instability, low income of farmers, scarcity of water for agriculture, and lack of urban planners and managers' interest in protecting agriculture land use and activity, and development of the housing sector were found to be the main factors that affected the agriculture land use change in the Palestinian urban environments.

Studying the dynamics of agricultural land use change and the factors that led to this change in the West Bank in general and in Tulkarem in particular might help with other cases in shaping a more robust theoretical understanding of how drivers of land change interact and behave under different circumstances, including protracted conflicts. Results of the study conducted in Tulkarem can be applied to other cities and villages located near the Separation Wall and affected by its existence. In addition, the approach can be used in other areas worldwide where political ecology plays a role in shaping the land uses. Further, the study aimed to understand the situation in Tulkarem (a single case study), the same approach can be applied to make a comparative case study with another city in the West Bank or other cities in the developing countries.

5.4 Recommendations

Taking into consideration the study results, the participants' suggestions and the related published literature, the study recommendations focus on how we could reduce the impact of urban expansion on agricultural land and what could be done to support the agricultural sector in Tulkarem.

The results showed that the agricultural land is under threat from the city's urban expansion. This issue requires focusing more effort on directing the city expansion into lands of lower agricultural productivity, to save the limited fertile land in the city boundaries. The loss of agricultural land may have implications, including losing the main source for food production

and household incomes of the city residents. To save agricultural land, several steps might be taken by the Palestinian Authority and its local governmental body, which include the following:

For planning and policy, the local government and the planning departments shall review, update and apply land use policies and regulations related to urbanization to fit the current situation and the development obstacles' they are facing. The study showed that political factors, particularly the existence of the Separation Wall and the division of the land into Areas A, B and C, have constrained Tulkarem's expansion and its urban development. According to the Oslo Accords, division of the West Bank into Areas A, B, and C was temporary, and it was not intended to accommodate long-term demographic increase and associated economic and social infrastructure expansion. Limitations imposed by lack of available land in Tulkarem suggest re-evaluation of zoning regulations and housing patterns where single housing or low-rise buildings (maximum 4 floors) are presumably the most common housing patterns in the city and encourage people to expand vertically by reducing the permit fees for this type of building. Consequently, the current policies such as the building permit rules should be changed to allow for more vertical expansion of the city.

The legislation system regarding the issues of zoning, design guidelines and varies land use restrictions shall be reviewed and updated. Legal systems must be instituted that will promote sound urban and rural planning, enforce regional planning guidelines and restore ownership laws and property rights. One on the main issues related to the legal system is land tenure. Land tenure is a very complex issue in the Palestinian planning due to the insecurity and mistrust associated with land rights in Palestine. But, it is very important to create a system of land registration and ownership in order to better plan the city and its services and avoid conflicts between land owners.

At the same time, it is very important for the local government to classify the agricultural lands based on their fertility. Accordingly, lands can be arranged and restrictions can be put on transferring these lands to other uses such as urban expansion. The role of government and the private and civil sectors shall be increased to enlarge the cultivated area by encouraging the cultivation of non-cultivated arable land. And develop strategies for reclamation and rehabilitation of the non-arable lands to increase the area of fertile agricultural lands.

It is worth mentioning that constraining the urban expansion in the city area increases the price of land and creates further pressure on infrastructure. One way to reduce the increasing density in the city is to improve the infrastructure in rural areas to direct expansion to those areas, and to create services and jobs in these areas to encourage people to move to rural areas or at least to reduce the rural-city migration.

The study showed that the planning system in the local governments is weak. There is a lack of communications and collaborations between the different planning departments. In order to prepare a new city master plan there is a need for more staff. The improvement of the economic, social, and administrative components of Tulkarem, dealing with the current political situation will need more specialized personnel who are aware of all factors and obstacles the city is facing. Further, more meetings and workshops between the municipality's various departments and other governmental organization should be established in order to share information and knowledge and collectively make decisions. At the same time, there is a need to improve environmental awareness, especially amongst the planners and decision-makers to pay more attention to the agricultural lands and natural resources.

