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THE RURAL URBAN CONTINUUM: TOWARDS A NEW
SPATIAL POLICY, THE CASE OF NORTH LEBANON

by
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AN ABSTRACT OF THE THESIS OF

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Title: The Rural-Urban Continuum: Towards a New Spatial Policy, The case of North Lebanon

The Rural Urban Continuum has no clear boundary, both geographically and conceptually. The following research provides a methodology for properly defining the Rural Urban Continuum (RUC). The approach was applied to Northern Lebanon.

The research also seeks to identify the typology of the villages found in the RUC surrounding the city of Tripoli. Four types of clusters were identified. Two of which fall under the urban model while the other two are considered a ruralopolis.

The methodology used in this research the potential to be applied to other parts of Lebanon. If applied properly it will help understand the RUC in Lebanon and develop spatial policies that take into consideration spatial variations.

Keywords: Spatial Policy, Rural-Urban Continuum, Rural-Urban Gradient, Rural-Urban Regional Classification, Land cover change

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LIST OF ABREVIATIONS AND ACRONYMS

CNRS: Center National de Recherche Scientifique Liban

CDR: Council of Development and Reconstruction

LULC: Land Use Land Cover

GIS: Geographic Information System

RUC: Rural-Urban Continuum

RNFA: Rural Non-Farm Activities

KM^2: Kilometer Square

%: Percentage

CHAPTER I

INTRODUCTION

Lebanon is the most urbanized country in the Middle East, with an estimated 87% of its population currently residing in urban clusters, the majority of which (64%) are settled in the metropolitan areas of Beirut and Tripoli (UN-HABITAT, 2008). Lebanon is undergoing rampant and haphazard urbanization; new constructions are massively increasing especially at the coastal strip, where the majority of the Lebanese population resides, contributing to the uncontrolled urban expansion (CDR, 2005). With limited planning regulation in place or enforced, urbanization seems to be covering increasingly larger areas.

The growth of cities in Lebanon mirrors the urbanization process that is taking place globally. This state of perpetual urbanization can be attributed to the belief that urbanization is a good economic engine (McMichael, 2012). This characterization of urbanization as a tool for development has led to rampant, uncontrolled urban expansion across the world. We are currently living on a planet largely comprised of cities. This situation was foreseen by Lefebvre in his book The Urban Revolution, where he explains that society is being reshaped not just spatially but also socially (Lefebvre, 1970). Brenner and Schmidt (2015) revisit the subject in their article "Planetary Urbanization" they explain that the urban has become a worldwide condition that is affecting social, political, economic and environmental relations, cutting across borders and geographical divisions. Cities keep sprawling and eating away from the once scenic rural landscape. Rural areas are beginning to look more and more like cities. Towns and villages are merging together with urban agglomeration to form one large

metropolitan area. As cities grow and expand, so does the urban divide and economic and social inequality (Calì, 2008).

Having realized that this state of affairs is not sustainable, scholars and researcher started searching for better ways for development (Buang et,al, 2011; Afgani et.al, 2012). Currently there has been a shift in the dominant paradigm. A new framework for development has emerged, one that is inclusive of both urban and rural needs. The new framework focuses on strengthening the rural-urban linkages in order to achieve development. The spatial framework of this approach has come to be known as the Rural-Urban Continuum (RUC) (Friedmann & Douglass, 1978; Ndabeni, 2016).

The rural-urban continuum framework has proved to be a powerful method for ecological research about urban influences on ecosystems and on sociological issues in rural settings (Fatkhiati et.al, 2015; Schmitz et.al, 2018). The principle behind the rural-urban continuum framework is to reveal the variation between the two realms, the urban and the rural, as well as the interrelations that exist and have rarely been considered. These interrelations include the flow of goods, people, and information and social relations across space and linking rural and urban areas. It is believed that by understanding these linkages and their manifestation we can address the rural urban inequality and plan for better regional development (Hou et.al, 2015).

One approach to this method that has been on the discussion table in the recent year is the Agropolitan approach; a bottom-up development planning approach that focuses on achieving equality between the urban and the rural. Unlike the growth pole strategy, a city-centric approach thought to spread economic growth from the city to the hinterland, the Agropolitan approach redirects the attention away from the city (Sakir et.al, 2017). The

Agropolitan approach does not involve the creation of new towns and villages but rather working with previously formed towns and villages. The approach has proved to be effective in some areas; however, it still lacks spatial framing based on socio-ecological interactions which shape the landscape and land cover of the region (Arnaiz-Schmidtz et.al, 2018).

Consequently, the following research seeks to contribute to the understanding of the socio-ecological interactions that shape the landscape of regions located in the RUC in order to provide a spatial framing to the implementation of the Agropolitan approach.

This is achieved by first mapping and understanding the land cover changes that have taken place over the past 20 years in Northern Lebanon in order to decipher landscape changes. The land cover change aspects help shed light on the historical evolution of the Rural-Urban Continuum-which is the representation of the variation of the urban-rural cover-and how it has changed over the years. The research also aims at developing a technique to spatially define and characterize elements of the rural-urban continuum of Northern Lebanon, by identifying and typifying specific localities in the rural-urban continuum that can be used for a pilot program of the Agropolitan approach. It is through the understanding of these small towns and villages' development character that proper policies

CHAPTER II

LITERATURE REVIEW

A. Planetary Urbanization

In 2016, an estimated 54.5 per cent of the world's population lived in urban settlements. By 2030, urban areas are projected to house 60 per cent of people globally and one in every three people will live in cities with at least half a million inhabitants. Earth is on the brink of becoming an urbanized planet (United Nation, 2016)

The narrative of the "urban age" was first introduced by the United Nations (Brenner and Schmid, 2015). The city has now turned into an elemental spatial unit, which serves as a universal form for human settlements. The urban age dialog has framed current discussion on the global urban state (Brenner and Schmid, 2015). In the early 1970s, Lefebvre predicted the current situation of complete urbanization. In his book "La Révolution Urbaine, Lefebvre (1970) postulates that: "Society has been completely urbanized." According to the author, the complete urbanization of society is the result of industrialization; which absorbs and dominates agricultural production. This process has led to the loss of peasant life. Villages have been transformed, absorbed by their neighboring cities, establishing the dominance of cities over the countries. Thus, by adopting this line of thinking, a vacation home, a supermarket and a highway in the countryside now become part of the urban fabric (Lefebvre, 1970).

Today it is completely evident that the urban has become a worldwide condition. New forms of urbanization are unfolding and debates on the urban question continue to proliferate.

Inspired by Lefebvre's work, Brenner and Schmid (2015) developed a new framework to better understand the complete urbanization of society (Khatam and Hass, 2018). Brenner and Schmidt (2015) proposed the theory of planetary urbanization. Drawing on the concept of urban society, Planetary urbanization refers to the fact that not only do the majority of the world's people live in cities, but – more importantly – that a much greater number of people, often not living in places defined as cities, are directly or indirectly involved in assuring the continuation of the global urbanization process (Kaika and Swyngedouw, 2014). Brenner and Schmid (2015) explain that currently urban agglomerations are no longer confined to nodal concentrations organized around and oriented towards a simple urban core. Instead they are redefined as a dense force field of continuous interactions. According to the authors this planetary urbanization was set into motion following the deregulation of the global financial system, the neoliberalization of local, national and global economy, generalization of global production, and the creation of new forms of market oriented territorial regulations. These changes channeled urban investments towards the rural areas (Harvey, 2010; Merrifield, 2014 as cited by Brenner and Schmid, 2015).

Following this shift of capital, rural zones around the world are being profoundly transformed. The influx of capital has established new models of land use and social reproductions that serve in rearticulating the dependencies between towns, villages and urban center contributing to a new form of urbanization that transcends the confines of specific places (Brenner and Schmid, 2015).

The state of perpetual urbanization can be attributed to the dominant paradigm that economic development can be generated through urban expansion. Having realized that this is not a sustainable view of development a new paradigm has been introduced, one that looks beyond the rural-urban dichotomy and focuses on their linkages.

B. Rural – Urban Linkages

Rural-Urban linkages have been overlooked in development studies for a long time (Akkoyunlu, 2015). The dichotomous approach to spatial policies has led to unjust, imbalanced development strategies; (Chulu, 2016). Therefore, there is a need to integrate the rural-urban linkages in any development policy.

An efficient interaction between rural and urban areas is the stepping stone for proper rural-urban development (Adell, 1999), as rural-urban linkages play an important role in the betterment of the local economy (Akkoyunlu, 2015). The complexity of livelihoods and the strategies adopted to better them can only be achieved through thorough understanding of these linkages (Akkoyunlu, 2015). The long-standing dichotomous separation between rural and urban has led to an increase in rural-urban migration and thus in urban poverty (Imai et.al, 2017). Imai et. al (2017) further explains that the poverty reducing effects stem from economic linkages rather than the rural-urban migration.

According to Carli and Menon (2013, cited by Akkoyunlu, 2015), balanced economic development can be achieved through four channels: consumers' linkages, urban-rural remittance, the changing rural land/labor ratios and Rural Non-Farm-Activities (RNFA). Rural Nonfarm- Activities and off farm activities are different; RNFA are linked to agricultural activities such as processing farm outputs, production of farm inputs and many others

(Wiggins et.al, 2018). RNFA are vital for the survival of rural household (Akkoyunlu, 2015). The synergy that exists between agriculture and the urban based enterprises is important to empower local economy through a pro-poor strategy (Tacoli, 2003).

RNFA are poverty reducing activities that facilitate the flow of inputs, goods and services between the rural hinterland and the urban centers (Christiansen and Todo, 2013). RNFA play a role in poverty reduction in rural towns. These activities strengthen the rural-urban linkages. Strong linkages are important for sustainable development as they help channel resources to where the net economic and social benefits are located (Akkoyunlu, 2015). These linkages can be seen in the rural-urban continuum.

1. *Rural – Urban Continuum (RUC)*

The RUC represents a gradient of urban and rural characteristics. It reveals the grey area that lies in between the completely rural and the completely urban which has never been explored.

Jane Jacobs (1969) states the importance of the continuum in development strategies. She argues against the imaginary and artificial separation of the urban and its sector and the rural and agricultural sector, indicating that the rural and the urban are interconnected through road and highways, rural-urban migrations and daily commutes from the rural to the urban (Akkoyunlu, 2015). This connection between rural and urban is reinforced at the nutritional and the governance levels. The nutritional connection is when urban food comes from the rural hinterland and, the governance connection which is through the municipalities and unions. It is through these connections that one can achieve development.

a. The classification of the Rural Urban Continuum

The definition of the Rural Urban Continuum relies on the classification of regions. The classification of the space, in which livelihoods and landscapes are used and transformed, helps in developing a proper spatial policy; which achieves social-ecological sustainability (Lerner and Eakin, 2011). An adequate spatial policy supports strategies that target productivity, poverty reduction, food and food security.

In 2001 the United Kingdom tackled this problem. They developed the rural-urban classification guide, which was later revised in 2011. This classification falls under the country's rural development and land management strategy, which promote effective use of lands. The policies and strategies encouraged multiple benefits from both urban and rural land, including through mixed use schemes and taking opportunities to achieve net environmental gains – such as developments that would enable new habitat creation or improve public access to the countryside (Ministry of housing communities and local government, 2019).

Accordingly, several attempts to determine the different regional classes that make up the rural urban continuum have been made. Notably, the US Department of agriculture ("Rural-Urban Continuum Codes", n.d), the UK department of Department for Environment, Food and Rural affaires (Bibby, 2013) and the European commission (Dijkstra and Poelman,2014). Both attempts relied on population density data to classify the RUC's regional classes. The Finnish Environment Institute (2013) expanded on these attempts and integrated two new characteristics that help in the classification: the land cover and mobility. The classification system proposed by the Finnish institute includes 7 new regions: 1) Inner urban

area, 2) Outer urban area. 3) Peri-urban area. 4) Local centers in rural areas. 5) Rural areas close to urban areas s. 6) Rural heartland areas. 7) Sparsely populated rural areas.

        The classification of the RUC gives more detail and distinction to the different forms that exists within it (Bibby, 2013). These different forms can be exploited to produce more inclusive development policies. An example of such a comprehensive spatial approach to development is the Agropolitan approach.

2. *The Agropolitan Approach*

In 1980's, a new approach to development was recognized (Friedmann and Douglas, 1980). This new strategy straddled the rural and the urban and created an all-inclusive framework: the Agropolitan approach. It follows a new school of thought for spatial planning known as regionalism[1].

The name of the approach originates from the combination of agriculture and metropolitan together. Just like its name, Aropolitan areas are towns that exhibit both rural and urban features. They are regarded as rural towns with urban level population density and size. They are essential in mediating between urban and rural settlements (Marais, 2015).

This approach's foundation is centered on achieving development through moving away from the urban-rural dichotomy and linking the urban and the rural at a local level through the help of small and intermediate towns (Akkoyunlu, 2015).

Agropolitan areas reinforce the rural-urban linkage by revealing the interdependencies that exist between them (Akkoyunlu, 2015). These areas provide a relief to major cities as an attractive destination for rural migrants, and assist in the correct spreading of development between the urban and rural sectors.

Agropolitan areas are a buffer zone that limits the growth of metropolitan cities and the formation of mega metropolitan areas. They serve as a support for economic activities and

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[1] An integrated approach to spatial policy, regionalism is a holistic approach to territorial planning that deals with the efficient planning of land use activities across scales and relationally (Vigar,2009). Another example of an integrated approach is metropolisation. Metropolisation is the process through which institutions lead policies enable the integration of proximally located cities, towns and landscapes, in ways to manage their services more effectively.(Pichler-Milanović et.al, 2013)

a way to decentralize administrative functions as well as help promote agricultural development and employment thus alleviating poverty (Chulu, 2016).

Rondinelli (1985), a supporter of the approach, argues that economic growth requires accelerated agricultural along with urban development. The goal of the small and intermediate towns program is not to create them, but rather use the previously existing ones to strengthen the rural-urban linkages, promote agricultural development, and limit urban encroachment (Gaile, 1992: Sietchiping et.al, 2014).

The effectiveness of the Agropolitan approach in achieving its stated goals is under debate. According to Simon (2000) as cited by Sakir et.al (2017) the general consensus revolving around the subject is positive. Various countries have adopted the approach and succeeded. China has had several success stories. Chen and Hughes (2002) recommend the Agropolitan approach as a self-centered development tool integrating socio-economic aspects with resources and landscape management.

The pattern of regional development with the Agropolitan approach is characterized by the creation of one or more activity centers in rural areas as a system of agricultural production and natural resources management (Klau et.al, 2019). The approach came as a critique to the growth pole theory. It promoted decentralization and strengthening the interdependencies that exist between the rural and the urban. It also tackled a regional planning issue: lack of proper spatial definition.

a. <u>Challenges Faced by the Agropolitan Approach</u>

According to Friedmann and Douglass (1978) and Akkoyunlu (2015), the approach proves to be a valid policy intervention for rural areas; however, it still faces some challenges.

The Agropolitan approach lacks a proper land reform program which would provide the villages with autonomy in terms of their resources and their management (Friedmann and Douglass, 1978). It would also provide the villagers with a sense of involvement in their own development. Land consolidation helps in reassembling fragmented holdings, which in turn helps increase productivity. Another problem faced is the lack of funding. Most resources are directed towards the city. A financial commitment to the program is necessary to create an environment conducive for economic growth especially as the majority of the crop value is lost to tenancy rates in many regions in the world, especially in Asian countries (Friedmann and Douglass, 1985). Another reason behind some of the failures of the Agropolitan approach is the lack of proper characterization of the towns and villages.

The Agropolitan approach, as explained by Friedmann and Douglass (1985), is an ecologically specific governance and a planning tool. Therefore, an adequate spatial framework designed to fit the different conditions of the small and intermediate towns is necessary for proper governance. The integration of the spatial characteristics into any development plan is important for the optimal use of the local resources and local service activities (Buang et.al, 2011). Therefore, proper characterization of the small towns and villages is important for the success of the approach. Recently, a lot of researchers have been conducting studies to determine the different features and spatial models of small and intermediate town.

3. *Small and Intermediate Towns Models*

Small and intermediate towns link metropolitan cities to the villages. Their proximity to villages and to huge urban centers socially, culturally and economically helps in providing

these linkages. Small and intermediate towns are partially urban and partially rural however, they differ in spatial forms. (Misra and Mishra, 2017). A number of models have been used by researchers worldwide.

a. Desakota Model

Terrence McGee (1991) coined the term Desakota to describe a new pattern of urban growth seen across rural south Asia. It refers to a mixture of agricultural and non-agricultural activities stretched along corridors between large city cores. They are characterized by dense populations, with an agricultural economy and increasingly mobile populations integrated into urban economies (McGee, 1991). Figure 2. is the representation of the urban model. It identifies 5 main regions:
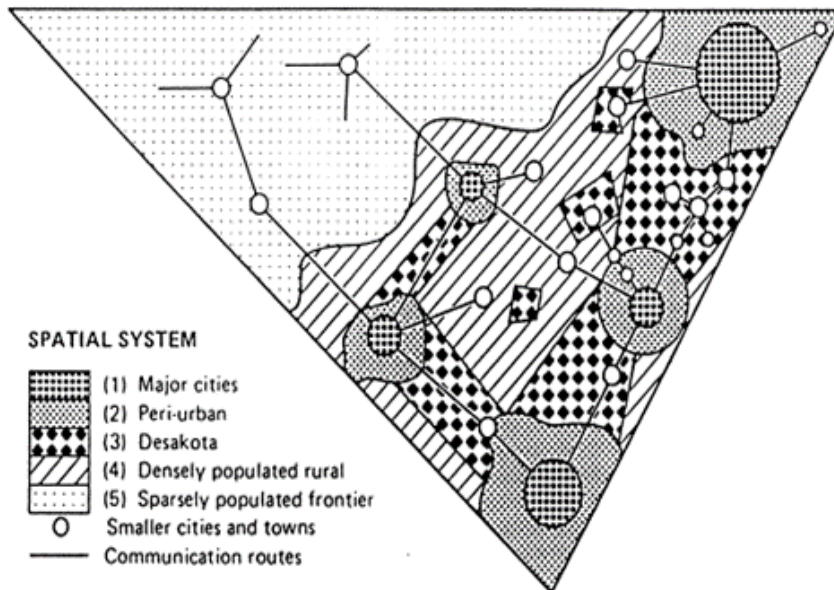
*Figure 1.*Desakota Model (McGee, 1999)

    1.   The major cities

2.	The peri-urban areas regions; areas surrounding cities which often have a daily commuting distance to the city core.

3.	The Desakota region; lying along corridors connecting large city cores to small town centers.

4.	Densely populated rural areas

5.	 Sparsely populated frontier region.

b.	Ruralopolis Model

While not as popular, but equally as important as the Desakota model, the Ruralopolis model refers to a high density area with an agrarian society. It was introduced by Qadeer (2000) to identify a rural region experiencing urban-level population increase which affects infrastructures, landscape and settlement system and redefines land economy and land use. In these high-density regions houses are scattered across the landscape. The spatial pattern of these areas does not follow the usual rural pattern, or the urban one. Ruralopolis was the term provided to describe this unique pattern. The attributes of the area are as follows:

1.	High population density

2.	Extended corridors or bands of homestead and villages sprawled

3.	Pressure on land

4.	Agricultural economy

5.	Increase in the number of facilities and services.

A Ruralopolis is a predominately a rural region that is linked to service centers, towns and cities. It is not the urban fringes or part of the metropolitan region. Qadeer (2000) explains

that a Ruralopolis is rural in terms of economic activities. It differs from a Desakota in urban influence. While Ruralopolis remains under rural influence a Desakota is under urban influence.

c. Rurban

Rurban refers to large rural settlements or towns (Kolhe and Dhote, 2016). It appears as islands of urban development in a sea of rural areas. Kolhe and Dhote explain that Rurban centers have urban characteristics but are governed by rural bodies. The population in these areas works in both the rural and urban sector. Qadeer (2004) states that Rurban refers more to the process of rural urbanization than the spatial reconfiguration. However, Kolhe and Dhote (2016) state that Rurban are the result of a Rurbanization process, which begs the question about the processes of spatial transformation that are occurring in the RUC.

4. *Spatial Transformation processes*

The literature points to three dominant spatial processes that shape small and intermediate towns: Rural Urbanization, Rurbanization and Urbanization by Implosion

a. Rural urbanization

Rural urbanization is driven by rural urban migration. It is characterized by urban expansion onto agricultural land, transforming rural-based lifestyle to an urban one (Roberts, 2016). Rural urbanization is the result of push and pulls factors (figure 2). It results in the alteration of several aspects: (i) a decrease in-agricultural labor forces; (ii) the diversification of economic and revenue structure; (iii) the loss of rurality (Zhijun, 2004: as cited by

Roberts,2016). This process results in expanding the poverty belt around the city (Wang

et.al,1999)

	Local Factors	External factors
Push factors	● Seasonality of income ● Land disputes ● Fragmentation of land ownership ● Water and land rights ● Over population ● Debt ● Violence against women ● Security issues ● Demographics	● Large scale commercial farming ● Modernization of agriculture ● Diaspora buying up property ● Land grabbing ● Famine ● Climate Change
Pull factors	● Access to services ● Employment opportunities ● Education ● Higher standards of living ● Better health care ● Political and religious freedom ● Access to capital ● Family	● Higher education ● Stepping stone to national and international migration ● Access to drug supply chain ● Better internet ● Access to business networks

Table 1. Push and Pull Factors (Roberts, 2016)

b. <u>Rurbanization</u>

The process of diffusion of urban lifestyle and population into rural setting is known as rurbanization (Bauer, 1975 as cited by Kohle and Dhote, 2016). It is sometimes refered to as recolonization of the rural areas (Roberts, 2016). Urban dwellers relocate to nearby rural towns and villages escaping the urban clutter. Rurbanization is widely seen in North America and Europe where the urban rich are resettling to the countryside.

Another phenomenon that has been modifying spatial patterns is gentrification. Gentrification is an economic tool used to revive disadvantaged and poor neighborhoods. However, it results in the relocation and marginalization of the neighborhoods' residents to city outskirts, a process known as suburbanization of poverty (Richardson et.al, 2019). This

process is the result of exclusion mechanisms, raising property value, displacing long-time residents with more affluent residents. This leads to suburban decline and an increase in suburban poverty (Hochstenbach and Musterd, 2018). These newly formed suburban regions are characterized by low property value and are inhabited by low income minority families. (Richardson et.al, 2019)

c. Urban implosion

Another landscape altering phenomenon is urban implosion. It is emerging in different parts of the world. Urban implosion is the expansion and development of rural towns independently of the city. It is the result of in place population growth leading to the expansion of villages and towns (Qadeer, 2004). Rural areas are producing an excess of population that cannot be integrated into the urban economy. Accordingly, the rural towns develop and grow to accommodate the growing numbers of residents.

The flow of capital out of the financial markets and into land-based investments assure the union of rural areas with urban development (Rignall and Atia, 2016). Accordingly, space and society are being reshaped; land is taken out of agricultural use and commoditized for industrial, residential and commercial purposes. Society is being urbanized, with agrarians abandoning their rural lifestyles and adopting a new one (Mughal, 2018).

C. Lebanon

The urbanization and spatial changes phenomena that have been occurring across the global are observable in Lebanon. Lebanon's landscape is being transformed from one that is

dominated by greenery to one engulfed by cement and urban structures. This state of rampant urbanization is particularly dominant on the coastal strip.

1. *Urbanization*

Lebanon is undergoing territorial mutation characterized by global urbanization (Verdeil et.al, 2008). In the last fifty years Lebanon has experienced a high rate of urbanization. 87% of the Lebanese population lives in urban areas and 64% lives in large urban agglomeration (UN Habitat, 2016). Rapid urban development has been occurring along the coast, stretching 200 km from the North to the South and around major cities (UN Habitat, 2011). Urban expansion is not limited to major metropolitan areas, it has also occurred around secondary cities and towns. Cities are growing both vertically and horizontally consuming neighboring lands and biodiversity (UN Habitat, 2011). Urban expansion has been occurring chaotically without any guiding plan or strategy, merging cities and towns into one large agglomeration. This state of global urbanization seen in Lebanon has been occurring since the civil war. According to Verdeil et.al (2008) the morphological evolution of the Lebanese urban fabric is the expansion of the urban lifestyle which infiltrates the rural setting and transforms the Lebanese's land cover.

2. *Land cover changes*

The narrow coastal strip of Lebanon is undergoing rapid land use changes. Degradation in productive land and erosion of prime soil are the result of unchecked urbanization, dramatic changes in population and changes in land perception (Darwish et.al,

2003). These factors along with changes in associated lifestyle have deeply affected the land

value and use. Land which used to be regarded for its agricultural and scenic worth is now

perceived as a commodity controlled by market prices (Masri et.al, 2002). As a result, urban

areas have grown at the expense of agricultural and forest lands.

a. <u>Urban cover</u>

Urban expansion in Lebanon has been occurring without any strategies or guidelines

(UN Habitat, 2011). The accelerated state of urbanization can be attributed to the laissez-faire

approach in the urban context. The government has been incapable of properly steering the

erratic growth of urban areas (UN Habitat, 2016). And while there are some tools to regulate

urban development in Lebanon, it is generally executed in a highly centralized manner (UN

Habitat, 2017). Urban master plans are primarily focused on the coastal line; 84% of the other

areas are unplanned. These areas are referred to as unclassified areas مناطق غير مصنفة\ which

are administratively managed by blanket regulations that rely on a lot coverage 2and floor-area

ratio3.

These blanket regulations have given a carte blanche for landowners to build on their

lands leading to haphazard urbanization, which is growing both vertically and horizontally.

In Lebanon, urban expansion follows three different patterns: circular, leapfrog and

linear (UNDP/MOE/ECODIT, 2011). Circular (or concentric) expansion is very visible around

major cities and towns including Beirut, Baalbeck, Zahleh, and Marjayoun. Linear expansion

(or ribbon construction) examples include the coastal highway (from Beirut to Jounieh and

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2 Combined area of all building on a lot measured
3 The size of the building relative to the lot

from Beirut to Sarafand) and selected inland regions (from Tripoli to Halba in north Lebanon and from Zahrani to Nabatieh in south Lebanon). Leapfrog development examples include Mechref Village (Mechref), Pine Hills (Chbanieh), Pine Park (Roumieh) and Beit Misk (Bhersaf). (UNDP/MOE/ECODIT, 2011).

b. Drivers of Urban Expansion in Lebanon

   i. Urban Migration

- Internal Migration

According to UN Habitat (2016) report III, Lebanese rural exodus has had a momentous impact on urbanization in Lebanon. The huge influx of rural dwellers to the city started in the late 50s with the decline in the agriculture sector. The report states that the main recipient of the exodus has been Beirut. However, secondary cities are graduallyreceiving more rural migrants.

- International Migration:

Even though Lebanon generates a lot of migrants, it also receives low skilled laborers from Asia, Africa and Syria. A lot of them are employed in the informal sector (De Bel-Air, 2017). These migrants reside in the poverty belts surrounding cities where they are generally employed.

ii. War displacement

In addition to rural urban migration, urban expansion in Lebanon is due to political instability. According to UN-Habitat (2011) War, conflict and occupation have played a significant role in shaping the urban dynamics in Lebanon. For example, the 1948 Palestinian ethnic cleansing resulting in the displacement of approximately 350,000 Palestinians currently residing in camps near cities. Another political event that reshaped the urban landscape of Lebanon is the Lebanese civil war which led to massive internal displacement. According to Verdeil et.al (2008), the civil war was an urban war with conflicts mainly taking place in urban centers. Many fled the range of artillery and took refuge in the nearby mountains, taking their urban lifestyles with them. Beirut kept sprawling and conquering neighboring villages such as Dora, Choueifat, and Baabda. Tripoli took over Zgharta. Similarly, Sour and Saida have expanded in size. The second massive wave of displacement came with the 1978 and 1982 Israeli invasion of Lebanon. Scores of Lebanese inhabitants were relocated, many took refuge in Beirut's suburbs, further expanding the city.

In 2011 the Syrian crisis broke out and many Syrians fled the unstable country and took refuge in Lebanon. Many of the refugees are residing in and around metropolitan areas with 27% of them located in and around the City of Tripoli (UNHCR, 2016).

iii. Remittance

The Lebanese diaspora is estimated at around 14 million. While the civil war is largely responsible for this huge number of emigrants, there has been outmigration of the better educated and more skilled individuals in search of better job opportunity. Once they are

abroad, they remit a portion of their monthly income (UN-HABITAT, 2012). Lebanon is the

largest receiver of remittance in the Middle East (UN-HABITAT, 2012).The remittances

received by Lebanon makes up around 18% of its yearly GDP (UN-HABITAT, 2016). The

remittances play a significant role in national development in Lebanon, often exceeding the

value of official development assistance. They are a key element in urban development.

Savings are invested in land acquisition, housing, and funds to start a commercial activity

(UN-HABITAT, 2016; UN-HABITAT, 2012).

The Lebanese diaspora is estimated to be at least three times larger than the resident

population. Its contributions have primarily been sought by businesses, social charitable

organizations, and international networks. Government engagement with the diaspora and

efforts to tap into remittances remain limited and concentrated on knowledge transfer in

different sectors, such as telecommunications (UN-HABITAT, 2016).

iv.   <u>Land Tenure</u>

Lebanon's lack of proper zoning laws and of a well-structured land tenure system has

been the main drive behind underdevelopment for a number of years. Currently legislation

concerning planning protection and zoning are in great need of review. In Lebanon most

unclassified land is open to exploitation. Since classified lands in Lebanon do not exceed 10%

of land coverage, the result is that most land is open for urban exploitation (Masri, Khawlie &

Faour, 2002). In 2005 Lebanon attempted to produce a National Master Plan for Land

Classification. The plan was meant to be an essential reference for land use. The aim of the

plan was to determine the best way to make use of the now classified land, and that would lead

to better resource management, economic growth and social inclusion (Council of

Development and Reconstruction, 2005). It proposed an urban structure that moved away from the central area of Beirut and started looking inwards. However, the plan failed to be properly implemented.

c. <u>Agriculture Cover</u>

According to the Government of Lebanon (2018), agricultural lands are diverse and relatively large; they cover 658,000 hectares, 258,000 hectares of which are cultivated for growing crops, and 400,000 hectares for permanent meadows and pastures, which may be used to support livestock production (Government of Lebanon, 2018). The agricultural cover in Lebanon can be divided into five agro-climate zones: 1) the coastal strip which consists of tropical, citrus, and horticulture crops, 2) the lower altitudes which include olives, grapes and other Mediterranean crops, 3) middle altitudes which hold temperate fruits and orchards and 4) the Bekaa region and Northern Lebanon where field crops are found (UNDP, 2012). According to the CDR (2016) agricultural land has been heavily fragmented. 75% of agricultural areas do not exceed 1 hectare, and they only represent 20% of the total cultivated areas. A study conducted by the UNEP in 2012 on the land cover land use changes in the Lebanese coastal area reveals a 2% decline in the coastal agricultural areas. Additionally, there has been an 11% decline in land dedicated for agriculture (Haydamous and El Hajj, 2016).

The sector is grossly overlooked and is facing many obstacles which have social, environmental and political dimensions. According to the MoE (2014), the most significant social challenges that the agricultural sector is facing includes a lack of proper legal coverage for farmers. There is currently no act under the labor law that offers any protection for

farmers. Another social obstacle facing the agricultural sector is the steady loss of the agrarian workforce and the aging rural population (MoE, 2014). Moreover, market dynamics have been unfavorable to small scale farmers; wholesalers and supermarkets maintain high leverage over farmers, forcing them to sell their produce at lower prices (GoL, 2018). The sector's infrastructure is very poor. The majority of packing and processing facilities do not meet safety and health standards and there is a deficit in cold storage (GoL, 2018).

On another note, the environmental problems that are impacting Lebanon have heavily affected the agricultural sector. Water shortage and climate change have been weighing down on agriculture. According to FAO (2016), water demands in agriculture often exceed the water supply. Population growth, growing urban development and economic advancement have strained the limited water supply that is left (FOA, 2016). According to the Government of Lebanon (2018), Lebanon is the 18th most water scarce country in the world. There is currently 839 m3 of renewable water supply per capita in the country. The country is 1000m3 below the scarcity threshold (Government of Lebanon, 2018). The agricultural sector in Lebanon is defenseless in face of climate change. Population growth, urban expansion, limited water and land resources, higher temperature, reduced precipitation and high evapotranspiration will decrease soil moisture and increase aridity thus affecting the overall agricultural yield of crops (MoE, n.d).

The political instability in the neighboring countries has strained the economic conditions of the agricultural sector. Even before the Syrian crisis, the agricultural market condition was already in a dire state. The crisis has flooded the market with cheap labor and low-cost produce and blocked main export routes (GoL, 2018). This has created unfavorable

conditions for Lebanese farmers who proceeded to abandon their lands in search of better economic opportunities.

The economic situation is Lebanon has been failing. Its public debt as reached 88.6 billion USD which accounts for 150% of Lebanon's gross domestic product. A liquidity crisis has been looming over since September.

In the midst of this financial crisis a wild fire erupted on 15 October, tearing through an estimated 3200-3700 acres in just 48 hours. This was followed by an announcement of tax increase. Consequently, on October 18 the Lebanese people took the streets in anger and frustration chanting against a political regime that exploited them for too long (Hodges, 2019). Lebanon is witnessing an unprecedented political movement.

d. Natural Cover

According to the 2018 state of Lebanon's forests report, Lebanon's natural cover includes 138.5 ha of scattered forests, 79.2 ha of dense of forests and 73.4 ha of shrubland (AFDC/MoA/MoE/UNDP/IUCN/LRI, 2019). 13% of the Lebanese territory is occupied by forests and 10% is occupied by other wooded lands. Lebanon has witnessed a loss in vegetation, namely in forests (i.e 1,783 ha), and grassland (i.e 1,201 ha) (AFDC/MoA/MoE/UNDP/IUCN/LRI, 2019). The loss is attributed to chaotic unplanned urbanization which keeps eating away at the natural landscape. The absence of proper urban planning coupled with a rising number of illegal constructions has put immense pressure on natural biodiversity Over grazing has also played a part in the loss of the natural landscape (MoE/UNDP/ECODIT, 2011). Another cause of natural cover deterioration is quarries.

Currently, there are 1,300 quarries distributed all over Lebanon. The quarrying activities have been eroding and destroying the beautiful mountain scenery in Lebanon. 738 ha of grassland and 137 ha of forests have been destroyed due to quarrying activities (AFDC/MoA/MoE/UNDP/IUCN/LRI, 2019).

3. *Rural – Urban Continuum*

According to Verdeil et. al (2008), following the civil war a new form of landscape appeared in Lebanon. The landscape is characterized by small isolated houses forming around highways and in the middle of fields. The picturesque old stone houses that are unique to the Lebanese rural scenery disappeared and they are replaced by modern cement construction. The morphological evolution of the landscape includes the formation of urban sprawl as a result of major agglomeration extending in the neighboring rural areas (Verdeil et al, 2008). Another distinguishing aspect of the rural urban continuum is the formation of slums near large agglomerations. According to UN Habitat (2011), there are currently 24 slums across Lebanon. These slums are the result s of rural migrants who relocate to villages nearby cities for better economic opportunities (UN Habitat, 2011). Following the 2011 Syrian crisis, more than 1 million Syrian refugee resettled to Lebanon. Most took refuge in villages and slums increasing pressure on land and resources. According to UNHCR, 1,720 household are living in substandard building around major agglomerations and 21,700 households are living in informal tented settlements (UNCHR, n.d)

There has been a sharp rise in the population of small and intermediate cities located across the continuum, increasing from 11% to 50% between 1980 and 2015 (Bahn and Abebe, 2017).

4. *Northern Lebanon*

Northern Lebanon is made of the North governorate and Akkar governorate. It is one of the most deprived and overlooked regions in the country (OCHA, 2018). Northern Lebanon has witnessed changes in its landscape characterized by urban sprawl, taking the form of informal urban settlements and slums due to the large numbers of Palestinian and Syrian refugees currently residing in Northern Lebanon (OCHA, 2018).

Northern Lebanon is characterized by its natural landscape. Northern Lebanon holds the second largest agricultural area in Lebanon (IDAL, 2018). Agricultural areas cover 15% of North Lebanon's territory, and 57% of Akkar's territory (IDAL, 2018; IDAL, 2017). Olives are the predominant crop in North Lebanon (62%) (IDAL, 2018); and cereal is the predominant crop in Akkar (38%).

Given the decline of the Lebanese natural and agricultural cover in the face of haphazard urbanization, a spatial policy is needed. The following research hopes to establish such a policy through the identification and classification of the rural urban continuum surrounding the city of Tripoli, North Lebanon. The process of classification consists of understanding the physical (land cover) aspects of the settlements found in the RUC, along with the socio-economic features.

Consequently, the following research seeks to properly define the rural, the urban and the RUC in order to provide a spatial framing to the implementation of the Agropolitan approach.

This is achieved by first mapping and understanding the land cover changes in Northern Lebanon in order to decipher landscape changes. The land cover change aspects help shed light on the historical evolution of the Rural-Urban Continuum-which is the representation of the variation of the urban-rural cover-and how it has changed over the years. The research also aims at developing a technique to define the typology of the RUC elements that can be used for a pilot program of the Agropolitan approach. It is through the understanding of these small towns and villages' development character that proper policies can be achieved

CHAPTER III

ANALYTICAL FRAMEWORK

The conceptual framework that the following research touches on includes: **Perroux's (1955) Growth pole theory, Lipton's (1977) Urban Bias theory, Brenner and Schmidt's (2015) theory of planetary urbanization, the Agropolitan approach** and **the agrarian question.**

Perroux's theory is based on the assumption that that economic growth in developing countries can be stimulated trough capital intensive investments of governments in industries of large urban centers. The growth is supposed to spread to rural areas through the trickledown effect. The conceptual problem in that theory is that it assumes that development in the rural hinterland cannot occur in the absence of an urban center. It fails to consider other factors such as ecological, crop type, prices control, availability of infrastructures and access to markets (Chulu, 2016). The single minded nature of the theory has led to the divergence of all the resources to the city leaving the country behind. This favoring of the city came to be known as **urban bias**. Lipton posited that the rural poor are dominated and exploited by the urban elite. The urban dwellers being more powerful are able to redirect the rural resources towards their own interest. The urban bias theory highlights the power divide between the rural and urban region (Adell, 1999). This bias towards the city has led to unchecked urban expansion, where the city kept growing at the expense of the countryside. This haphazard urbanization has changed the rural landscape. The urban has infiltrated the rural, and distinction between rural and urban became increasingly harder. This situation was foreseen by Lefebvre in 1997 in his book urban society, where he depicted the complete urbanization of society. Inspired by

Lefebvre's work, **Brenner and Schmidt (2015)** developed a new framework to better understand the complete urbanization of society (Khatam and Hass, 2018). Brenner and Schmidt (2015) proposed the theory of **planetary urbanization**. Drawing on the concept of urban society, planetary urbanization refers to the fact that not only the majority of the world's people live in urban settings, but – more importantly – that a much greater number of people, often not living in places defined as *cities*, are directly or indirectly involved in assuring the continuation of the global urbanization process (kaika and swyngedouw, 2014).

Agropolitan approach came as a critique to the growth pole theory. The Agropolitan approach breaks through the rural dependency on the urban, and acknowledges the interdependency and interconnectedness of both areas. The approach is market oriented (Frieddman, 1980). This transition of the rural society to a more urbanized and market oriented society is referred to as **agragrian transition**. **Agrarian transition** is a range of processes linked to the increasing importance of the market economy, which affect agricultural and the rural population

CHAPTER IV

METHODOLOGY

This thesis proposes a spatial tool to improve environmental spatial management schemes and land planning and social welfare in North Lebanon, where the land has been subjected to intense urban transformations and loss of rurality through the identification of the spatial and economic features (Arnaiz -Schmitz et.al, 2018; Fatkhiati et.al, 2015).

A set of objectives and sub-objectives are identified in order to properly classify the RUC and determine the type of spatial forms that exist along the RUC.

Objective	Sub-objectives	Approach	Type of method
Map land cover changes in North Lebanon	Map urban cover evolution Map rural cover regression Map natural cover regression	GIS analysis	Quantitative
Define the RUC	Classifying the RUC (urban core, intermediate Zone and Rural areas). Studying the RUC's evolution Typifying the RUC elements	GIS analysis Secondary data Primary data	Qualitative and Quantitative

Table 2 Objectives and sub-objectives

A. Study area

The study area is Northern Lebanon. Northern Lebanon has a population of approximately 1.1 million people, covering an area of 1976 km2. The area includes two governorates, Tripoli and Akkar. Tripoli, the capital of the North governorate, is the second largest city in the country. The area is primarily agricultural; Akkar governorate is the second largest agricultural area in Lebanon after the Bekaa (UNHCR, 2010).

Northern Lebanon is an excellent study area for the application of the Agropolitan approach. As figure.2 illustrates Northern Lebanon still holds large green areas and urban development is still in its early stage. Additionally, the linkage between the urban and rural are quiet visible in Northern Lebanon. Tripoli receives human capital and sustenance from Akkar, while Akkar in return receives remittance and services (education, health)

Thus, the application of the approach will be both possible and beneficial to the North in strengthening the linkages that exist.
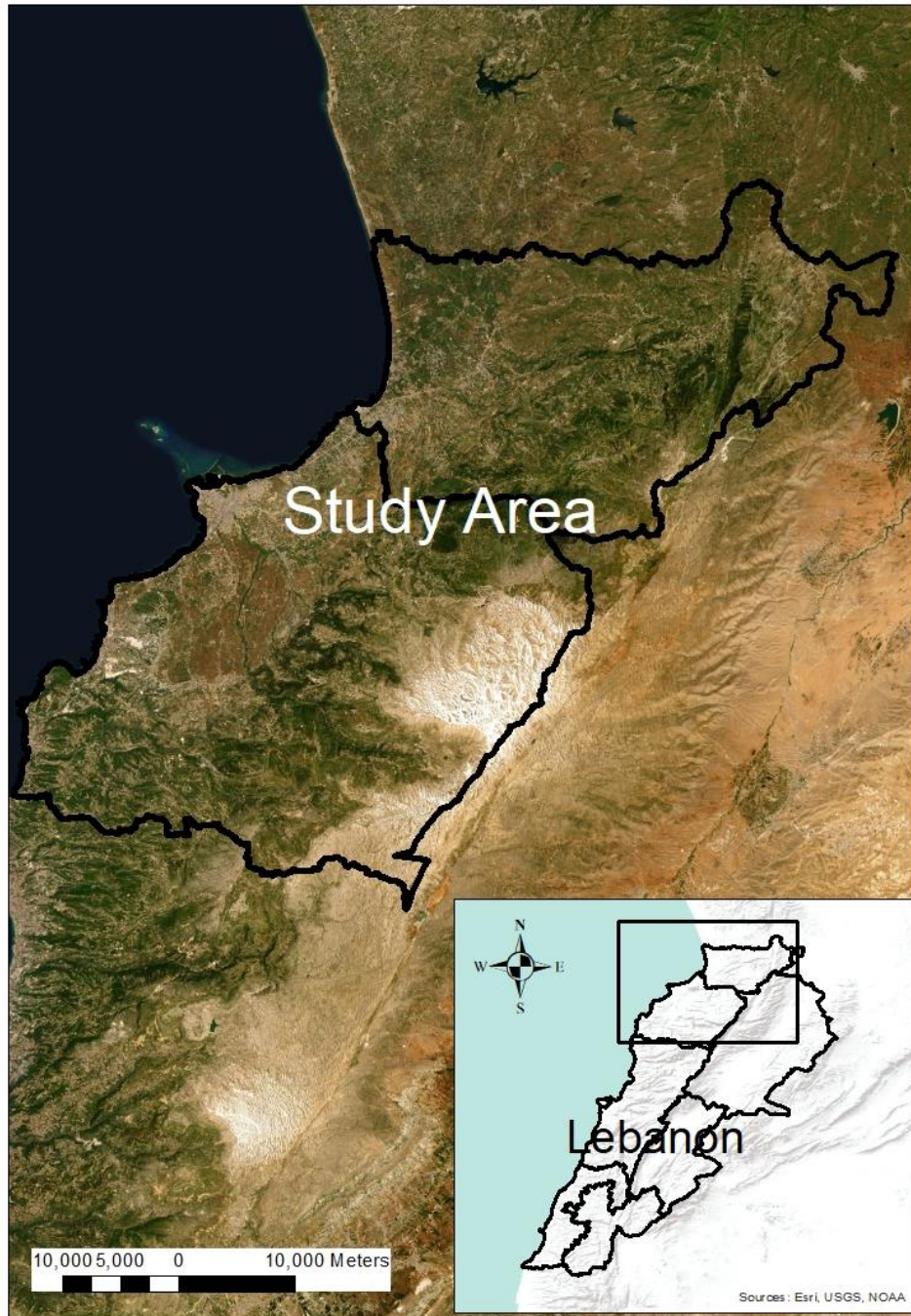
Figure 2 Study area (GIS,2017)

B. Mapping land cover changes in North Lebanon

Understanding the land cover dynamics sheds light on the morphology of the RUC. The following section will present the historical urban, rural, and natural elements land cover changes in North Lebanon through the help of Arcmap. The methodology will rely on data obtained from the CNRS and on the Corine 2006 land classification.