This study found that there is a lack of updated data and information about the city in different aspects such as the demographic, the economic and the social. Such a lack of

information is critical and affects any future prediction about the area. Accordingly, it is very important for the local institutions to collect and prepare a solid database about the city. This database includes, and not limited to, updated information about the natural growth, population density, population number, land use classifications, urbanization density, and economic data about the agricultural production and other local industrial activities.

Furthermore, building permits should not be given from the local government or the municipality only. Collaborations shall be established between the municipality and the local government and the institutions that are involved such as the Agricultural Engineering Association, Environmental Protection Authority, and Agricultural Relief Agency to study the impact of giving these permits and which areas shall be protected. Second, the city planners shall prepare a land use map that includes the residential areas, the future expansion and the agricultural lands to determine which areas shall be protected and to direct the urban expansion away from these areas. The maps and data developed in this study can be implemented in preparing the land use map. Further, the planning skills shall be improved by attending workshops and classes that keep the planners updated with the new technology and the obstacles that may face during their profession.

For improving the agricultural sector: The study revealed that there are internal factors that lead to urban expansion over the agricultural lands such as the farmers' socio-economic situation. The study participants recommended that among the necessary steps to reduce the sale of agricultural lands for urban uses, the government should increase its support to farmers to improve their standard of living and their economic conditions by initiating a loan and support system for the conservation and management of agricultural lands (i.e., the formation of a system

of insurance and long-term loans in the agricultural sector), building up an inclusive and a well-run service system (i.e., roads, storage, transport facilities, and agro-industrial facilities) to sustain the agricultural sector. In addition, the government should coordinate the agricultural activities at the national level by varying the range of products, farmers can obtain better profits and consumers can achieve a higher standard of living. At the same time, marketing of the agricultural production should be managed and organized to prevent importation of products that are produced locally, finding channels to export the local products to international markets and increase the agricultural industry's ability to absorb the surplus in the agricultural products through food preservation and processing, such as pickling, freezing of vegetables and processing in soft drink factories.

Further the public awareness shall be increased to activate the role of Palestinian women in agricultural development, due to their ability in making decisions and managing the agricultural holdings, and getting their rights legitimate of the inheritance.

Issues related to economic development are also vital to successful planning strategy in Tulkarem. The development of economic strategies to increase revenues, investment, and employment opportunities is essential to overall well being and success of the city. Through the establishment of industrial zones, the introduction of new and modern technologies, and encouraging foreign investments in the Palestine, will reduce the unemployment rates and reduce the dependency on Israel.

Another important issue facing the city farmers is the increasing production costs. The government should develop a strategy and regulations to organize and control the fertilizer and pesticide sales in the local market to prevent the rising prices, the low quality materials and the black market that badly influences agricultural production. Further, the Israeli competition for

the local products was an important factor that affects the socio-economic situation of Tulkarem's farmers. To reduce the impact of this factor, it is recommended to place regulations and restrictions on the imported products from Israel and increase the control over the quality and amount of these products in addition to financial support and compensation to encourage farmers to continue and compete. Furthermore, it is very important to increase the workshops and communication between the agricultural organizations and the farmers and between the farmers themselves to share knowledge and experience in planting and pets and disease control and to vary their products.

Lastly, the government shall work to increase the percentage of landholders whose main occupation is agriculture by preventing the fragmentation of agricultural holdings area by finding laws and legislation to prevent fragmentation of agricultural holdings without running contrary to the Islamic religion in the division of inheritance. For example, give the land to the son who is interested in working in agriculture. Otherwise, the governmental institution can rent the land and lease it for who is interested in planting it, as the case in Jordan.

The study showed that political factors impose economic, social, and geopolitical constraints on Tulkarem residents' life. Any attempt to improve the urban planning in the city to optimize the use of the available land resources may not be sufficient without ending the occupation. Promoting transfer of land from Area C in the east side of the city to areas A and B would temporarily lessen the pressure on the city's agricultural lands.

In the case of this study, the loss of agricultural lands in Tulkarem was related to different factors, which were many related to the politically unstable conditions and the existence of the

Separation Wall. Urban areas in the developing countries are affected by other factors, such as climate change, resource depletion, food insecurity and economic instability. Meanwhile, many of these countries experience population growth that is unpredictable and even uncontrollable in the urban areas. Various cities of the developing countries are facing tremendous challenges of this unpredictable and uncontrollable urbanization that may generate a huge suffering to the people.

While, the overwhelming population growth is uncontrollable in many of the developing countries, good governance is rare. The urban problems arise in these cities due to improper management and unplanned growth. The urban populations have expanded without appropriate services and facilities essential for sustainable livelihood. The problems are being exacerbated because of little or no consideration of eco-development perspectives in local and regional policies.

Based on the findings of this study and to achieve sustainable urban development in the developing countries, environmental problems such as ecosystem disruption and resource degradation shall be considered as key issues in urban planning. Managing the urbanization carefully may avoid serious environmental problems. A professional planning team in addition to other governmental institutions shall be responsible and cooperative to prepare plans that sustain the use of the environmental resources and at the same time are flexible to accommodate unexpected changes that may occur in the area. A large data base about the current and future prediction for the different environmental resources shall be available and updated to help in preparing this database.

5.5 Sustainable Urban Agriculture- Lessoned Learned, the Case of Cuba

I found the case of Cuba very interesting and suitable to learn from its experience in sustainable agriculture, as the country experienced limitations and restrictions and was under an economic embargo. The case of Cuba provides potential strategies for the local government and the farmers of Tulkarem to sustain the agricultural lands under the restrictions and the obstacles they are facing due to the political situation.

First, when we talk about the concept of sustainable agriculture, it means *"the agricultural technologies and practices that maximize the productivity of the land while seeking to minimize damage both to valued natural assets (soils, water, air and biodiversity) and to human health (farmers and other rural people, and consumers)"*(Hiranandani 2010). It seeks to minimize the use of non-renewable inputs (fossil fuels, chemical pesticides and fertilizers) that degrade the environment. Furthermore, it engages people's capacities to work together to solve common management problems (Karbasioun2010).

Sustainable agriculture encompasses a wide range of technologies and practices, which include rain water harvesting, soil and water conservation, crop rotation, composting, using livestock and farmyard manures, irrigation scheduling and management, restoration of degraded or abandoned land, urban agriculture, integrated pest management, poly-culture and organic farming (Hiranandani 2010).

Briefly, water harvesting involves simple technologies to channel and store rainfall that was previously poorly used or wasted, while irrigation scheduling entails using water more efficiently. Integrated pest management relies on natural predators to control pests as well as bio-pesticides (products derived from plants, fungi and bacteria); thereby reducing chemical pesticides. Poly-cultures involve planting multiple crops that enhances biodiversity and

eliminates the need for pesticides by promoting multiple habitats for natural predators of crop-eating insects. Organic farming is a variant of sustainable agriculture that uses little or no chemical pesticides and fertilizers (Karbasioun 2010).

Some may argue that without chemical inputs, farms may be less productive. This is not the case, for instance, since 1989, Cuba reduced its use of pesticides and fertilizers from 80% to 60%, but it produces more food now than it did in the 1980s (Karbasioun 2010). Sustainable agriculture has challenged the assumption of high productivity of industrial agriculture by proving to be more productive and ecologically sound (Hiranandani 2010).

In the last century, Cuba practiced industrial farming to meet its domestic food and export needs (Hiranandani 2010).After the collapse of the Soviet Union in 1989 and the economic embargo by the United States (US), Cuba lost its biggest trading partner and its ability to import food, and chemicals and machines for its agricultural sector (Hiranandani 2010). The country was cut off from imported foods such as meats, grains and processed foods. Accordingly, Cuba was forced to produce almost all its food domestically with the lack of petrochemicals, which are needed to maintain the sugar fields, and fuel for transportation, large machinery and electricity due to the US embargo (Karbasioun 2010).