Data	Source
GIS shapefile:	CNRS
LULC	AUB
Population	
Roads	
Corine and classification	CNRS

Table 3 Data used in thesis

A. Classify the Rural-Urban Continuum in North Lebanon.

In order to properly identify and classify the villages in the rural urban continuum, the extent of the continuum in North Lebanon must be classified. Accordingly, in this thesis the methodology proposed by The Finnish Environment Institute (2013) was applied. The Finnish Environment Institute addressed the task of rural-urban spatial classification; in order to move away from the rural urban dichotomy and dive into the intricacy of the area that lies in between, by suggesting a new set of criteria for a 3rd level of classification of the RUC. Figure.3 represents the different levels of classification. The first level relies on the conventional rural urban dichotomy. The second level includes a rural-urban gradient, also known as the rural-urban continuum. The rural urban gradient consists of an urban core and rural areas and the area that lies in between: The Intermediate Zone (IZ).

The third level of classification divides the IZ into regional classes including 1) peri-urban areas 2) rural areas close to urban areas, 3) local centers in rural areas. These regional classes are the main subject of interest in this study.
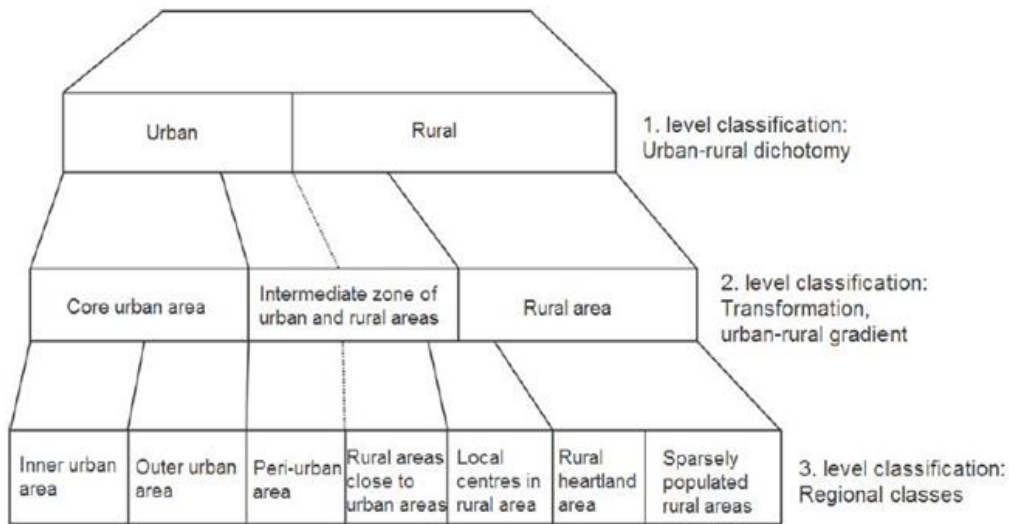

Figure 3 Rural Urban regional classification (Finnish Environmental Institute, 2013)

1. *Classification of the RUC/RUG Regional Classes*

The RUC includes several elements known as regional classes. The Finish institute defines the regional classes as follows:

- Inner Urban Area: A compact and densely built area with continuous development.

- Outer Urban Area: A dense urban area extending from the boundary of the inner urban area to the outer edge of the continuous built area.

- Peri-Urban Area: A part of the intermediate zone between urban and rural, which is directly linked to an urban area.

- Local Centers in Rural Areas: Population centers located outside urban areas, small towns and large parish villages.

- Rural Areas Close to Urban Areas: Areas with a rural character that are functionally connected and close to urban areas.

- Rural Heartland Areas: Rural areas with intensive land use, with a relatively dense population and a diverse economic structure at the local level.

- Sparsely Populated Rural Areas: Sparsely populated areas with dispersed small settlements that are located at a distance from each other. Most of the land areas are forested.

2. *Regional Classes Characteristics*

Regional classes are defined by a set of criteria, also defined the Finnish Environement Institute. The Institute relied on a set of international standards and data, such as the Corine land cover classes and a 1km2 grid for population in Europe to help them map the RUC and determine its different regional classes and their characteristics. They define the following

Inner Urban Area: Population >15000 and built up density >= 0.1

Outer Urban Area: 1 km of continuous urban cover surrounding inner urban areas.

— **Urban Core**

Peri-Urban areas at a distance of 3 kilometres from the urban core

Rural Areas Close to Urban: Needs to be accessible to urban core, 10 km away from urban core.

IZ

Local Centers in Rural Areas: Needs to fulfill three of the following criteria:

- Population density =400 people/km^2

- The average population of the last three years > 5000.

- Built up density = 0.1

- There are more than 2000 workplace.

IZ

Rural Heartland

- Population > median and < 5000

- Population < median and rural land use area> upper quartile

Rural Areas

Sparsely Populated Rural Areas : population < median

a. <u>GIS Analysis</u>

The LULC, population and built up shape files were all intersected with the North Lebanon polygon. The core urban, the local centers and the rural areas were identified by selecting villages that fit the aforementioned criteria for each class. As for the peri-urban and rural areas close to urban area, a buffer of 3km and 10km respectively were drawn from the center of the urban core.

3. *Typifying the RUC regional classes*

The study aims to typify the regional classes of the RUC. It is by understanding these regional classes and their features helps in implementing development plans.

Dimension	Indicator
Mobility	Travel time in public transport to the municipality (min) Modal split by bus (%) Modal split by metropolitan (%) Modal split by train (%)
Identity and Lifestyle	Change in resident population between 2001 and 2011 (%) Location coefficient – complex families Location coefficient – isolated single-family house Rejuvenation index change (%)
Natural Elements	Percentage of area occupied by green elements (%) Percentage of area classified as Natura 2000 (%) Largest patch index of elements with natural value Number of patches with natural value
Land Cover	Percentage of area occupied by agro-forestry systems (%) Percentage of area occupied by farmland mosaic (%) Percentage of area occupied by other artificial surfaces (%) Total urban-rural edge (km)
Economic Activities	Company specialization index, based on data tables from the Ministry of Economy and Employment (Portugal) Employment diversification index, based on data tables from the Ministry of Economy and Employment (Portugal) Location coefficient – employment in Agricultural Sector Business space/warehouse rental price index (industry) (€/m2) (confidential)
Spatial Functions	Dwellings for habitual residence without wastewater drainage (%) Buildings not served by municipal solid waste collection (%) Population density in urban areas (inhabitants/hectare) Centrality potential

Table 4 Dimensions and indicators (Gonclaves et,al, 2016)

Gonçalves et.al (2017) proposed a trans-disciplinary methodology towards a typology of the regional classes. The typological characterization of the RUC sub region relies on the set of dimensions and indicators recommended by Gonçalves et.al (2017) (Table 3)

The classes that show homogeneity in their dimensions are clustered together. The characteristics of each cluster are then compared to those of the known spatial models4 of small and intermediate towns.

It should be mentioned that not all the Gonçalves et.al (2017) indicators were used as some of the data is not available or not applicable to Lebanon. The following are the applied dimensions and characteristics:

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4 Discussed in length in literature review

Dimension	Indicator
Mobility	Distance to Urban Core (km)
	Frequency of public transport (min)
	Supply of public Transport
Population Dynamics	Changes in population between1998 and 2017 (%)
	Population Density
	% of new born
Natural Elements	% of area occupied by green elements
	% of area occupied by outcrop
	% of area occupied by beaches
	Presence of water
Land cover	% of area occupied by forests
	% of agricultural land
	% of abandoned agricultural land
	% of cattle or poultry breeding
	% of area occupied by shrubs
	% of area occupied by urban cover
Economic activities	% of permanent farmers
	% of seasonal farmers
	Land Price ($/m2))
Spatial Function	Wastewater services
	Solid waste services
	Presence of schools

Table 5 Dimensions and indicators used

The above stated dimensions and indicators were collected through fieldwork and secondary data and GIS data. The data regarding mobility was determined by collecting itinerary information from local bus and taxi stops in Tripoli, North Lebanon. The information regarding identity and economic activities were gathered from the CAS (Central Administration of Statistics), Ministry of Agriculture and online platforms for real estate prices (property finder Lebanon) respectively. Data regarding land cover is recovered from GIS shapefiles.

C. Data Limitations

The following research relies on three sets of data obtained from GIS shapefiles. The data represents the land cover of Lebanon from 1998 till 2017. When examined further, there appeared to be some discrepancies in the data.

To begin with, while the total area of Lebanon is 10,452 Km2, the data shows otherwise. Additionally, the area differs from one year to the other. To avoid the confusion the data will be represented through percentages rather than kilometer square.

Furthermore, the urban cover in the 1998 shapefile is misleading. The 1998 shapefile presents a faulty representation of the urban and natural cover. According to this dataset, there was 149km2 of area classified as urban in 1998. This does not match the new urban dataset obtained from the CNRS.
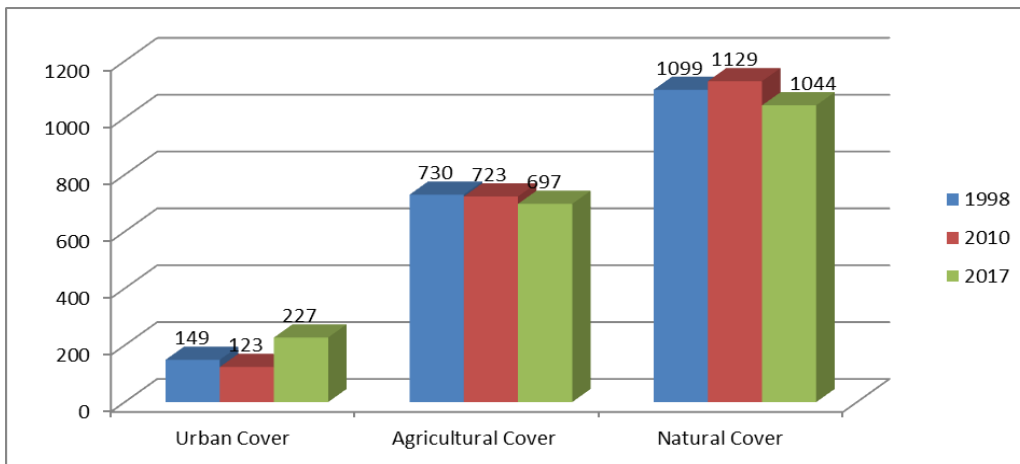
Chart 1 Land cover evolution (GIS, 2017)
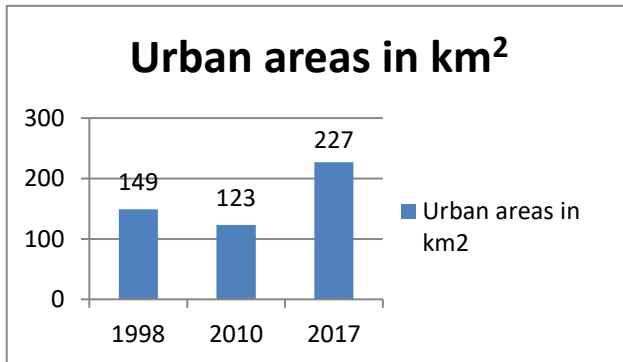
LULC urban areas   **CNRS urban areas**
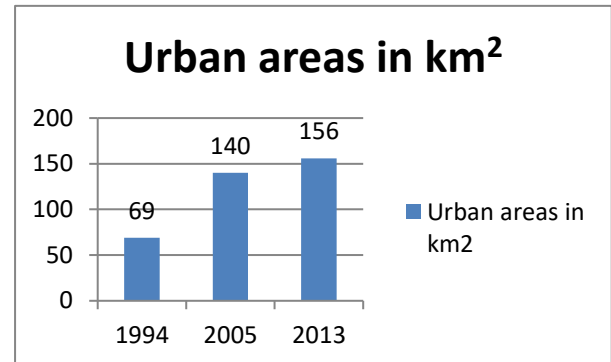

Chart 2 Data comparaison

      The urban data presented in the 1998 dataset contradicts the trend of urbanization seen in Lebanon. According to MOE/UNDP/ECODIT (2011), Lebanon has undergone a fast rate of urbanization which resulted in straining both the agricultural and natural cover. Therefore, there are doubts cast upon the validity of the 1998 data presented in chart.1, which requires further interpretation.

      Accordingly, a second set of data obtained from the CNRS was used to determine the validity of chart 1. The data represents the historical evolution of urban development in Lebanon. After comparing the CNRS acquired urban data with the urban data from LULC (chart.2), it became clear that chart 1 does not accurately represent the land cover of North Lebanon. The CNRS data showed that there is a steady increase in urban area since 1994, which agrees with the trend of urbanization in Lebanon. The LULC urban data showed a decline in urban area in 2010 which does not fit the Lebanese urban context.

Additionally, when comparing the urban areas of the two data sets, the discrepancies in the LULC urban area appear. According to the CNRS, the urban area in 2005 was 140km^2, which is less than the urban area in 1998 (149km^2) of the LULC data.

Subsequently, in order to better represent the urban cover, the 1994 urban area from the CNRS data will be used instead of the 1998 urban area of the 1998 LULC data.

There were also issues with the natural cover area. According to Ecodit (2011), natural cover has been declining in the face of urbanization. However, chart.1 shows that the natural cover increased in 2010 before declining again, which contradicts Ecodit's statement.

Since the urban area in the shapefile has been replaced by the area from the CNRS dataset, the difference between the two should be added to the natural cover. Chart 3 represents the new data that will be used for the remainder of the study.

Chart 3 reveals a steady increase in urban land cover coupled with a decline in agricultural and natural cover, which agrees with the land cover changes in Lebanon. Urban development has increased by 228% at the expense of natural and agricultural cover which decreased by 11.4% and 4.5%, respectively.
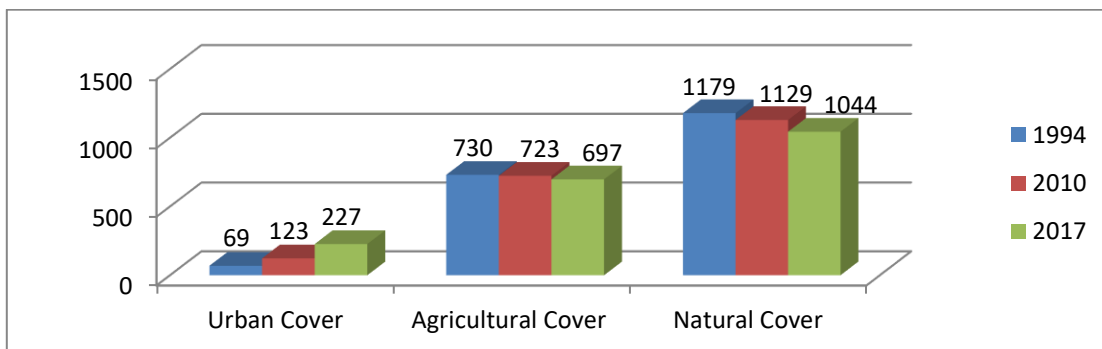

Chart 3 Updated Data

CHAPTER V

RESULTS AND DISCUSSION

Much like the rest of Lebanon, the land cover changes that have overtaken North Lebanon's territory, were driven by chaotic urbanization at the expense of the agricultural and natural cover. These land cover dynamics have been reshaping and modifying the North's rural-urban continuum for the last two decades. As revealed by GIS analysis, the North's landscape is characterized by three types of land cover: 1) Urban, 2) Rural and 3) Natural.

The land cover changes have been documented and mapped through the use of Arcmap. Then statistical analysis is carried out to study the effect of land cover dynamics on the rural urban continuum surrounding the city of Tripoli. The analysis aims at understanding of the socio-ecological interactions that shape the landscape of regions located in the RUC in order to provide a spatial framing to the implementation of the Agropolitan approach through the following:

1. Mapping and understanding the land cover changes over the past 20 years in Northern Lebanon in order to decipher landscape changes.

2. Developing a technique to spatially define and characterize elements of the rural-urban continuum of Northern Lebanon, by identifying and typifying specific localities in the rural-urban continuum that can be used for a pilot program of the Agropolitan approach.

A. Land cover changes

The land cover changes are studied by: 1) drawing past and current land cover maps, 2) statistical analysis of the maps. The results are presented as follows:
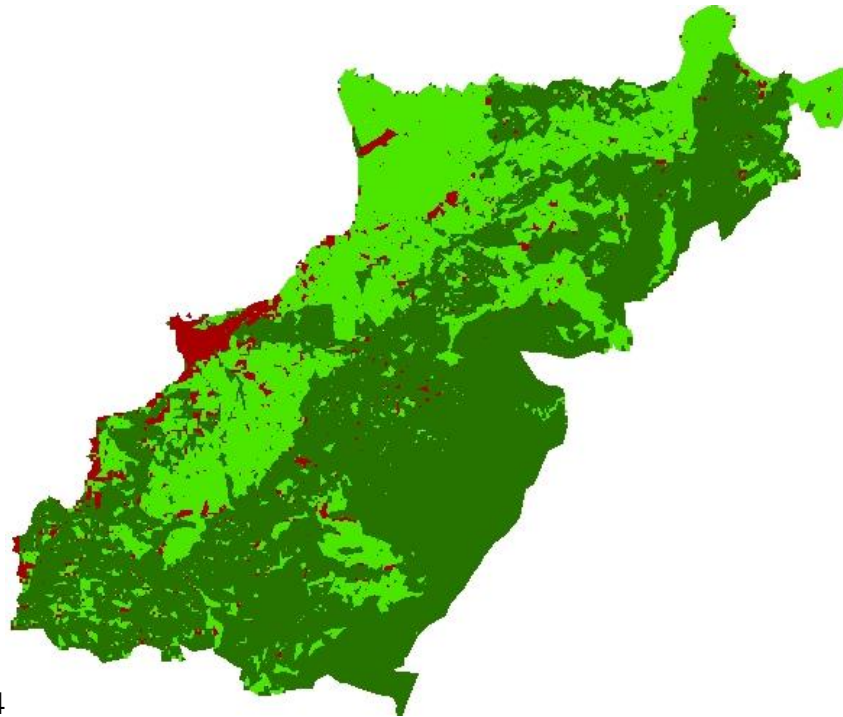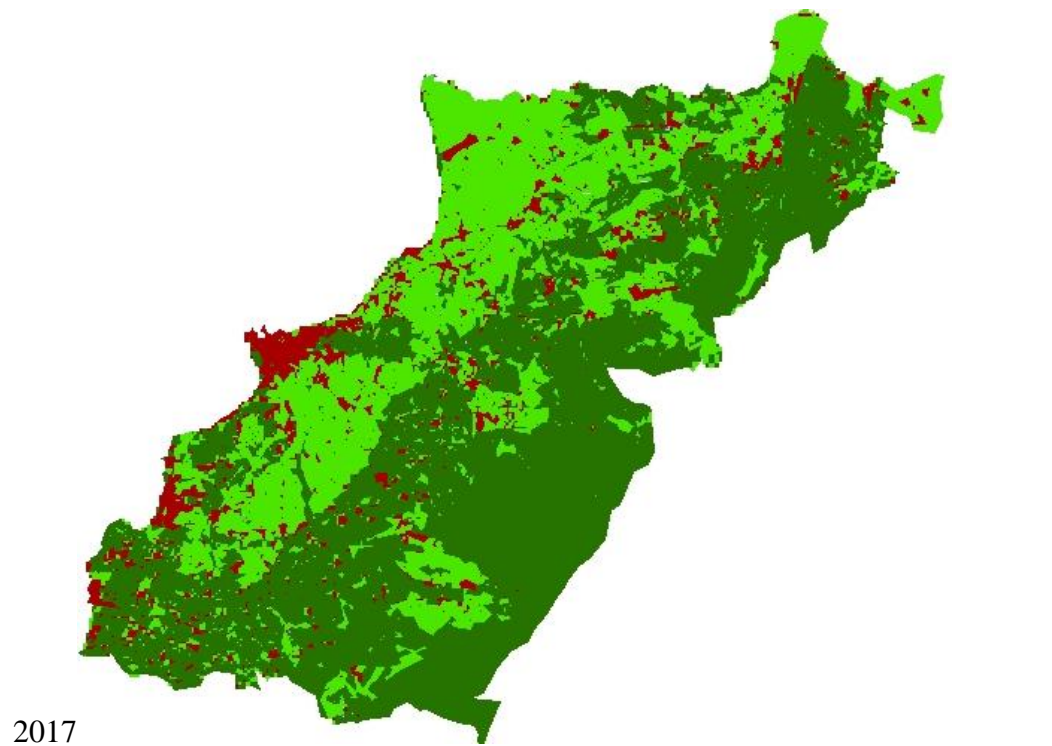
1994
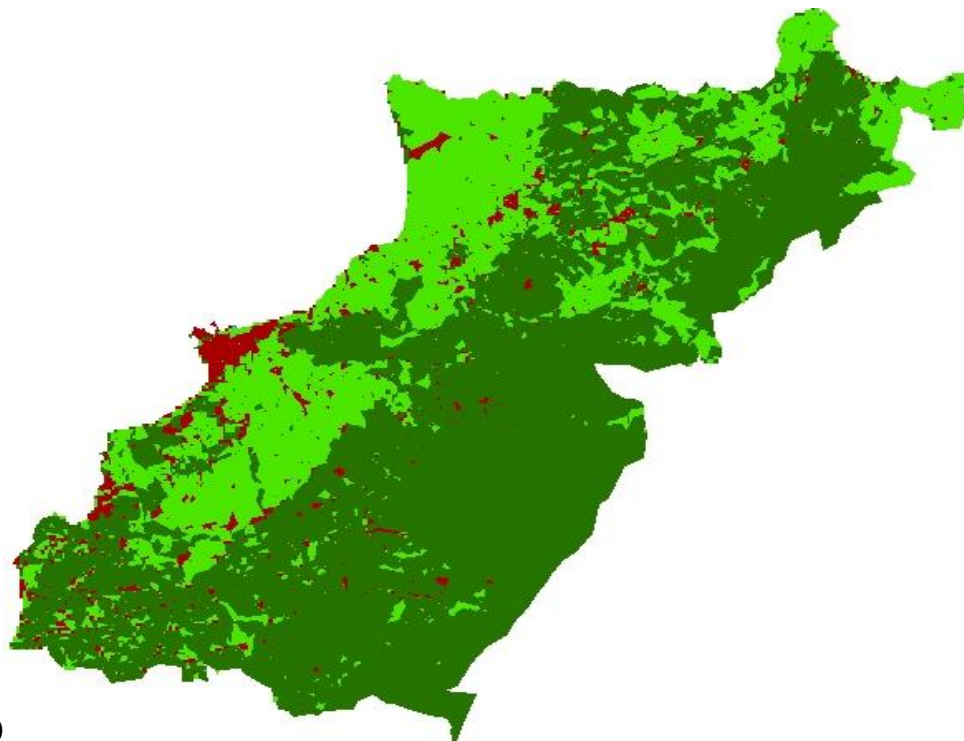
2010

2017

Figure 4 Land cover evolution (GIS, 1994, 2010,2017)

Legend

Urban Cover

Agriculture cover

Water bodies

Natural cover

1. *Urban Cover*

The Land use land cover classification in Lebanon follows the CORINE Land

Cover/Use Class Description. According to the CORINE standard the Lebanese urban cover

features different types including: urban fabric, urban sprawl, and artificial structures.