In order to reduce the impact of this situation, Cuba revived the traditional cultural practices of farming, such as crop rotation, mixed planting and livestock manuring, which were used before the advent of modern chemicals (Karbasioun 2010). Farmers began to use bio-pesticides and bio-fertilizers that are locally made, waste recycling, biological pest control, composting and other ecologically sound practices to avoid a disastrous food shortage (Karbasioun 2010).

Further, Cuba turned to solar and wind energy to meet its rural electrification and farm needs because of absence of oil. Also, Cubans tapped their energy potential by introducing bio-gas digesters to decompose animal wastes, while at the same time generating energy. The bio-digestion process eliminates any pathogens or other potentially dangerous contamination from the animal waste (Hiranandani 2010).

Another adjustment policy used by the Cuban government was supporting urban agriculture to utilize unused lands in the cities for farming purposes to feed their population. This strategy brought about considerable quantities of agricultural products, particularly vegetables from abandoned spaces of the cities. It made the cities greener and more environmentally friendly, reduced the transport costs of agricultural products to the cities and employed a large number of urban citizens. Vacant lots, rooftops, backyards and empty spaces in all Cuban cities have been converted into organic gardens, and fresh produce is sold from private stands throughout urban areas at reasonable prices (Karbasioun 2010). The urban agriculture movement in Cuba plays a critical role in supplying fresh and organic food items to the country's population. To protect and sustain the urban agriculture, the government of Cuba put strategic plan that gives urban agriculture its own zoning category, which means protect this form of farming from being changed to other categories (Karbasioun 2010).

Urban agriculture decreases the environmental and the economic cost of food. Further, it reduced energy consumption because food is locally produced rather than being transported over long distances. Moreover, urban agriculture reduces the costs of transportation and storage by selling the products directly to consumers. Other advantages of growing food in urban areas are the reduction of stresses on soil and biodiversity in non-urban areas, city waste management and

providing food and jobs for low income urban residents' especially when there is no investment in industry like the case of Cuba (Hiranandani 2010).

Another important thing to learn about the case of Cuba is the decentralization efforts in development planning, administration, health care and education, which has reduced rural–urban divide, giving all Cubans access to education, healthcare and cultural life similar to that available in urban areas. Agriculture has become available occupation, and generating decent incomes. A significant lesson from this experience is the importance of making small and sustainable farms attractive, which not only promotes food security but also reverses increasing urban pressures.

The net result of the changes in the Cuban farming sector is that currently the country has the most sustainable agricultural production in the world (Hiranandani 2010). In less than a decade, Cuban agriculture revolutionized itself from high-input, non-sustainable to a diversified, organic and sustainable model demonstrating that chemical-intensive industrial agriculture is not the only way to produce food. The Cuban experience illustrates that we can very well feed a nation's population with a model of limited and small sized farms that utilize eco-friendly technologies, thereby ensuring self-reliance in food production. The case of Cuba offers an important lesson; the investments in human development, general education and research is very important for developing human, intellectual, social and cultural capital that may be urgently required for a nation's transformative processes.

As a closing statement, the local government of Tulkarem with the help of the city residents and farmers can work together to sustain the agriculture of the city by following the manageable and affordable steps that were done by the Cubans, regardless of the obstacles and restrictions they are facing.

5.6Study Limitations

The limitations of this study were mainly imposed by the complexity of the political situation and data availability. Prolonged occupation, the absence of statehood, the weakness of research, and lack of experience are presumed factors that affect data availability. For this study, it was difficult to obtain aerial photos of different years for Tulkarem, as they are not available in the local government. The acquisition of new aerial photos by the local government requires security coordination with the Israeli military and shall be done by an Israeli company, which costs the local government a huge amount of money that is usually unaffordable.