Urban fabric is defined by CORINE as an area occupied by both residential and other administrative public/private structures. The urban cover can either be continuous (dense urban fabric) or discontinuous (low density to medium density urban fabric).

Urban sprawl is defined as urban units found on either agricultural cover or natural land cover. It includes urban sprawl on field crops on permanent crop, wooded lands . . . etc.

Artificial structures include industrial areas, highways, ports . . . etc.

Out of the 227km2 of urban cover found in North Lebanon, urban fabric covers the largest area with 77.75%, urban sprawl covers 7.05%, artificial structures account for 15.15% and urban vacant land accounts for the remaining 0.07%.
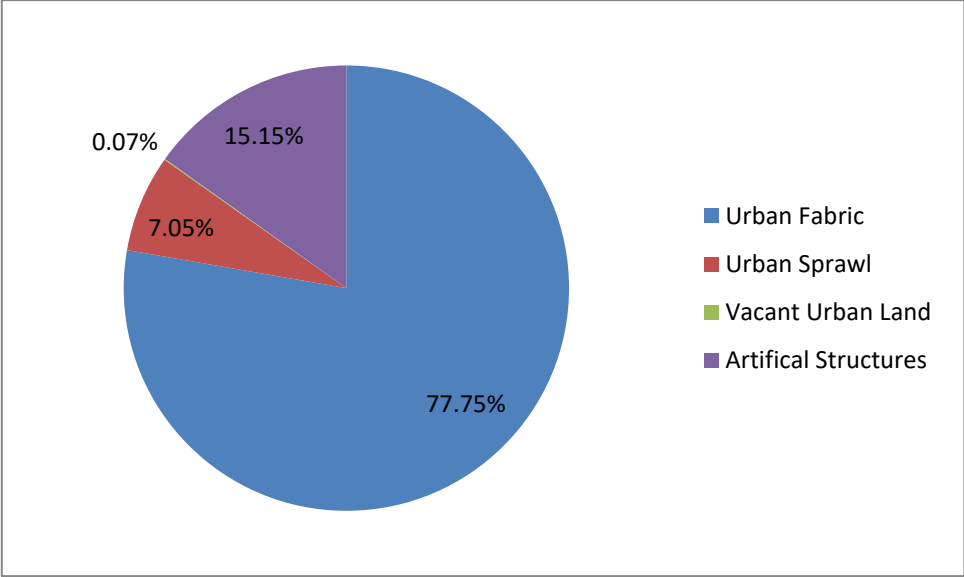

Chart 4 Urban cover (GIS, 2017)

The statistical analysis of the North's urban cover evolution reveals that urban fabric significantly increased by 337% from 1994 till 2017. Urban sprawl increased by 72.7% from

1994 till 2010 and then decreased by 28.9% in 2017. Artificial structures increased by 130.2%. Urban vacant decreased by 50%.
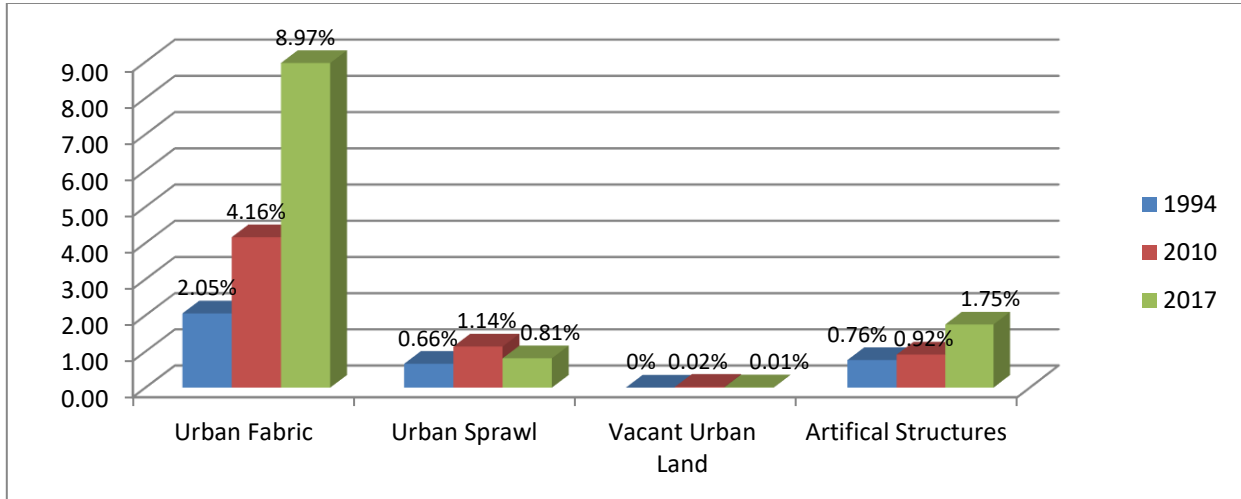

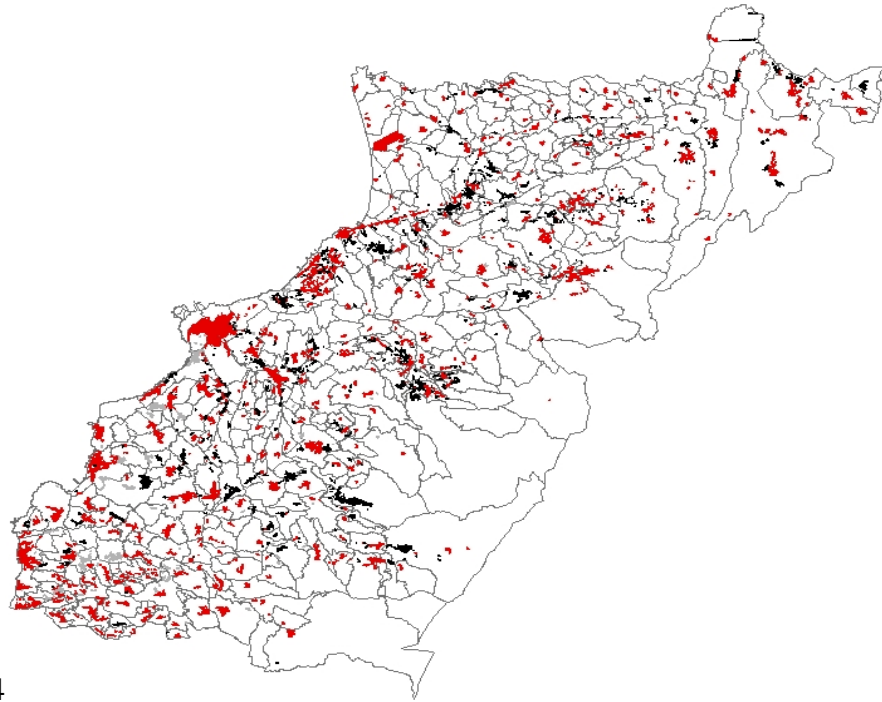Chart 5 Urban cover evolution (GIS, 1994,2010,2017)

Figure 5 visually represents the evolution of the urban cover from 1994 till 2017. Figure 5 includes the three different types of urban cover listed earlier: 1) urban fabric. 2) urban sprawl and 3) artificial structures. Figure.5 illustrates the following:
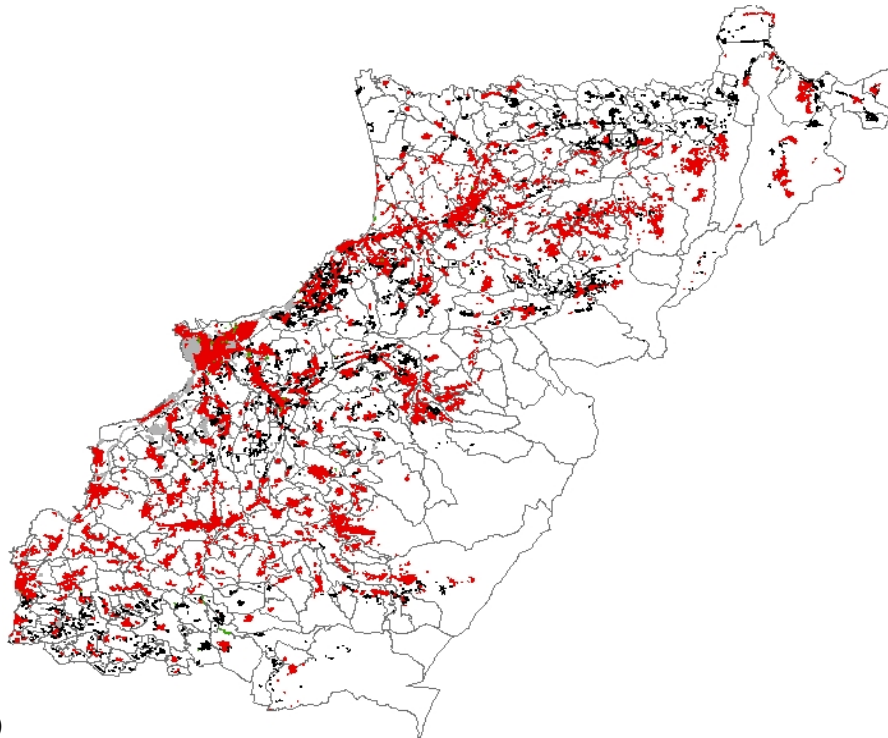
- An increase in urban fabric % area. Between 1994 and 2017 urban fabric has densified along roads, moving from the coast inwards.

- An increase an urban sprawl % area. Between 1994 and 2010 urban sprawl increased in the North East and South West region.

- A decrease in urban sprawl % area. Between 2010 and 2017 the North East and South West regions no longer hold urban sprawl instead it was replaced by urban fabric.

- An increase in artificial structures % area along the coastal line.

Year	Urban fabric	Urban sprawl	Vacant Urban Land	Artificial structure
1994	2.05%	0.66%	0%	0.76%
2010	4.16%	1.14%	0.02%	0.92%
2017	8.97%	0.81%	0.01%	1.75%
% change(1994-2010)	102.92%	72.7%		21.05%
%change(2010-2017)	115.62%	-28.94%	-50%	90.21%

Chart 6Time series summary table

1994

2010
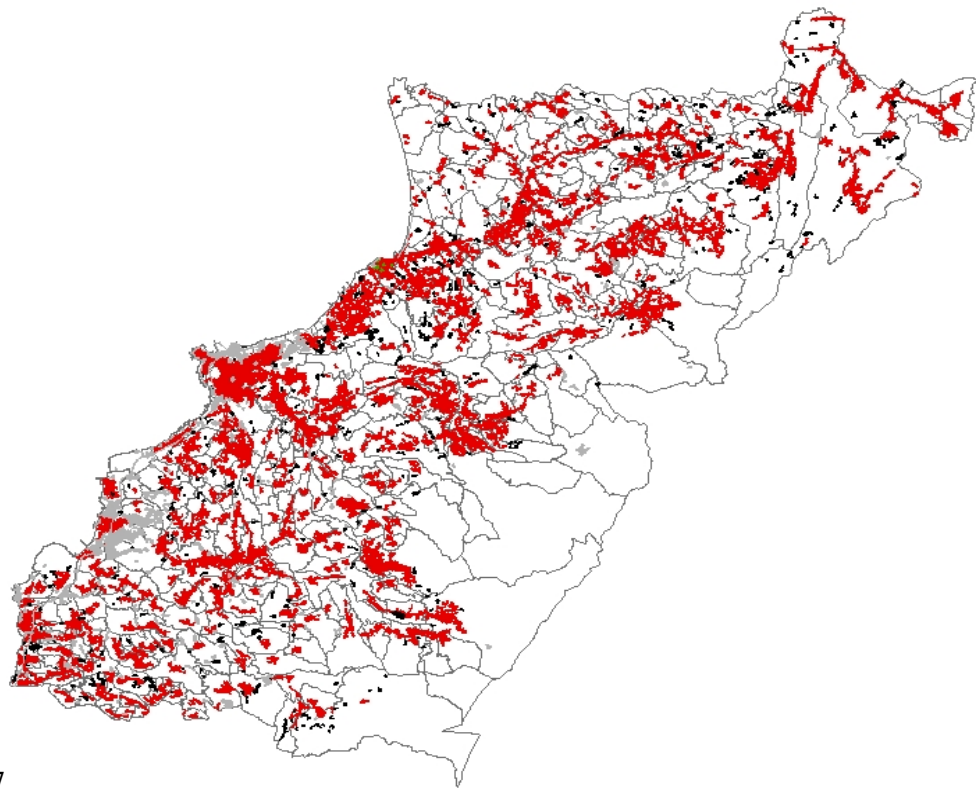
2017

Figure 5 Urban evolution (GIS, 1994,2010,2017))

Legend

(gray)	Artificial Structures
(green)	Urban Vacant Land
(black)	Urban Sprawl
(red)	Urban Fabric
(white)	North
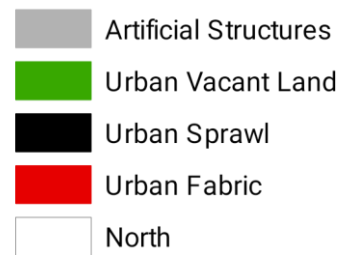
a. <u>Urban Fabric</u>

  Out the total urban cover in North Lebanon, medium density urban fabric covers 4.83%, low density urban fabric covers 3.36% and dense urban fabric covers 0.78%.
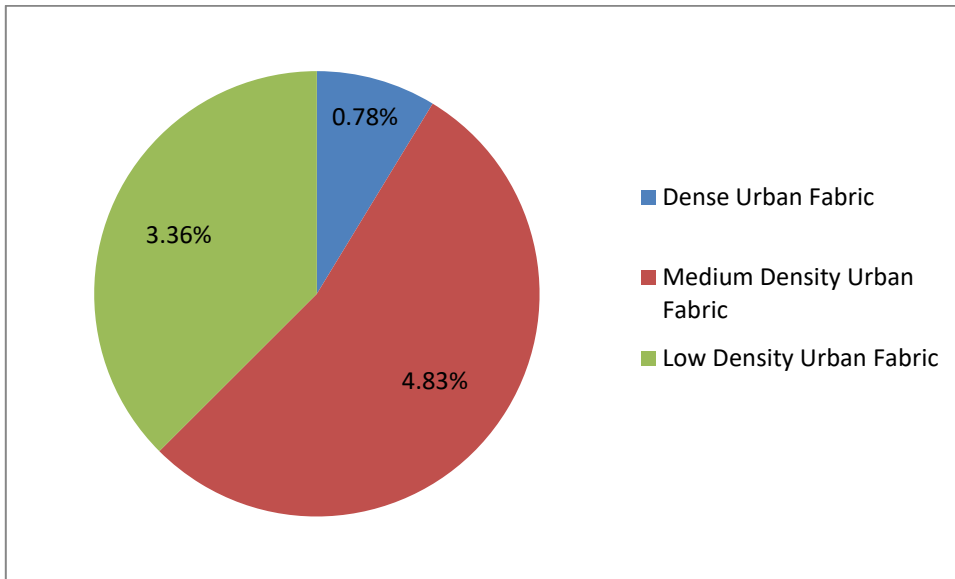
Chart 7 Urban fabric (GIS, 2017)

The study of the evolution of urban fabric in North Lebanon reveals that dense urban fabric increased by 680%, medium density urban fabric increased by 2442% and low-density urban fabric increased by 90.9%
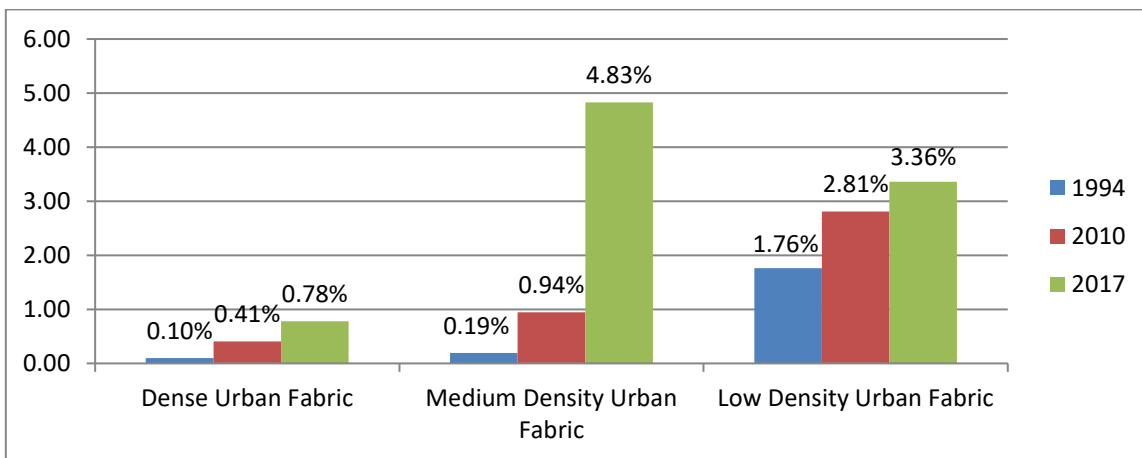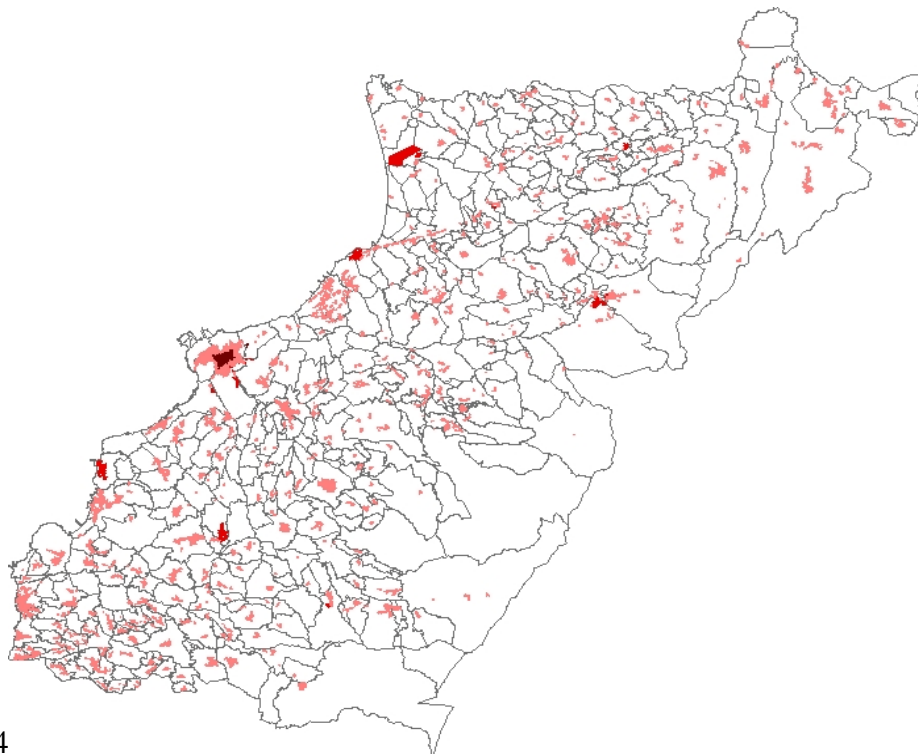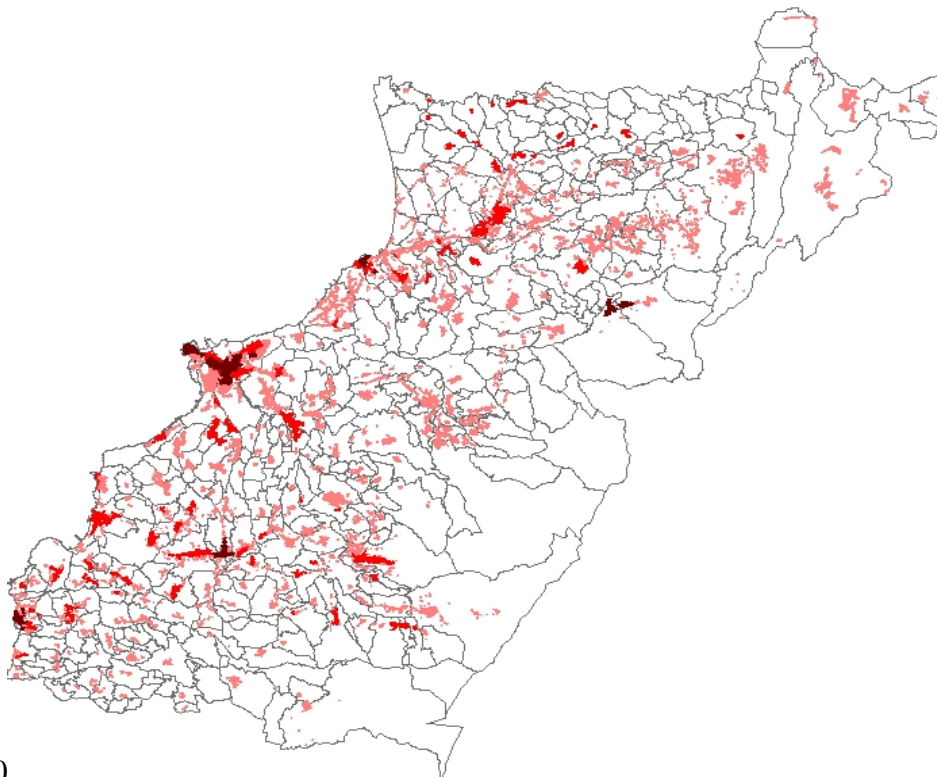

Chart 8 Urban fabric evolution (GIS, 1994,2010,2017)

Figure.6 visually represents the evolution of urban fabric in North Lebanon between 1994 and 2017. The figure illustrates the following:

- A significant increase in low density urban fabric % area. Between 1994 and 2010 low density urban fabric area increased mainly in the western region of North Lebanon

- A significant increase in medium density urban fabric % area. Between 2010 and 2017 medium density urban fabric experienced a noteworthy intensification along the coast of North Lebanon and inwards.

- A slight increase in dense urban fabric % area. Between 1994 and 2017 Dense urban fabric area slightly increased along the coastal line especially in the city of Tripoli..
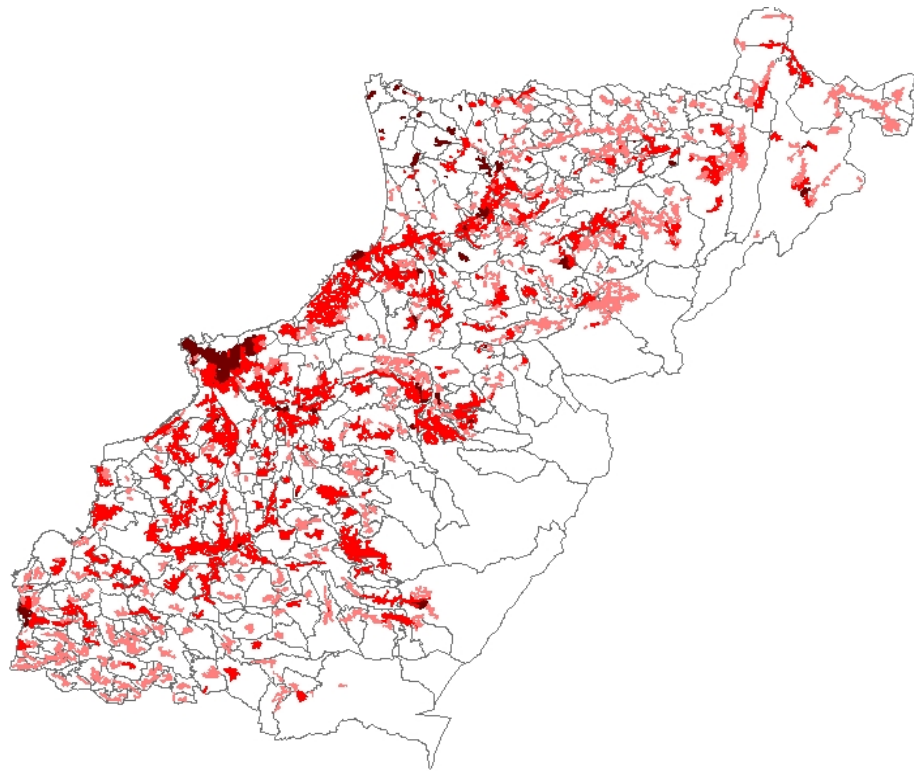
1994

2010

56

Figure 6 Urban fabric evolution (GIS, 1994,2010,2017)

Legend

Low Density Urban Fabric

Medium Density Urban Fabric

Dense Urban Fabric

North

Year	Medium density urban fabric	Low density urban fabric	Dense urban fabric
1994	0.19%	1.76%	0.1%
2010	0.94%	2.81%	0.4%
2017	4.83%	3.36%	0.78%
% change(1994-2010)	394.7%	59.65%	300%
%change(2010-2017)	413.8%	90.9%	95%

Table 6 Time series statistical summary

b. Urban Sprawl

Out of the 227 km^2 of urban cover in North Lebanon, urban sprawl on permanent crops covers 0.38%, urban sprawl on field crops makes up 0.18%, followed by urban sprawl on forests, on intensive agriculture and on shrub land with 0.13%, 0.02%, and 0.11% respectively
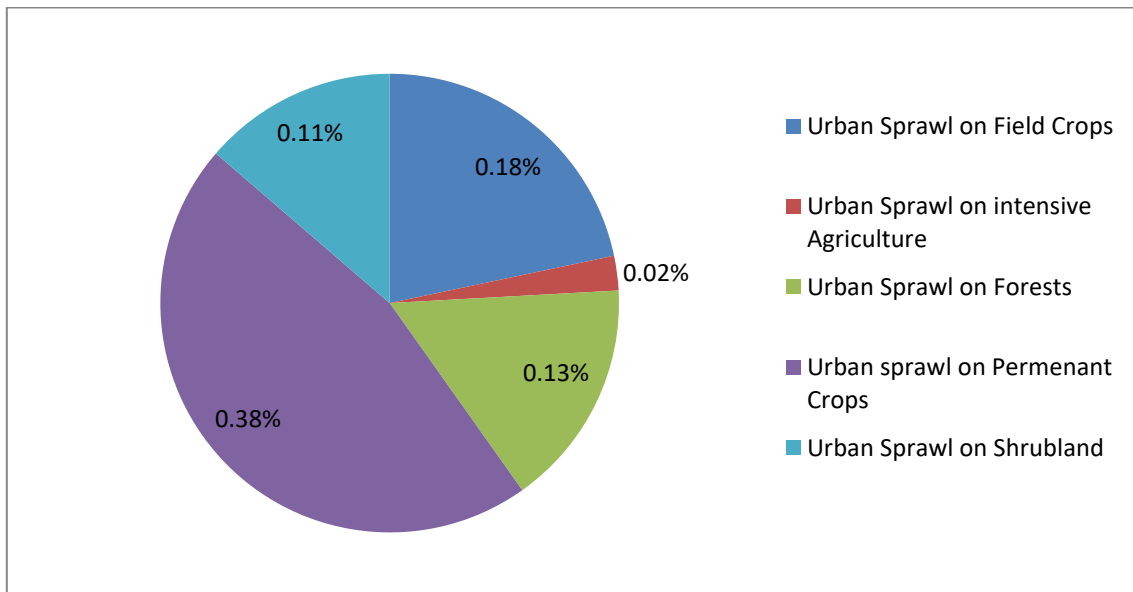

Chart 9 Urban sprawl (GIS, 2017)

The evolution of urban sprawl area from 1994 till 2017 is documented in chart.8. The chart reveals that urban sprawl has not had a significant statistical changed since 1994, with an overall increase of 23%. According to chart 8, 2010 scored a significantly higher percentage of urban sprawl than 2017 and 1994
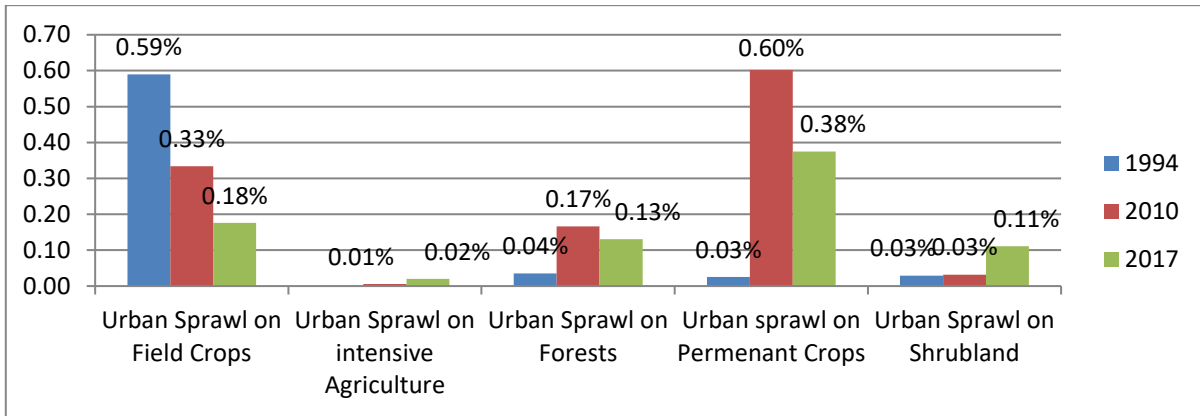
Chart 10 Urban sprawl evolution (GIS, 1994, 2010, 2017)

Figure 7 visually represents the changes in urban sprawl growth between 1994 and 2017. Figure.7 illustrates the following:

- A significant increase in urban sprawl on permanent crop % area. Between 1994 and 2010 urban sprawl on permanent crop experienced an increase along the coast and South

- A decrease in urban sprawl on permanent crops. Between 2010 and 2017 urban sprawl on permanent crops decreased, which is coupled with a rise in urban fabric. When compared to figure.5 the areas that used to be occupied by urban sprawl on permanent crop in 2010 were replaced by urban fabric in 2017. Figure.6 shows that it was replaced by medium-density urban fabric.

- A steady decrease in urban sprawl on field crops. The decrease is coupled with an increase in urban fabric. When compared with figure.5 the area that used to be occupied by sprawl on field in 1994 was replaced urban fabric in 2017. Figure.6 reveals that the urban fabric is low density-urban fabric.

- A slight increase in % area of urban sprawl on shrub land and forests.

1994

2010

61
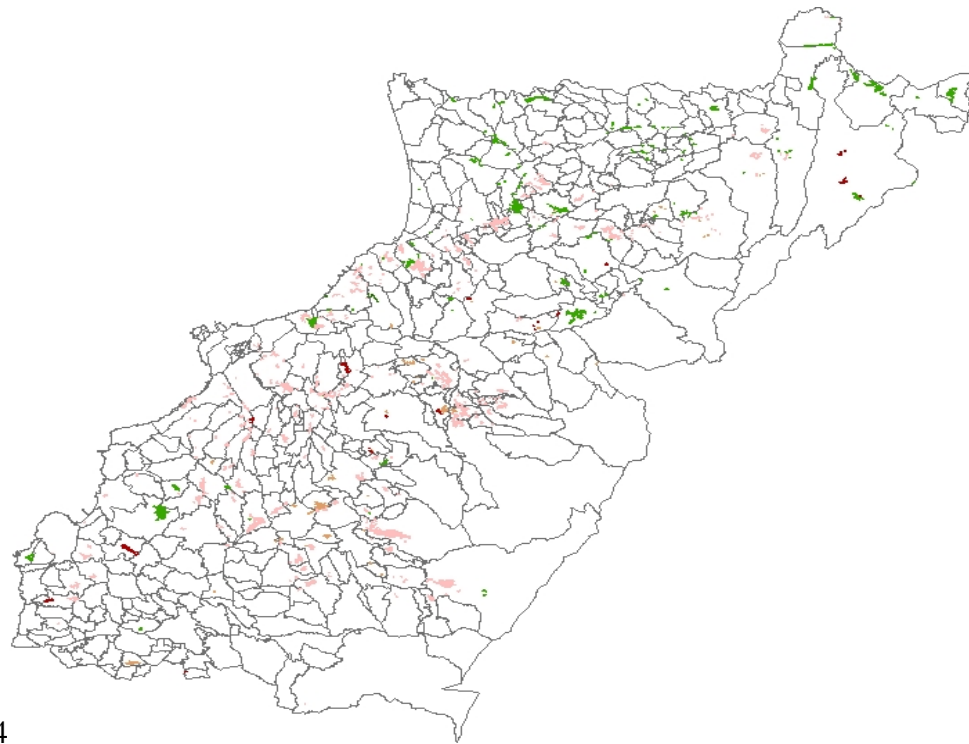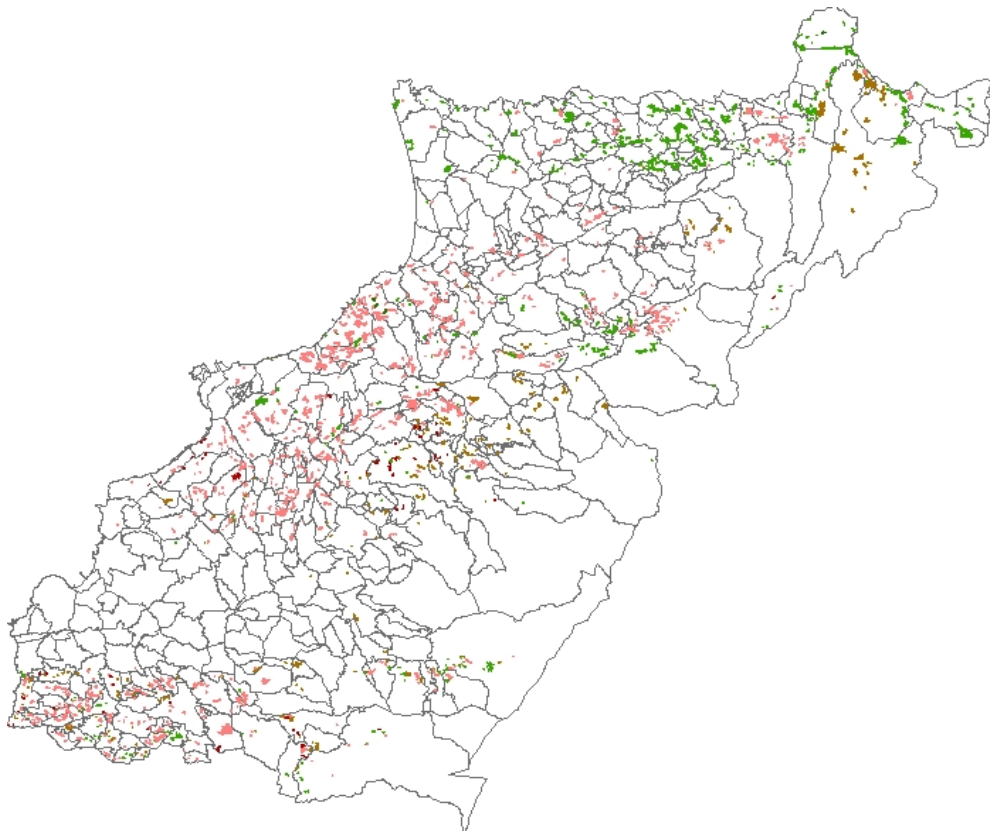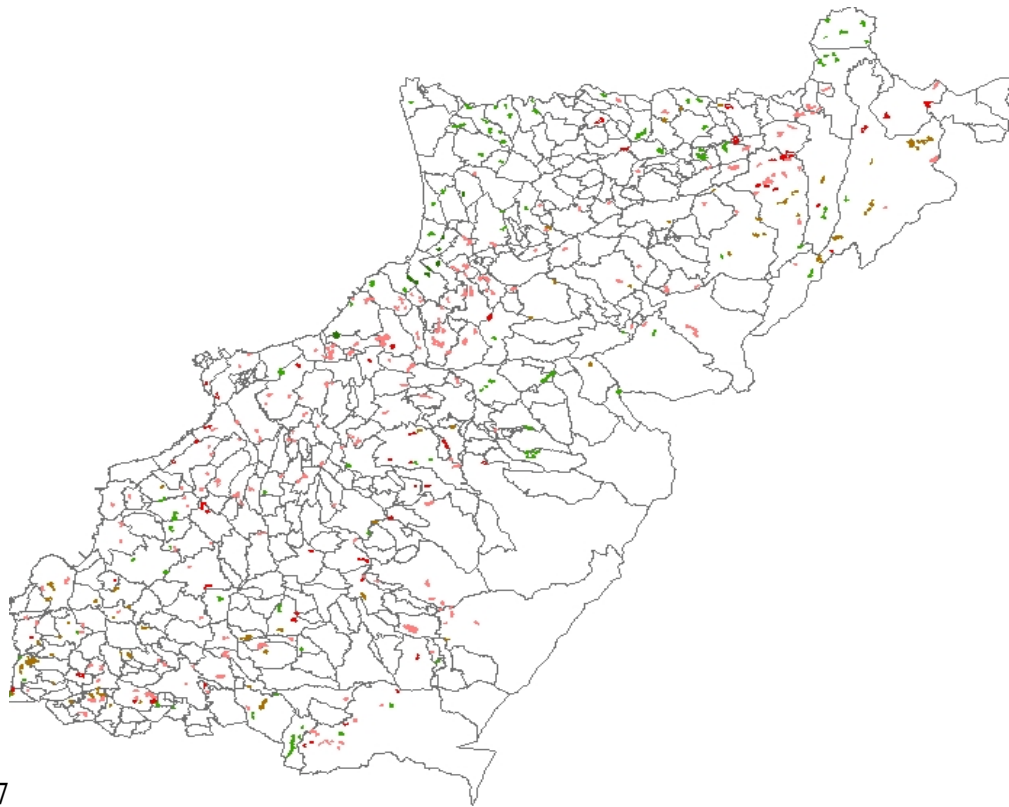
2017

Figure 7 Urban sprawl evolution (GIS, 1994, 2010, 2017)

Legend

☐	Urban Sprawl on Shrubland
■	Urban Sprawl on Permanent Crops
■	Urban Sprawl on Forests
■	Urban Sprawl on Intensive Agriculture
■	Urban Sprawl on Field Crops
☐	North

Year	Urban sprawl on field crops	Urban sprawl of permanent crops	Urban sprawl on shrub land	Urban sprawl on forests	Urban sprawl on intensive agriculture
1994	0.59%	0.03%	0.03%	0.04%	0.01%
2010	0.33%	0.6%	0.03%	0.17%	0.01%
2017	0.18%	0.38%	0.11%	0.13%	0.02%
%change(1994-2010)	-44.06%	1900%	0%	325%	0%
%change(2010-2017)	-45.45%	-36.66%	266.66%	23.52%	100%

Table 7 Times series statistical summary

2. *Agricultural Cover*

According to GIS analysis, agricultural land cover includes: permanent crops, field crops, olives, and poultry breeding, cattle raising protected agriculture, abandoned agricultural land vineyard and agricultural units.

Chart 10 is a detailed breakdown of North Lebanon's agriculture lands in 2017. Out of 35.41% of agricultural cover, olives occupy the largest area with 14.05% followed by field crops and permanent crops with 10.42% and 7.68% respectively.

1.02% 0.18%
0.01%
0.05%
2.01% 0.02%

7.68

14.05%

10.42%

- Permanent Crops
- Field Crops
- Olives
- Poultry Breeding
- Cattle Rasising
- Protected Agriculture
- Abandoned Agricultural Lands
- Vineyards.
- Agricultural Unit
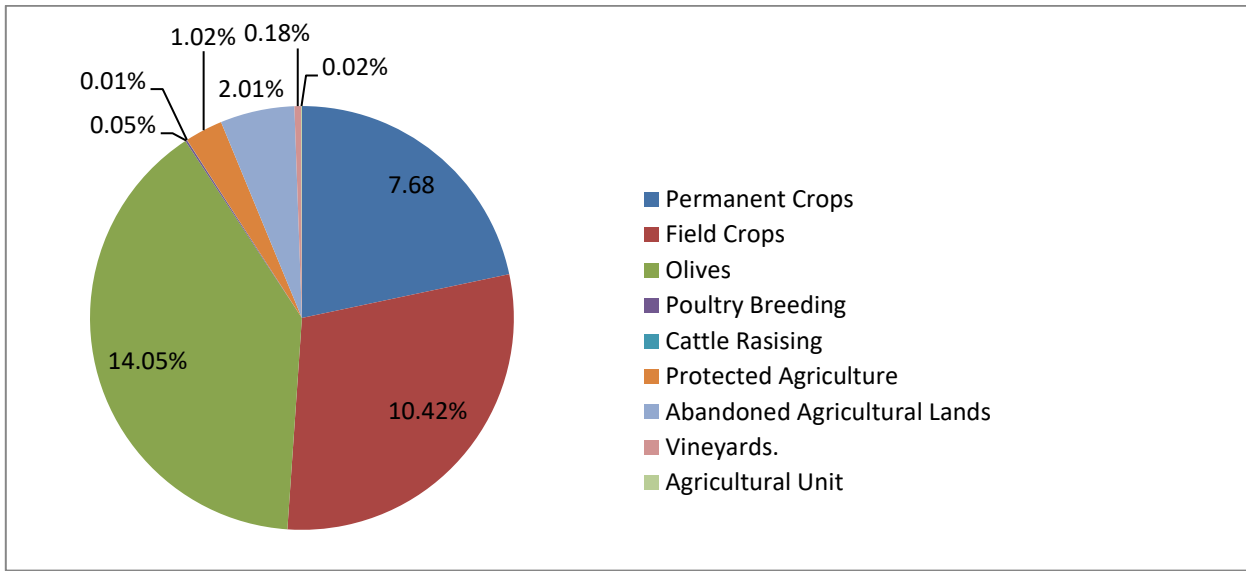
Chart 11 Agriculture cover (GIS, 2017)

The regression of agricultural cover area is documented in chart 11. The chart presents an overview of the general state of agriculture in North Lebanon. According to chart 11 agricultural cover has been receding for quite some time; notably permanent crops with a 11.11% decrease, field crops increased in 2010 by 3.1% then decreased by 38.2% in 2017 and vineyard decreased by 100% between 1994 and 2017. However, olives increased by 27.2%. Poultry breeding, cattle raising, protected agriculture and abandoned agricultural land have all increased by 100%.