Further, getting the required information about the study area was difficult. The most difficulty the author faced was collecting the census data about the study area. For instance, some available data was about the West Bank in general such as the population natural growth, family size and immigration rate. Other data was about the whole district, which consists of the city of Tulkarem, and 39 other communities. It is worth noting that most of the available data about the study area are not up to date. For example, the latest demographic pyramid of Tulkarem district was published in 2007 and the unemployment rate was published in 2011.

Other data such as the number of farmers, the total agricultural production, and total income were not available. The unavailability and un-updated data may cause some confusion and unrealistic prediction of the near future of the study area.

Moreover, for type 1 and 2 questionnaires, the interviews were conducted only with the participants who are involved in the planning process in the municipality and the local government. This led to a reduced sample size.

Despite these limitations, this study was the first to be conducted in Palestine. Therefore, the approach used in this study can be applied to all communities in Palestine that are affected by

the political instability and existence of the Separation Wall, as well as any community that is politically unstable around the world. More research can be done to investigate the agricultural land use change factors in more details and their consequences such as land fragmentation due to the Islamic law of inheritance and the Israeli competition.

Further, it can be recommended to conduct a level two and three classification for land use for the area to show more details about the land fabric of the area and to use stratified sampling for such study participants sample.

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Appendices

1. Questionnaire Type One- Planners
2. Questionnaire Type Two- Mangers and Decision Makers
3. Questionnaire Type Three- Farmers

1. Questionnaire Type One- Planners

Faculty of Environmental Design

University of Calgary

2500 University Drive NW

Planners Questionnaire

Section #1 General Questions
Participant number: _____ Years of experience: _____ The type of work _____

Section #2 Qualitative open ended questions
1. What are the main changes in land use/ land cover in the city of Tulkarem? 2. What are the main causes for this change? 3. Where are the current areas of rapid urbanization in the city? Why? 4. What is the role of farmers' economic situation in the change of land use? 5. Do you have a limit for the urban expansion of the city? 6. The city has a limited available land, at the same time the population is increasing, what is your plan for the near future? 7. Do you notice that the distribution of people inside the city varies? why? 8. Does the local government have policies of urban development and expansion especially in the agricultural lands? In other words, are there any policies to protect agricultural and natural resources lands? 9. How do you deal with the issue of limited available land for construction and agriculture? 10. What are the major obstacles facing the agricultural sectors in the city? 11. As a planner, do you have any plans to enhance the agricultural production? 12. How do you consider the agricultural and natural resources lands in the planning process? 13. What is the impact of local migration from rural areas to the city on the urban agriculture

and the urban expansion of the city?

14. What is the role of social relationship and Islamic law of inheritance on land size?
15. How does the land size play a role in the urbanization on the cost of agricultural lands?
16. How will the rapid urbanization stress or enhance the productivity of our natural resource base and the industries that depend on it, including agriculture?
17. What is the role of the political situation including the Israeli closure on the loss of agricultural lands?
18. How does the existence of the Separation Wall play a role on the loss of agricultural lands?
19. Since the construction of the wall, has the population changed in the city?
20. What are the action scenarios that the local government has if there is any change in the political situation?
21. What are the effects of the political instability on the land use planning, informal expansion of built up areas?
22. How does the land divided into A,B and C affect city planning?
23. How does the land price affect its use?
24. From your point of view, what are the reasons behind selling the agricultural lands for development purposes?