Chart 12 Agriculture cover evolution (GIS, 1994, 2010, 2017)

Figure 8 visually represents the regression of agricultural land in North Lebanon over the past 23 years. Figure 8 illustrates the following:
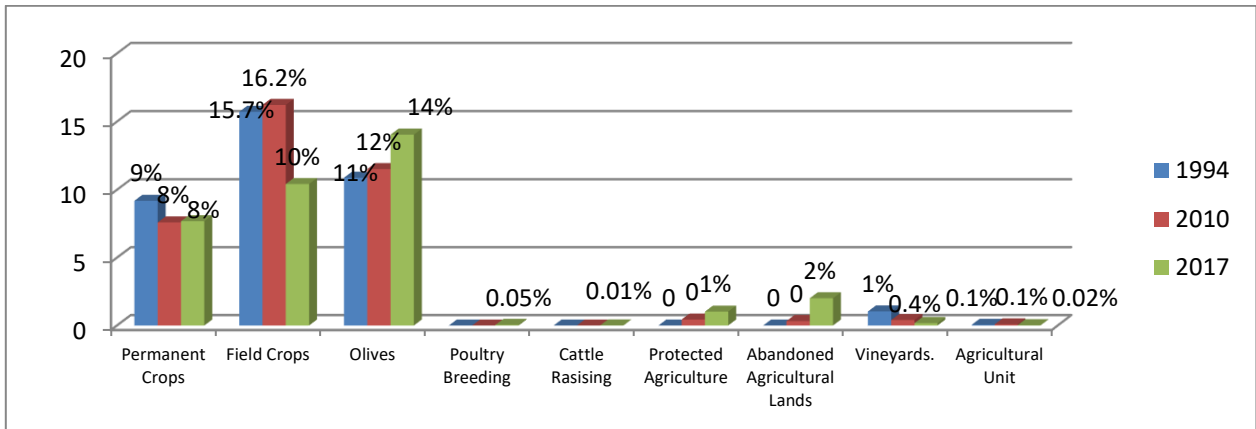
- A slight increase decrease in field crops between 1994 and 2010.

- A significant decrease in field crops areas. Between 2010 and 2017 field crops area declined. The area was mainly replaced by urban sprawl in 2010 and later by urban fabric in 2017 (refer to figure 7 and 8)., and by olive trees.

- A slight decrease in permanent crops between 1994 and 2010.

- A significant increase in abandoned agricultural land. In 2017 abandoned agricultural land appeared. The area used to be occupied by field crops in 1994. In 2010 the area held both field crops and urban sprawl. In 2017 it was replaced by urban fabric.

- A steady increase in olives. Olives have replaced some field and permanent crops.
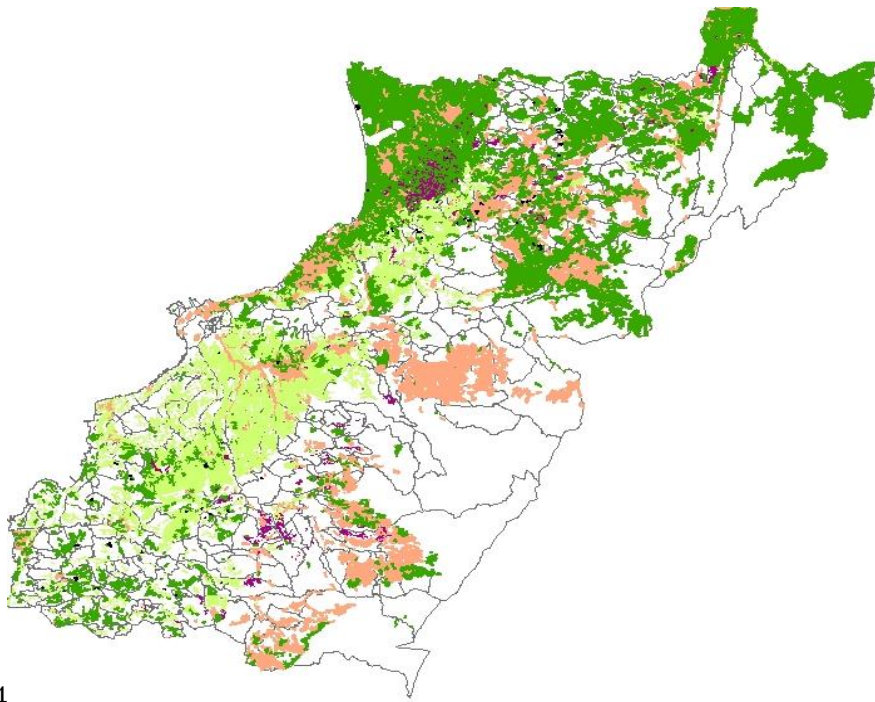
1994
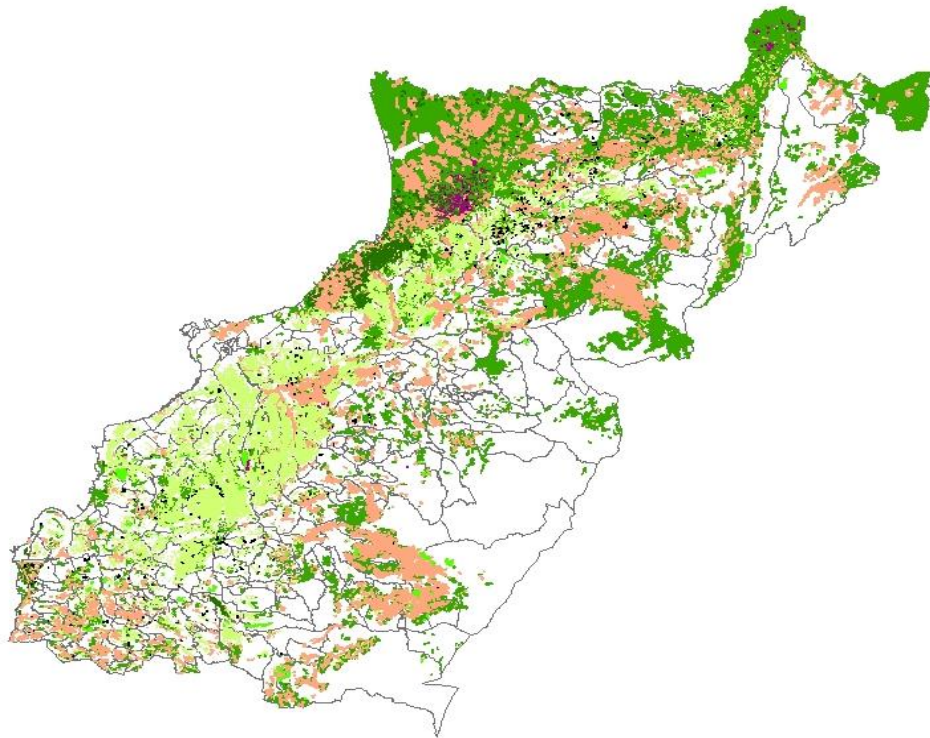
2010
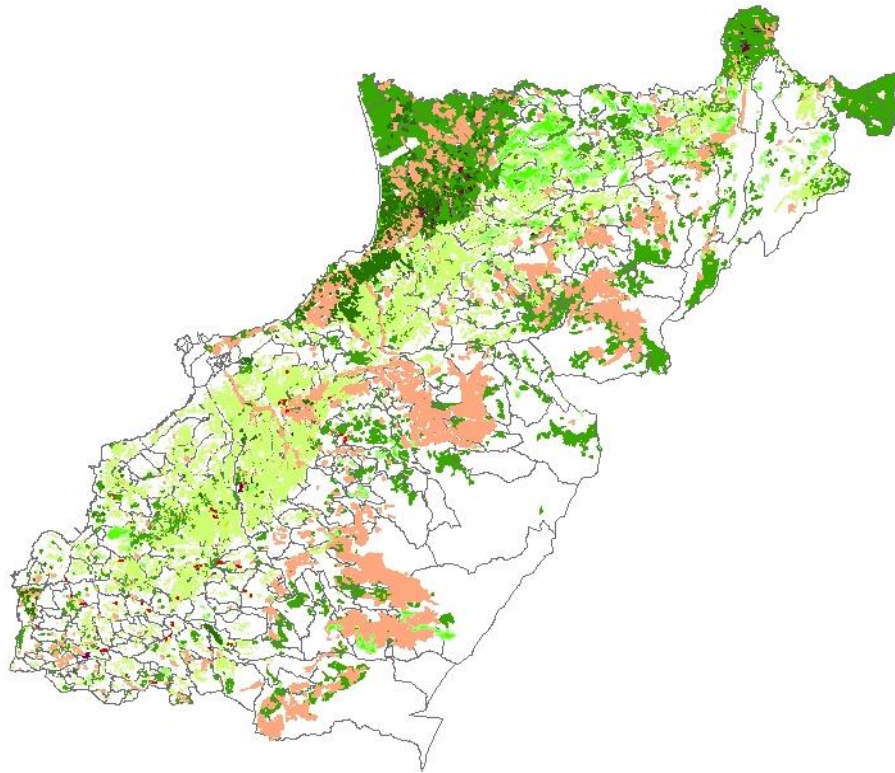
2017

Figure 8 Agriculture cover evolution (GIS 1994, 2010, 2017)

Legend

Vineyard	Poultry Breeding
Agricultural Unit	Olives
Abandoned Agricultural Lands	Permanent Crops
Protected Agriculture	Field Crops
Cattle Raising	North

Year	Permanent crop	Field crops	Olives	Poultry breeding	Cattle raising	Protected agricultural lands	Abandoned agricultural lands	Vineyards	Agricultural Unit
1994	9%	15.7%	11%	0%	0%	0%	0%	1%	0.01%
2010	8%	16%	12%	0%	0%	0%	0%	0.4%	0.01%
2017	8%	10%	14%	5%	0.01%	1%	2%	0%	0.02%
% Change(94-2010)	-11.1%	1.9%	9.09%					-60%	
% change(2010-2017)	0%	-37.5%	16.6%					-100%	100%

Table 8 Times series statistical summary

3. *Natural Elements Cover*

Natural elements cover occupies 1044km^2 of the North's total area. Out of the 1044km^2, forest cover has the largest share with 29%, outcrop is the second most abundant nature cover with 14.77% followed by shrub land with 8.93%. Bare soil, beaches and water cover have the least coverage with 0.06%, 0.05% and 0.22%.
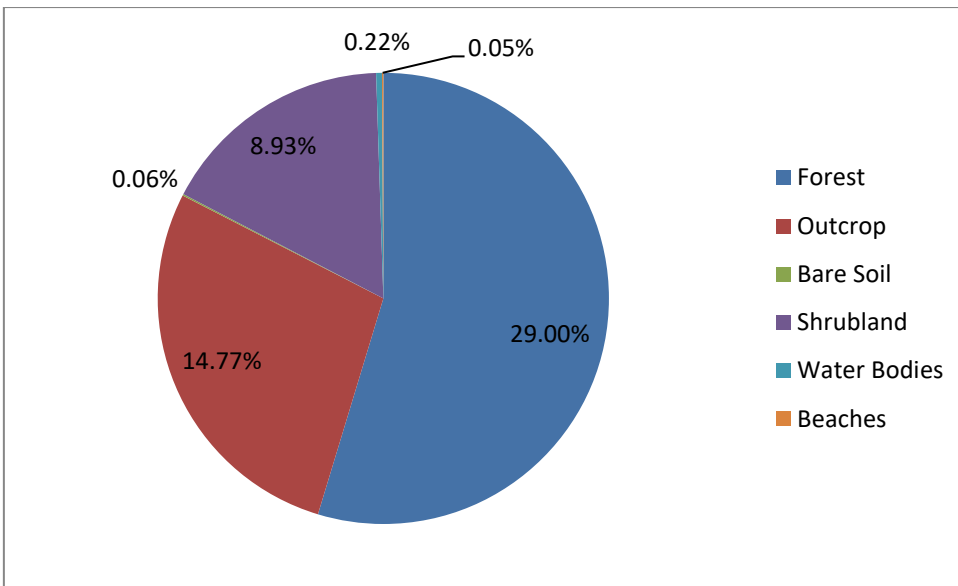
Chart 13 Natural element cover (GIS, 2017)

The statistical analysis of the natural element cover revealed that forest land cover has increased in the last 20 years by 20.8%. Outcrop has also experienced an increase by 400% from 1994 till 2017. Shrub land and bare soil have decreased by 70.96% and 100% respectively. The % of area covered by bare soil decreased 100%. And the area occupied by water bodies and beaches did not change over the past 20 years.
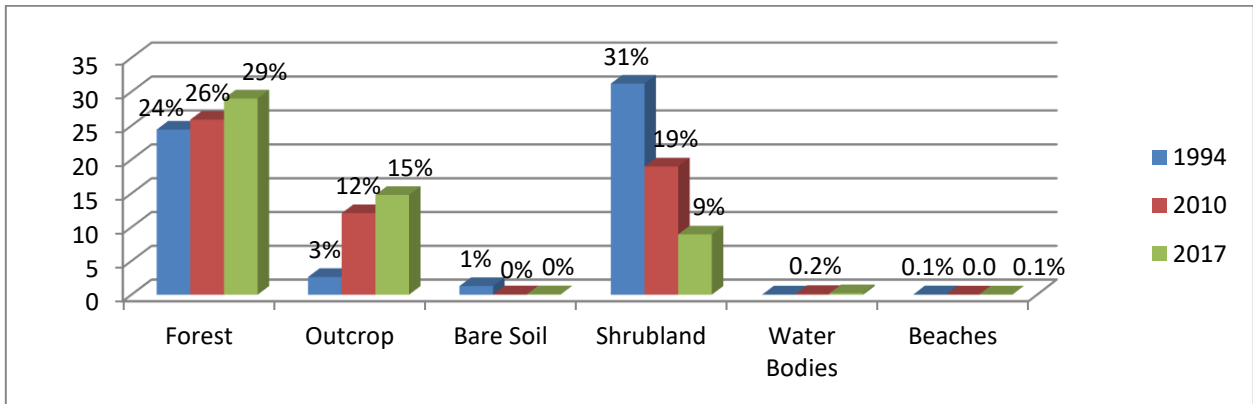
Chart 14 Natura element cover evolution (GIS, 1994, 2010, 2017)

Figure 9 visually represents the natural cover changes over the past 20 years. Figure 9 illustrates the following:

- A significant decrease in shrub land area. Between 1994 and 2017 area covered by shrub land have been replaced by forests and urban crop. Additionally when compared to figure 5 and 6 we see that the area has been cleared out for urban fabric (low and medium density).

- A slight increase in forested areas. Between 1994 and 2017 forested areas grew in size however they became more fragmented.

- A significant increase in outcrop. Between 1994 and 2010 outcrop has replaced a significant area of shrub land and some forested areas.

- Bare soil, water bodies and each did not exemplify any visual changes.
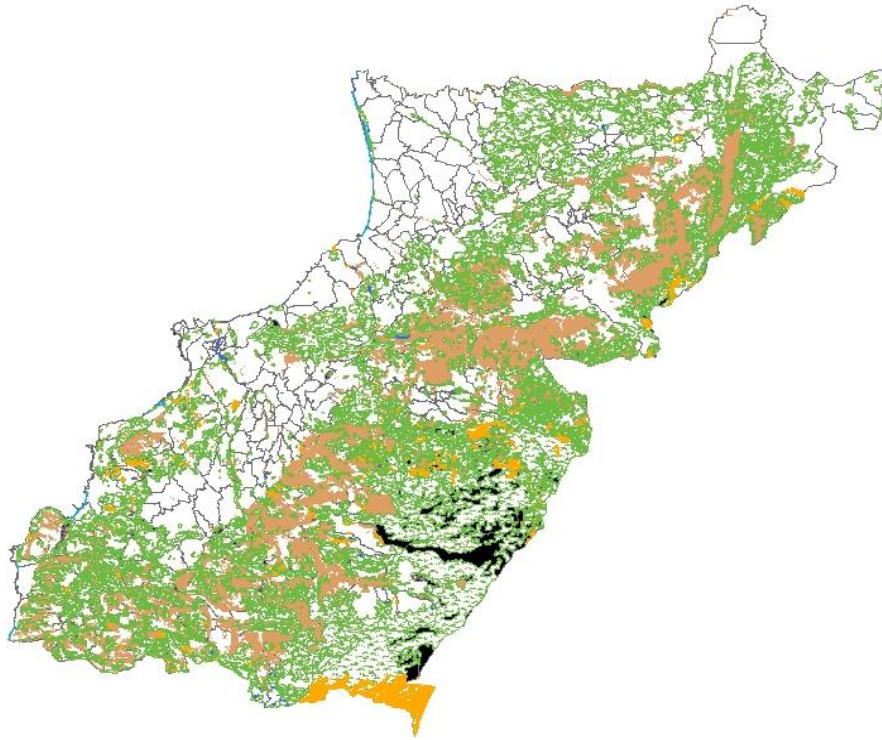
1994
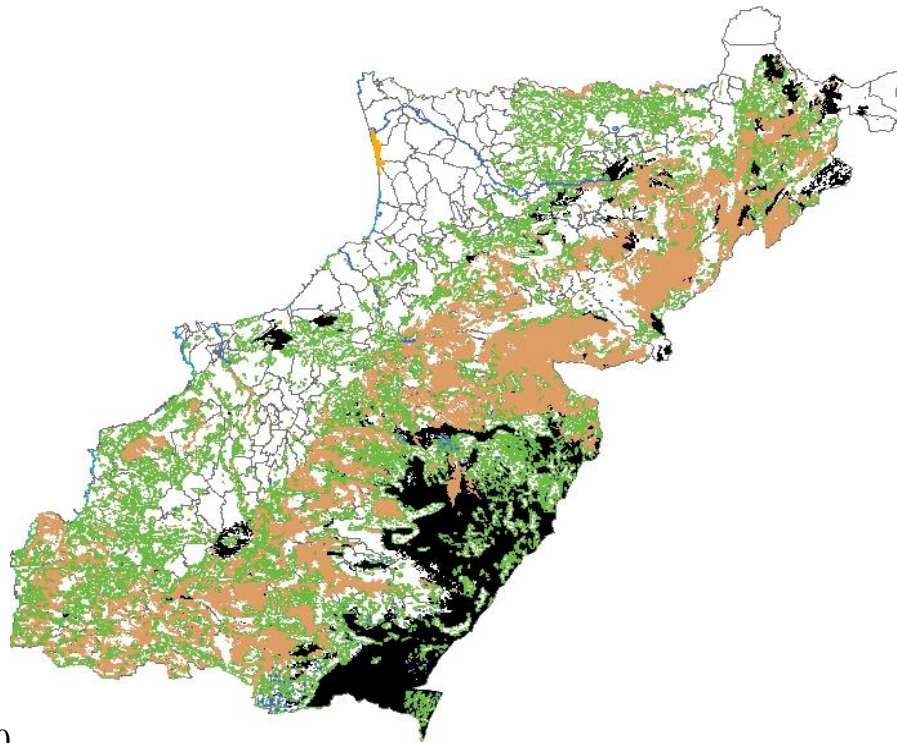
2010
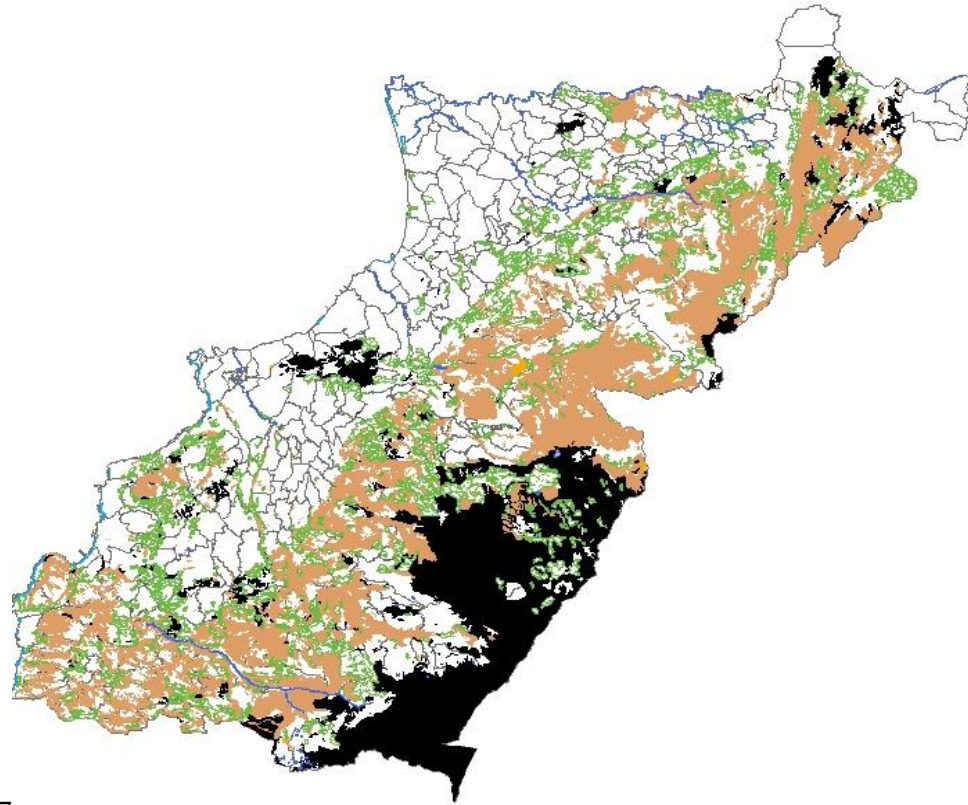
2017

Figure 9 Natural element cover evolution (GIS, 1994, 2010, 2017)

Legend

	Beaches
	Water Bodies
	Shrubland
	Bare Soil
	Outcrop
	Forests
	North

Year	Forests	Bare soil	Outcrop	Shrubland	Water Bodies	Beaches
1994	24%	1%	3%	31%	0.2%	0.1%
2010	26%	0%	12%	19%	0.2%	0.1%
2017	29%	0%	15%	9%	0.2%	0.1%
% Change(94-2010)	8.3%	0%	300%	-38.7%		
% change(2010-2017)	11.5%	0%	300%	-52.6%		

Table 9 Time series statistical summary

4. Discussion

a. Urban cover

The previously presented data reveals that urban cover has been eating away at the natural and agricultural cover for the past 20 years or so. Between 1994 and 2017 the urban cover replaced 10.2% of the agricultural cover and 5.3% of the natural cover. This disproportional increased of urban onto agricultural and natural land is due to the lack of proper laws that protected agricultural lands against urban exploitation.

The analysis of the urban cover in Northern Lebanon reveals the following characteristics: urbanization in North Lebanon adopts a ribbon sprawl pattern of development. It is characterized by low to medium density urban fabric. Dense urban fabric is mostly concentrated in the coastal strip, specifically in Tripoli. Additionally, urban sprawl is most dominant on permanent crops. The following profile reasserts the urbanization trends seen in Lebanon.