Section # 3 Frequency weighted questions about the land use change factors

As a planner, how do you rank the following factors that have effect on the loss of Agricultural land in the city of Tulkarem? Where 5 is most important, and 1 is least important

Factor/ rank	**(5)**	**(4)**	**(3)**	**(2)**	**(1)**
Political factors					
Economic factors					

Urban development					
Demographic factors					
Policy and Planning factors					

Section # 4.					
How do you rank the factors that stand behind changing the agricultural land to built up areas in the city of Tulkarem? Where 5 is most important, and 1 is least important					
Factor/ rank	**(5)**	**(4)**	**(3)**	**(2)**	**(1)**
Poor farmers' income comparing with other jobs					
The price of the land					
Low level of education					
Interested in working in agriculture sector					
Increase in population					
Population migration to the city					
Low products prices					
Scarcity of water					

The existence of the separation Wall					
Israeli closure					
The dividing of land to A,B and C areas					
Lack of financial support for the agricultural activities					
Competition from Israeli products					
Using technology in agriculture					
Poor planning policy					
Lack of guidance					
Lack of planning law to protect the agricultural land					
Size of land/ land fragmentation					

2. Questionnaire Type Two- Decision Makers

Faculty of Environmental Design
University of Calgary
2500 University Drive NW

ENVIRONMENTAL DESIGN | UNIVERSITY OF CALGARY

Agricultural Cooperatives and Representatives of Commerce Questionnaire

Section #1 General Questions
Participant number: _____ Years of experience: _____ The type of work _____
Section #2 Qualitative open ended questions
25. What are the major obstacles facing the agricultural sectors in the city? 26. What are the possible ways to deal with the current situation? 27. Does the local government have policies of urban development and expansion especially in the agricultural lands? In other words, are there any policies to protect agricultural and natural resources lands? 28. Do you have any plans to enhance the agricultural production? 29. Do you work with the city planners to protect the available agricultural land? 30. What is the impact of local migration from rural areas to the city on the urban agriculture and the urban expansion of the city? 31. What is the effect of the political situation especially the existence of the Separation Wall on the agricultural production, marketing and consumption? 32. What is the role of the political situation including the Israeli closure on the loss of agricultural lands? 33. How does the existence of the Separation Wall play a role on the loss of agricultural lands? 34. What are the action scenarios that the local government has if there is any change in the political situation? 35. What are the effects of the political instability on the land use planning, informal expansion

of built up areas?

36. How the land dividing to A,B and C affected the city planning?
37. From your point of view, what are the reasons behind selling the agricultural lands to development proposes?
38. How will the rapid urbanization stress or enhance the productivity of our natural resource base and the industries that depend on it, including agriculture?
39. What are the impacts of future land use and land cover change on water quality and quantity?
40. Are there any subsidies or loans given to the farmers? what are the organization that support the farmers?
41. What is the effect of land ownership on the agricultural production? (tenant usually does not take care of the land as much as the owner in applying fertilizers,…..)
42. What is the impact of the Islamic law for inheritance on land fragmentation and size?
43. What is the effect of land size on land selling for development purposes?
44. How is the local production affected by the Israeli competition?
45. Do you have control over the amount of products imported from Israel?
46. How do you control the agricultural products prices?
47. How do you deal with the increasing demand for local consumption?
48. What is the proportion of the people in the city that are involved in agriculture?
49. Do you have programs for land reclaiming?
50. Do you provide guidance for farmers? how?
51. What do you think can be done to improve on the agriculture output?
52. How does the land price affect its use?
53. What is the impact of the agricultural supplies (fertilizers, seeds, etc) on the land production?

Section #3 Quantitative questions

How do you rank the following factors that have effect on the loss of Agricultural land in the city of Tulkarem? Where 5 is most important, and 1 is least important

Factor/ rank	**(5)**	**(4)**	**(3)**	**(2)**	**(1)**
Political factors					
Economic factors					
Urban development					
Demographic factors					
Policy and Planning factors					

How do you rank the factors that stand behind changing the agricultural land to built up areas in the city of Tulkarem? Where 5 is most important, and 1 is least important

Factor/ rank	**(5)**	**(4)**	**(3)**	**(2)**	**(1)**
Poor farmers' income comparing with other jobs					
The price of the land					
Low level of education					
Interested in working in agriculture sector					
Increase in population					

Population migration to the city					
Low products prices					
Scarcity of water					
The existence of the Separation Wall					
Israeli closure					
The dividing of land to A,B and C areas					
Lack of financial support for the agricultural activities					
Lack of planning law to protect agricultural land					
Competition from Israeli products					
Using technology in agriculture					
Poor planning policy					
Lack of guidance					
Size of land/ land fragmentation					

3. Questionnaire Type Three- Farmers

Faculty of Environmental Design
University of Calgary
2500 University Drive NW

ENVIRONMENTAL DESIGN | UNIVERSITY OF CALGARY

Farmers Questionnaire

Participant number: _____

Section #1 Qualitative open ended questions
1. What is your educational level? 2. How long have you stayed in this area? 3. Have you noticed any environmental or societal changes since your stay here? 4. What are the main causes of this change? 5. Do you own the land or rent your land? and does the ownership of the land makes a difference for you to take care of the land? 6. Did you buy this land or you inherit it, how big it was before? 7. What is the average size of farms that are located in your area? 8. Which type of the food your land produces? 9. How do you take the decision what to plant and how much? 10. How do you market your products? 11. Have you had any changes in the land output since you started farming? 12. What are the obstacles that you are facing to manage your land? (no profit, no support, less productive, political factors,…. 13. Do you get enough money from agriculture to cover your basic needs and also be able to save some? 14. Is it your only source of income? 15. Who family member works with you in agriculture?, why the other members of the family do not work in the land?

16. Do you receive subsidy from the government or other organizations? What is the type of this support?.
17. What do you think are the requirements to support the agricultural sector?
18. What is the effect of the political situation especially the existence of the Separation Wall on the agricultural production?
19. What is the effect of the Separation Wall on marketing and consumption?
20. What is the role of the political situation including the Israeli closure on the loss of agricultural lands?
21. How does the existence of the Separation Wall play a role on the loss of agricultural lands?
22. What are the action scenarios that the local government has if there is any change in the political situation?
23. How do you think will be the situation if there is no Wall?
24. How the prices of the fertilizers, seed and agricultural supply affect the production and profit of the land?
25. Do you have access to the Israeli markets?
26. Are you affected by the Israeli agricultural products competition?
27. How the land dividing to A, B and C affected your land productivity?
28. From your point of view, what are the reasons behind selling the agricultural lands to development proposes?
29. Who much are the land prices in your area?
30. How does the land price affect its use?
31. Do you want to sell your land? Why?
32. Do you receive guidance from agricultural cooperatives or any other organization?
33. Do you plan to continue using this land for agricultural activities in the next 5 –10 years?
34. If some of the agricultural land is currently used for construction, how that affects the remaining farmlands?
35. What is the impact of the agricultural supplies (fertilizers, seeds, etc) on the land production?

Section #3 Quantitative questions

How do you rank the following factors that have effect on the loss of Agricultural land in the city of Tulkarem? Where 5 is most important, and 1 is least important

Factor/ rank	**(5)**	**(4)**	**(3)**	**(2)**	**(1)**
Political factors					
Economic factors					
Urban development					
Demographic factors					
Policy and Planning factors					

How do you rank the factors that stand behind changing the agricultural land to built up areas in the city of Tulkarem? Where 5 is most important, and 1 is least important

Factor/ rank	**(5)**	**(4)**	**(3)**	**(2)**	**(1)**
Poor farmers' income comparing with other jobs					
The price of the land					
Low level of education					
Interested in working in agriculture sector					
Increase in population					

Population migration to the city					
Low products prices					
Scarcity of water					
The existence of the separation Wall					
Israeli closure					
The dividing of land to A,B and C areas					
Lack of financial support for the agricultural activities					
Competition from Israeli products					
Using technology in agriculture					
Poor planning policy					
Lack of guidance					
Lack of effective planning law that protect the agricultural land					
Size of land/ land fragmentation					