According to the State of the Environment Report urban planning in Lebanon is centered on the coastal areas, and it can be categorized into different patterns with ribbon sprawl being the most dominant in North Lebanon (MoE/UNDP/ECODIT, 2011)

Urbanization has been eating away at the rural cover (Faour, 2014). A testament to this statement is the results found in the study, urban sprawl on permanent crops being the most dominant. This was made possible due to the sanctity of the private land in Lebanon. The private ownership of land has long been the drive behind urbanization in Lebanon since owners have the right of construction (MoE/UNDP/ECODIT, 2011). In her analysis of the making of propertied landscape, Fawaz (2015) argues that land-use plans in Lebanon bear all

the marks of the property effect and, the development of land-use plans act to promote private ownership. Fawaz(2015) explains that property operates as a system of social relations embedded within specific geographic and social contexts. She clarifies that property rights (in land) distribute the powers and legitimacies needed to control this valuable resource (Fawaz, 2015).

Furthermore, the study revealed that urbanization in North Lebanon appeared to be moving at a slow rate between 1994 and 2010; urban cover area had increased by1.97 folds across 12 years. Faour (2014) attributed the slow rate of urbanization to political favouritism. Harb (2008) in a lecture on regional balanced development attributed this political favouritism to the North's pre-war reputation. She explains that the North falls victim to its reputation as the most developed region after the central area; thus aids, infrastructure and services were rerouted to the occupied south and Bekaa, even though the North suffered most from the war (Harb, 2010)

Between 2010 and 2017, urbanization in North Lebanon picked up the pace and grew 1.57 times in areas. MOE/UNDP/ECODIT (2011) attributed this urban growth to several factors including population dynamics and poor land practices.

North Lebanon has a high population density of 711 persons/km2, with almost 80% residing in urban areas. Population density is highest on the coastal strip with Tripoli holding the largest share of urban dwellers in North Lebanon with an estimated 14,428 persons/km2 (IDAL, 2018). The concentration of people has led to large urban development and construction plans to accommodate the growing number of people.

This urban expansion is the result of poor land management plans that help urban development grow at the expense of natural and agricultural resources (MOE,UNDP,ECODIT, 2011). Lebanon's lack of proper zoning laws has allowed uncontrolled urbanization to erode the rural and natural landscape. Additionally, the growth in immediate construction loans, remittance and deposits helped urban development to take place (GoL, 2018).

The growth of urban centres in rural areas facilitated the recent protests that erupted in Lebanon. On October 17th, following a series of economic and ecological events the Lebanese people. In the North, areas of contestations were found in rural areas. Figure 10 locates the regions that the protests took place in Northern Lebanon. The protest took place in dense urban areas.
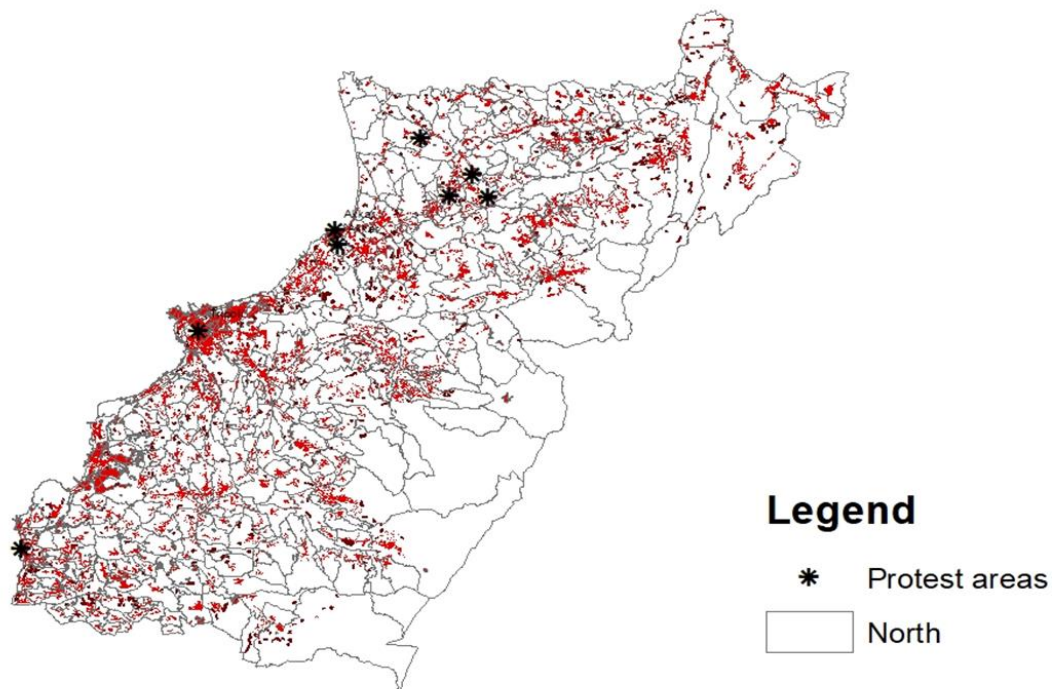
Figure 10 Protest site (GIS, 2019)

The assembly of the demonstration in these areas is the result of urban growth. With urbanization comes more connections, strong connections facilitate collective action. The cost of mobilization decreases when the urban density increases.

b. <u>Agricultural cover</u>

The study of the agricultural profile in Northern Lebanon revealed that the North has experienced a slight decline in agricultural areas. Over the years agricultural areas were replaced by: 1) urban cover (10.4%) and natural (15.4%). Many agricultural lands were transformed to shrubland (42.1%), outcrop (16.8%) and forested areas (41.1%)

This decline is the result of the gross mismanagement and dismissal of the sector. The limited access to proper technologies, the lack of proper governmental support (lack of financing, poor agricultural extension programs, and poor law implementation), the financial instability and low productivity has made the sector highly unattractive to the agrarian laborers. These unfavourable conditions led agricultures to abandon their lands in search of better opportunities (GoL, 2018). The 2017 agricultural data shows a large area of abandoned agricultural lands. When compared with the urban data map, it reveals that the agriculture fields that have been abandoned have been replaced by urban cover.

The analysis of the North's agricultural cover reveals that in 2010 there was a sudden increase in field crops. According to the IDAL (2014), Lebanon has been the main exporter of field crops to the GCC up to 2010 which can justify the rise in field crops area. The Syrian crisis led to the closure of the export road connecting Lebanon to the GCC countries. The Syrian crisis led to a rise in transportation cost making it harder to export the food to KSA, Qatar, Syria, and UAE. Furthermore, the Syrian crisis also flooded the country with cheap agricultural products and labour (GoL, 2018) making it increasingly difficult to sustain an agrarian lifestyle for Lebanese laborers.

North Lebanon's agriculture witnessed an increase in olive trees. According to the Government of Lebanon (2018) olives have been replacing wheat crops as the top crop for the last 45 years. North Lebanon holds 62% of the country's olive cover and 51 % of the country's olive mills (IDAL, 2018).

c. Natural Element Cover

The study of natural cover in Northern Lebanon reveals that the region has experienced a slight decrease in natural cover. 5.3% of the natural cover has been urbanized and 1.9% was utilised for agricultural purposes. However, even though the natural cover has decreased Forested areas have increased.

According to the state report of Lebanon's forest 2018, there has been an increase in forest areas across Lebanon between 1990 and 2015: 130 ha to 137.3 ha (AFDC/MoE/UNDP/IUCN/LRI, 2019). This increase in forested areas can be attributed to the sustainable forest management and reforestation initiatives adopted by the ministry as part of its plan for the Rio Convention. The plan also included the creation of protected areas to help safeguard forestry. Nature reserve occupy 2.7% of the country's territories. The strategies adopted by the ministry were successful in safeguarding and increasing the forested areas. However, there has been some fragmentation of the areas which breaks the continuity of the ecosystem.

The increase in outcrop is mainly located in south east region of the North, in the Chekka area. Chekka is known for the cement factory and the associated quarrying activities. According to the state of the forest report 2018, quarrying activities have been a main culprit in landscape deterioration (ADFC/MoE/UNDP/IUCN/LRI, 2019).

The decrease in shrubland and bare soil is attributed to unchecked urbanization. Urban expansion has been responsible for the deterioration, fragmentation and permanent alteration of the natural cover in Lebanon (MoE/UNDP/ECODIT, 2011).

B. Rural Urban Continuum

The RUC's is studied by: 1) defining the RUC, 2) studying the evolution of the RUC, and 3) typifying its elements. The results are presented as follows:

1. *Defining North Lebanon's RUC*

In 2017 North Lebanon held many urban cores mainly found near the coastal strip of the North. Moving inwards away from the coast, the degree urbanization gradually decreased into the rural areas which are mainly found in the far east

Located between the two ends of the continuum is the intermediate zone which holds several elements including: peri-urban areas, local urban centres, rural areas close to urban areas. The following elements hold characteristic of both ends on the continuum.
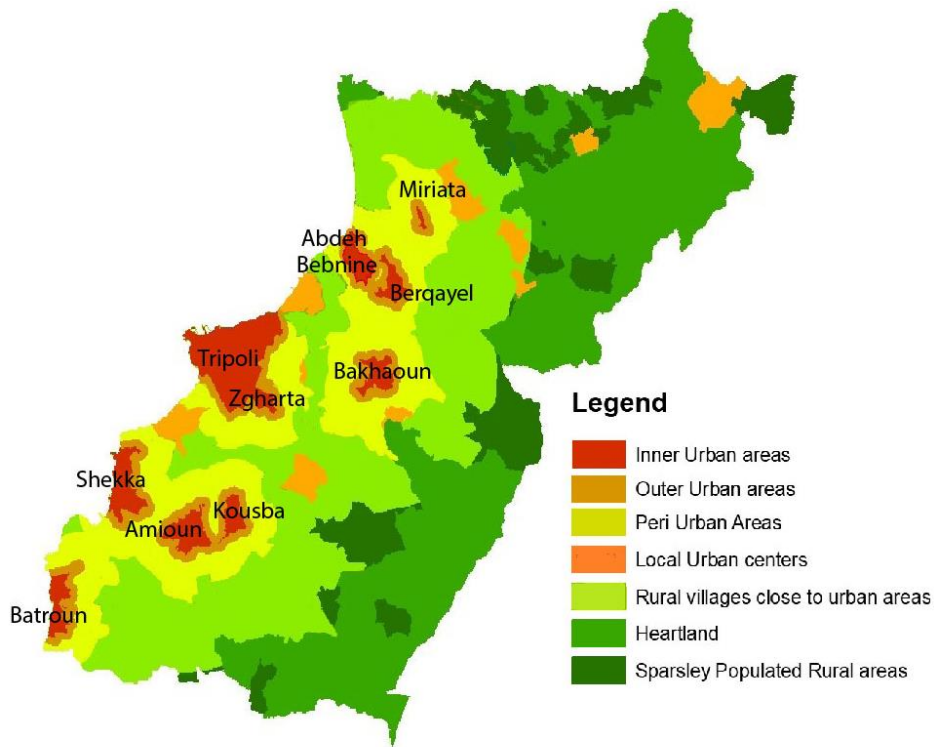
Figure 11 RUC North Lebanon

2. *RUC Evolution*

The historical examination of North Lebanon's RUC shows that in 1994 the gradient favored the rural end of the continuum, with rural areas occupying the largest share in the North. The urban core includes only Tripoli and the intermediate zone is centered in Tripoli.

In 2010 there was a growth in the intermediate zone due to the expansion of Tripoli's urban core to include Zgharta and the formation of a new urban core 13.74 km away. The intermediate zones surrounding the two urban cores are connected and form one large intermediate zone.

In 2017 the gradient favored the urban end of the continuum, with urban areas occupying the largest share of the North. Areas which used to be part of the intermediate zone are now part of the urban area which includes 10 urban cores. Rural areas have diminished, occupying only a small strip towards the East

1994
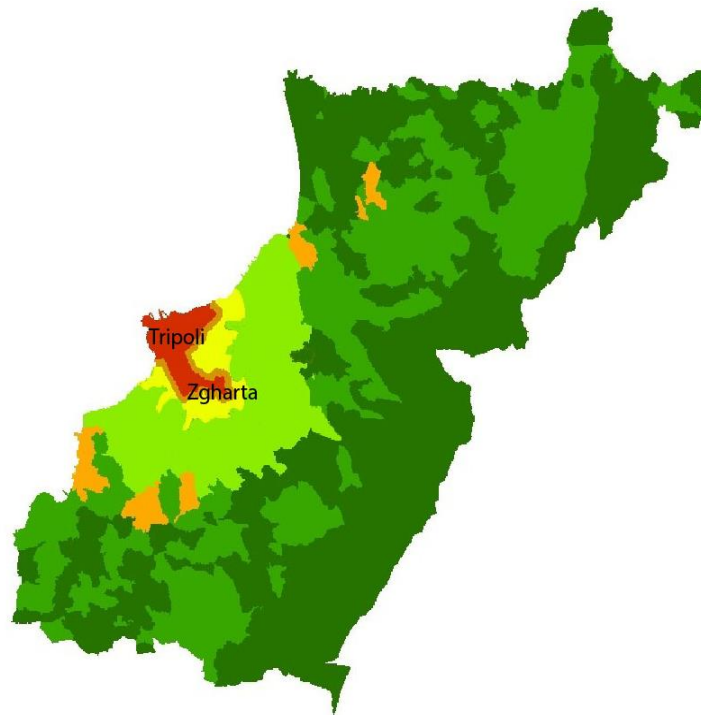
2010
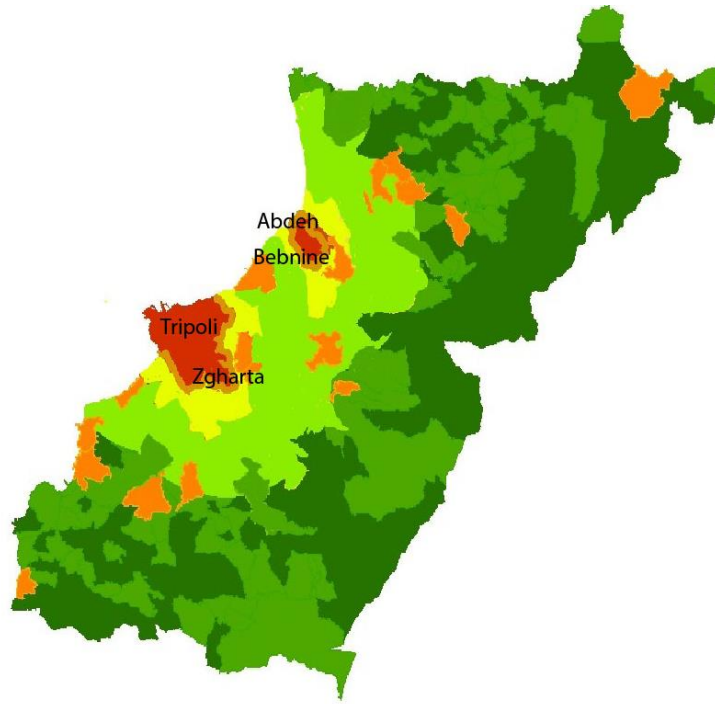
2017
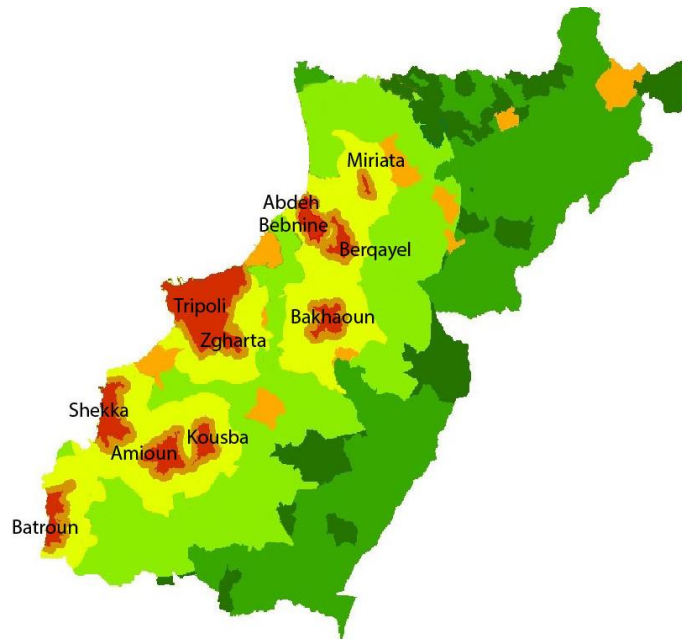
Figure 12 RUC evolution (GIS, 1994, 2010, 2017)

3. *Typology of Regional Classes*

The following section examines the intermediate zone surrounding the city of Tripoli as the urban core. 14 villages from the intermediate zone are selected and tested against a set of dimensions and factors in order to typify the villages. Based on the characterization of these villages four clusters are determined, which can be summarized as follows:

Cluster one: consists of five villages. A land cover primarily dominated by urban and agricultural land cover, and high population density characterizes this cluster. Another important characteristic is the level of connectivity with the urban core. The cluster is served by a high number of public transports, including vans and taxis, which are available, every 30 mins. The land prices in this cluster are low ranging between $20 to $60.

Cluster two consists of two villages. The cluster's characteristics are similar to that of cluster one. However, cluster two differs in land prices. The land prices of cluster two elevated and can reach up to $180. Another important characteristic is that the residents of the cluster are seasonal farmers

Cluster three consists of three villages. A land cover primarily dominated by urban and natural elements and a relatively high population characterizes the cluster. The cluster is serviced by public transport. The land prices of the area are significantly high reaching $550. Additionally, the cluster does not appear to have a thriving agricultural sector since the percentage of famers both seasonal and permanent is low.

Cluster four consists of four villages. Cluster four is similar to cluster three but differs in land prices and involvement in the agricultural sector. Land prices in this cluster are

relatively low and range between $45 and $90. The cluster shows a higher percentage of

seasonal and permanent farmers than cluster three

Cluster	villages	Characteristics
Cluster one	Kafar Hata, Nabi Youcha, Alama, Arde, Majdeliya	Large agriculture area (~56.2%) ~768.6 people/km^2 Large urban area (26.1%) High connectivity (~46 taxis) ~60$/m^2
Cluster two	Al Menieh , Meryata,	Large agriculture area(~51.5%) ~1553 people/km^2 Large urban area (~32.6 %) High connectivity with Tripoli (~48 taxis) ~180$/m^2
Cluster three	Ras Maska, Deddeh, Qalamoun, Batroumine , Nakhle	Large natural area (~ 37.49%) ~1135.8 people/ km^2 Large urban area (29.11%) Connected to Tripoli (30 Taxis) ~283$/m^2
Cluster four	Barsa, Meziara,	Large natural area (~57.9%) ~965 people/km^2 Connected to Tripoli (30 Taxis) Large Urban area 67.5$/m^2

Table 10 Cluster characteristics

Dimension	Indicator	Al Mennieh	Nabi Yousheaa	Miryata	Alma	Arde
Mobility	Distance to Urban Core (km)	12km	11km	14km	11km	11 km
	Frequency of public transport (min)	15mn	15mn	30mn	30mn	30 mn
	Supply of public Transport	50 vans	50 vans	51 taxi	51 taxi	51 taxi
Population Dynamics	Changes in population between1998 and 2017 (%)	68.13%	56.3%	56.3%	56.2%	56.2%
	Population Density	3094.5/km2	870.7/km2	2905.3/km2	443.6/km2	598.95/km2
	% of new born	2.2%	2.2%	0.3%	0.3%	0.3%
Natural Elements	% of area occupied by green elements	0%	5.01%	2.7%	17.5%	7.01%
	% of area occupied by outcrop	0%	22%	0%	9.7%	2.8%
	% of area occupied by beaches	0.6%	0%	0%	0%	0%
	Presence of water	No	No	No	No	No
Land cover	% of area occupied by forests	0%	0%	0%	0%	0%
	% of agricultural land	53.2%	35.6.%	39,1%	54.7%	60.1%
	% of abandoned agricultural land	0%	0%	0%	0%	0%
	% of cattle or poultry breeding	0%	0%	0%	0.15%	0%
	% of area occupied by shrubs	0%	5%	2.7%	17.5%	7.01%
	% of area occupied by urban cover	44.60%	19.6%	51.8%	60.8%	17.7%
Economic activities	% of permanent farmers	1.6%	0.52%	2.01%	0.14%	3.21%
	% of seasonal farmers	5.25%	1.82%	10.63%	18.7%	22.69%
	Land Price ($/m2))	180$/m2	60$/m2	100$/m2	55$/m2	20$/m2
Spatial Function	Wastewater services	NO	NO	NO	NO	NO
	Solid waste services	Yes	Yes	Yes	Yes	Yes
	Presence of schools	Yes	Yes	Yes	Yes	Yes

Table 11 Typification of selected villages

Dimension	Indicator	Kafar hatta	Batroumine	Mejdalya	Meziara	Ras Maska
Mobility	Distance to Urban Core (km)	26km	12km	8.4km	21km	4.1km
	Frequency of public transport (min)	30mn – 1h	30mn – 1h	30mn	30mn	30mn – 1h
	Supply of public Transport	30 taxis	30 taxis	51 taxis	51 taxis	30 taxis
Population Dynamics	Changes in population between1998 and 2017 (%)	56.3%	56.2%	56.3%	59.58%	55.27%
	Population density	126.7/km2	504.1/km2	580.5/km2	923.89/km2	459.13/km2
	% of new born	1.69%	1.69%	0.3%	0.3%	1.69%
Natural Elements	% of area occupied by green elements	0%	19.1%	10.8%	68.45%	25.5%
	% of area covered by outcrop	0%	0.5%	11.2%	6.2%	0.43%
	% of area occupied by beaches	0%	0%	0%	0%	0.43%
	Presence of water	No	No	Yes	No	No
Land cover	% of area occupied by forests	0%	6.7%	0.09%	60.1%	6.6%
	% of agricultural land	72.1%	65.2%	41.4%	5.6%	33.33%
	% of abandoned agricultural lands	2.4%	0%	0%	0.%	0%
	% of cattle and poultry breeding	0%	0%	0.09%	0%	0%
	% of area occupied by shrubs	0%	12.6%	10.7%	8.3%	20.7%
	% of area occupied by urban cover	21.1%	10.5%	32.1%	16.7%	36.47%
Economic activities	% of permanent farmers	0.23%	0.05%	1.3%	0.3%	0.99%
	% of seasonal farmers	0.83%	5.99%	5.6%	0.54%	5%
	Land Price ($/Km2)	50$/m2	110$/m2	60$/km2	45$/m2	550$/m2
Spatial Function	Wastewater services	No	No	No	NO	NO
	Solid waste services	Yes	Yes	Yes	Yes	Yes
	Presence of schools	Yes	Yes	Yes	Yes	Yes

Table 12 Typification of selected villages

Dimension	Indicator	Deddeh	Barsa	Nakhle	Qalamoun
Mobility	Distance to Urban Core (km)	8.1km	5.5km	9.5km	8.5km
	Frequency of public transport (min)	30mn – 1h	30mn – 1h	30mn – 1h	
	Supply of public Transport	30 Taxis	30 Taxis	30 Taxis	
Population Dynamics	Changes in population between1998 and 2017 (%)	57.87%	56.27%	52.75%	86.25%
	Population density	886.9/km2	1005.26/km2	400/km2	1662.73/km2
	% of people born in the area	1.69%	1.69%	1.69%	9.19%
Natural Elements	% of area occupied by green elements	36.9%	37.7%	19.3%	22.7%
	% of area occupied by Outcrop	10.98%	0%	18.47%	0.47%
	% of area occupied by beaches	0%	0%	0%	0.6%
	Presence of water	No	No	No	No
Land cover	% of area occupied by forests	19.1%	14.7%	6.7%	2.8%
	% of agricultural land	33.9%	30.58%	38.47%	28.57%
	% of abandoned agricultural lands	0%	0%	0%	05
	% of cattle or poultry breeding	0%	0%	0%	0%
	% of area occupied by shrubs	16.47%	23.23%	12.6%	30.9%
	% of area occupied by urban cover	17.61%	29.7%	22.03%	33.3%
Economic activities	% of permanent farmers	1.7%	0.4%	2.5%	0.86%
	% of seasonal farmers	4.7%	6.1%	10.14%	7.1%
	Land Price ($/Km2)	201$/m2	90$/m2	185$/m2	100$/m2
Spatial Function	Wastewater services	No	NO	NO	NO
	Solid waste services	Yes	Yes	Yes	Yes
	Presence of schools	Yes	Yes	Yes	Yes

Table 13 Typification of selected villages

4. Discussion

According to the analysis of the RUC's evolution, the North is becoming more and more urbanized. The different urban cores found in the North are expanding and fusing together to form one mega metropolitan area, threatening biodiversity, arable land and creating infrastructure and traffic issues. UN Habitat (2011) attributes this to the lack of guiding strategies and plans. This urban extension is coupled with the expansion of urban lifestyle which infiltrates and insinuates itself in the heart of the rural villages and boroughs of Lebanon (Verdeil et. al, 2008). Lebanon's landscape is changing, and this new form of urban development requires further interpretation. This study aims at understanding these changes. It offers a new approach to deal with the complexity of the Lebanese landscape. This approach has two advantages, one of which is the integration of the spatial classification and typologies of villages, providing a new perspective to address management planning and policy design in Lebanon.

The second advantage is its integration of different dimensions including the economic, identity and lifestyle. This provides more insight into the studied towns and villages in order to better help in advancing these towns and villages.

The characterization of the RUC reveals that there are four different forms of urban models. The analysis of their dimensions and indicators indicates that there are two models in the RUC surrounding Tripoli: 1) ruralopolis and 2) rurban.

Qadeer (2004) defines a ruralopolis as a high-density area with an agrarian economy. This definition fits both cluster one and two. However, cluster 1 and two show some sligt differences:

- Cluster 1has a better economic status then that of cluster 2.
- Cluster 1 has a larger urban area than cluster 2

- Cluster 1 has a higher population density then cluster 2.Hi

The large urban area in cluster one is the result of popultion and economic growth that cluster 2 has not yet experienced.

Cluster 3 and 4 follow a rurban model. Rurban is the result of rurbanization or counter-urbanization when urban dwellers move out of the city and relocate to nearby rural areas. Similarly to cluster 1 and 2, cluster 3 and 4 differ in economic status. Land property is higher in clusters 1 and 3. Cluster 4 is the result of gentrification, where the urban poor have been pushed out of the urban center and forced to relocate to the outskirts of the cities. Cluster 3 is the result of the urban rich relocating to the outskirts to escape the overcrowded city.

In addition to the economic difference, cluster three and four differ in the following:

- Cluster 3 has a larger urban area

- Cluster 3 has higher population density

- Cluster 4 has a larger natural area.

In recent years cluster three have been gaining attention from urban dwellers. Educational institute, health care services, etc have been relocating towards that cluster and attracting new comers. This lead to an increase in population and thus in urban area at the expense of natural cover.

The choice of four different structure is to draw attention to the different typological forms that exist even within spatial model. It emphasis the different interaction between the rural and urban consequently, develop policies that are adapted to the different typologies. The different typologies will elicit different policies for development. There are no blanket polices that apply to Agropolitan areas.

Unlike most studies on spatial policies, the methodology has introduced in this research integrated social and economic aspects to properly understand the physical changes, their drivers and how to best steer them. The research reveals the different forms that exist in the RUC and the processes that have led to their formation. Some of the other attempts to implement the Agropolitan approach were not successful. An example of such failure is the ECER Besut which failed to properly integrate the social aspect, thus failing at capacity building of local population (Buang et.al, 2011). However, there have been success stories in Kenya and Pulau Banggi where the governments successfully implemented the Agropolitan approach through the creation of spatial models that takes into consideration different variables such as population, environmental, economic characteristics (Fatkhiati et.al, 2015; Gaile, 1992).

There have been some attempts in the Arab region to adopt this new approach to development; such as Egypt's the relocation projects of urban slums to new towns, Tunisia's project on the creation of technopoles and Syria's sub-center formation creation. These projects, however, only focused on the physical and population aspects; they did not look at the variables that play a role in haphazard urbanization (UN-Habitat, 2016).

5. *Evolution of Villages*

The following section examines the LULC evolution of the selected villages. It sheds light on the LULC dynamics in each village. The results are presented as follows:

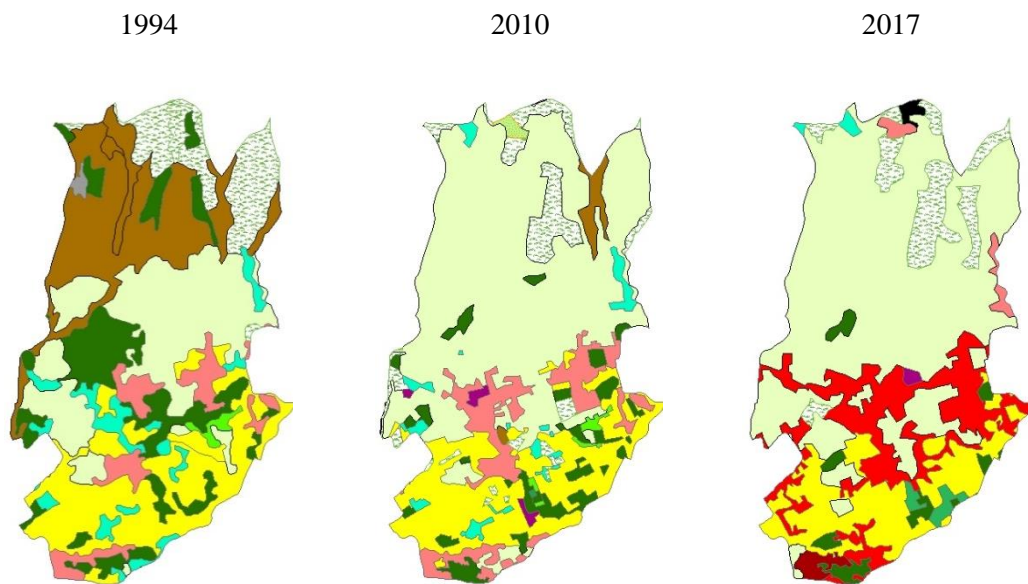a. Cluster 1

1994   2010   2017
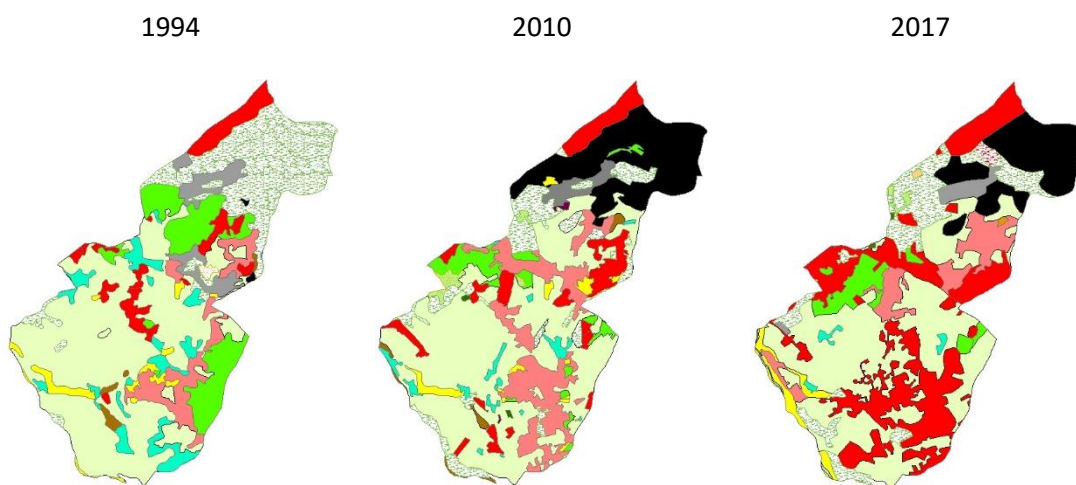
Figure 13 Arde evolution

1994   2010   2017

Figure 14 Mejdalaya evolution

1994   2010   2017
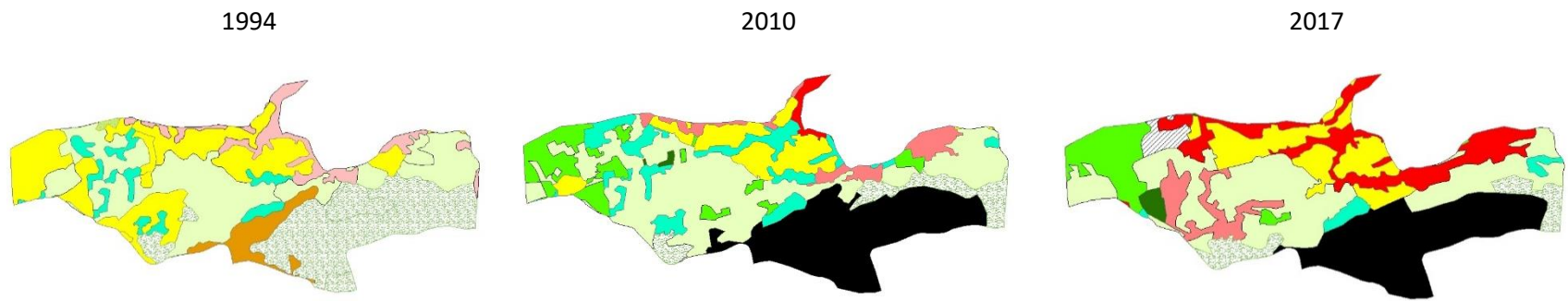
Figure 15 Nabi Youcheaa
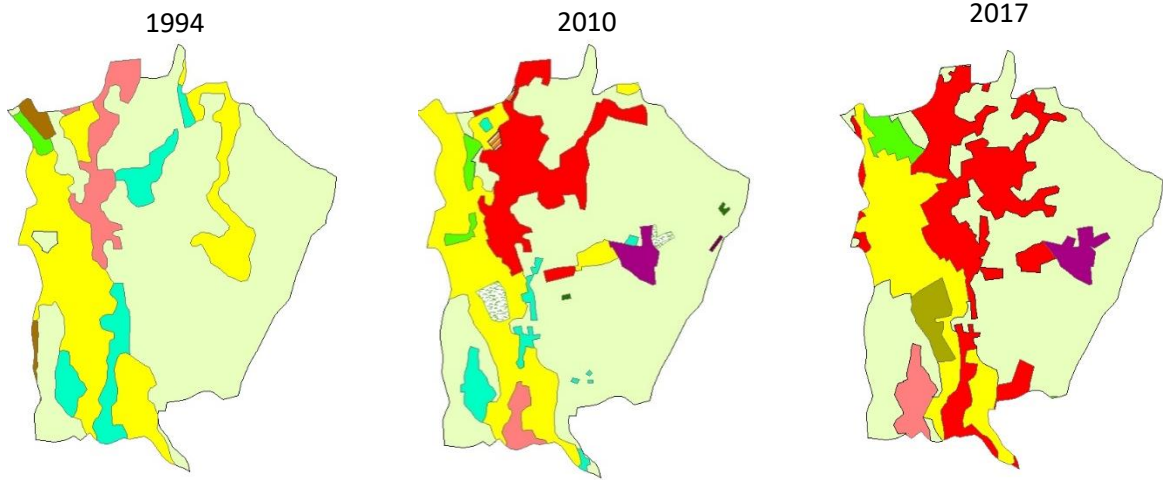
Figure 16 Kfar Hatta evolution
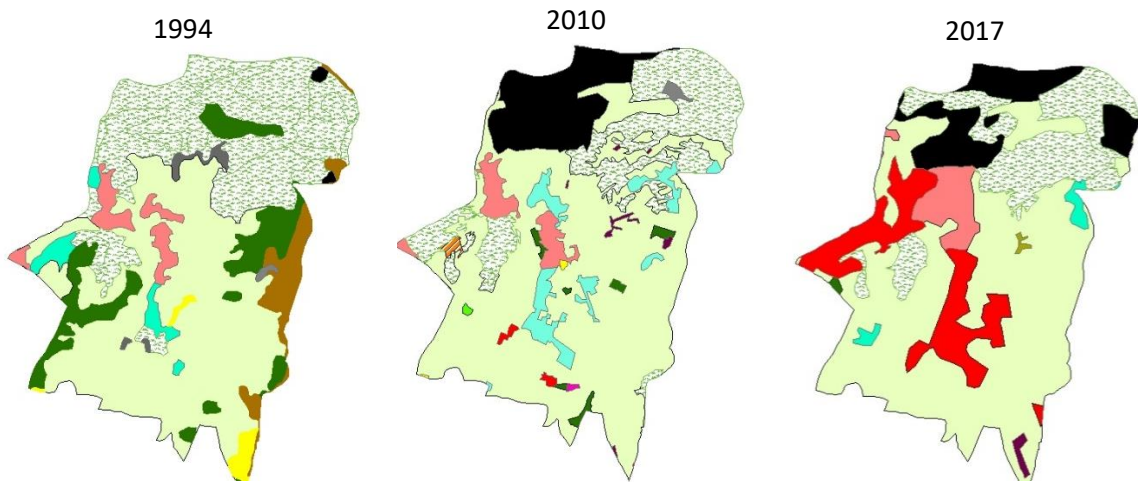
Figure 17 Aalma evolution

Land cover	Villages									
	Kfar Hatta		Nabi Youcheaa		Aalma		Arde		Majdalaya	
	1994	2017	1994	2017	1994	2017	1994	2017	1994	2017
Forest	1.1%		4.73%	0%	4.27%	0%	19.79%	0%	0.68%	0.09%
Shrubland			26.01%	5.01%	33.1%	17.5%	9.7	7.6%	19.38%	10.7%
Outcrop			0%	22.2%	0.3%	9.7%	0%	0.34%	0.14%	11.64%
Permanent crops	25%	16.3%	15.04%	12.5%	1.26%	0.003%	19.6%	14.06%	2.3%	1.8%
Field crops	0.67%	1.9%	8.6%	7.9%	9.62%	0.14%	14.4%	2.8%	10.62%	3.8%
Olives	60.5%	51.9%	30.3%	29.9%	44.1%	54.1%	23.61%	55.5%	43.05%	
Protected agriculture			1.11%	0.83%			0%	0.98%		0.09%
Abandoned agriculture land	0%	2.4%								
Vineyrad							0%	0.17%		
Cattle raising									0.09%	
Poultry breeding						0.15%				
Low density urban fabric	5.2%	2.7%	6.4%	5.2%	3.32%	4.25%	6.07%	1.04%	6.5%	6.5%
Medium density urban fabric	0%	16.8%	0%	11.11%	0%	11.9%	0%	15.2%	0.65%	19.29%
Dense urban fabric							0%	0.86%		
Urban sprawl on field crops			0.3%	1.67%			0.52%	0%		0.27%
Urban sprawl of permanent crops	6.73%	0.96%	5.2%	1.67%	2.05%	0.94%	4.6%	0.34%	5.6%	0.55%
Urban sprawl of shrubland									0.18%	0.55%
Urban sprawl on forests										

Table 14 land cover evolution of cluster 1

According to figures 13 to 17, the villages of cluster 1 have experienced an increase in their agricultural and urban cover. Olives and field crops replaced areas that used to be covered by forests. In some instances, olives replaced field and protected agriculture. According to GoL (2018), olives have been replacing crops as high value crops for the last 45 years. Some villages adopted new agricultural habits (cattle raising and poultry breeding).

Additionally, medium density urban fabric replaced urban sprawl and low density urban fabric areas.

Table 13 provides some statistical insight to these dynamics. According to table 13 forests and shrubland have been declining in cluster 1 villages.. Between 1994 and 2017 the urban cover intensified from low density fabric and sprawl to medium density urban fabric.

b. <u>Cluster 2</u>
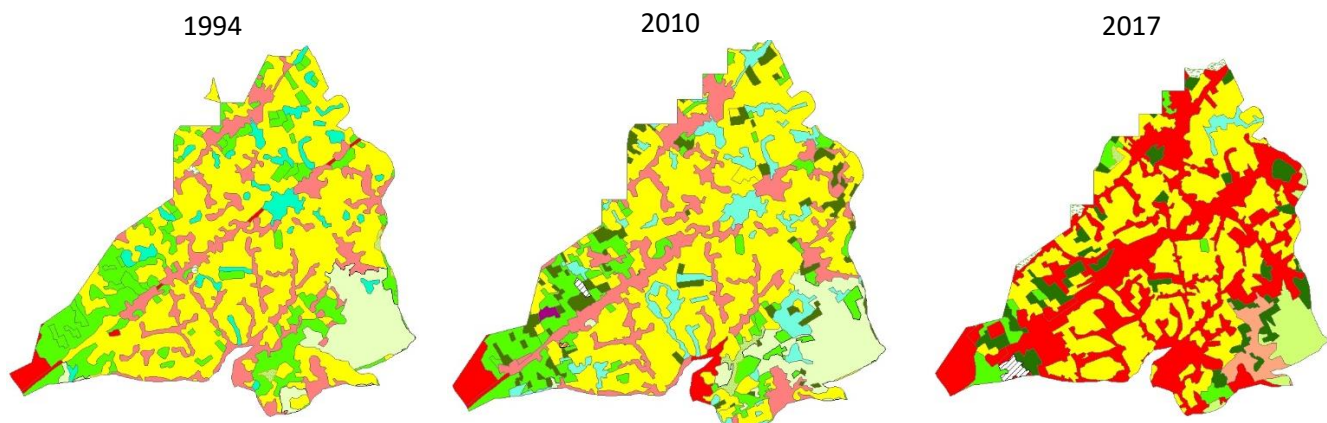
Figure 18 Menieh evolution
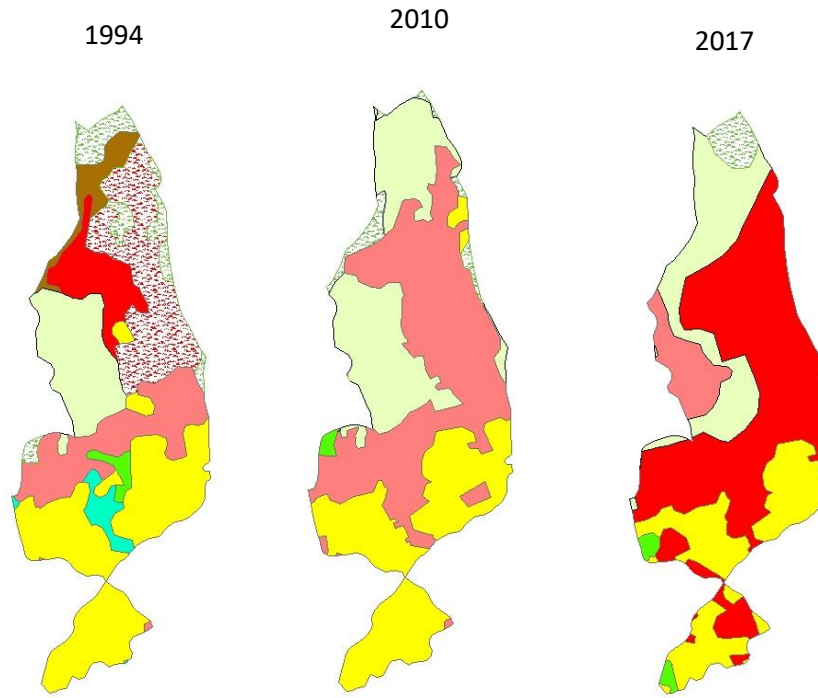
Figure 19 Miriata evolution

Land cover	Villages			
	Menieh		Meriata	
	1994	2017	1994	2017
Forest	0.02%		3.53%	
Shrubland	0.11%	0.67%	5.3%	2.6%
Outcrop				
Permanent crops	51.34%	38.03%	27.43%	19.46%
Field crops	17%	2.9%	0.88%	1.15%
Olives	8.3%	4.36%	13.27%	18.58%
Protected agriculture	0%	7.79%		
Abandoned agriculture land				
Vineyrad				
Cattle raising				
Poultry breeding				
Low density urban fabric	15.65%	2.7%	14.15%	6.1%
Medium density urban fabric	0%	36.91%	0%	50.44%
Dense urban fabric				
Urban sprawl on field crops	0.27%	0.63%		
Urban sprawl of permanent crops	5.1%	0.77%	1.76%	
Urban sprawl of shrubland			2.6%	
Urban sprawl on forests				

Table 15 Land cover evolution of cluster 2

According to figures 18 and 19, Menieh and Miriata have been agricultural areas since 1994. Both Menieh and Miriata do no show any elements of natural covers in the past 23 years.

In 1994, Mennieh's land cover consisted of permanent crops, low-density urban fabric. field crops and olives. In 2017, Mennieh's land cover consisted of permanent crops, medium density urban cover and protected areas.

In 1994, Miriata's land cover consisted of low-density urban fabric, urban sprawl on shrublands, olives and permanent crops. In 2017,Miriata's land cover consisted of medium density urban fabric, olives, field crops and permanent crops.

Both villages experienced an increased and densification of urban fabric from low density to medium density. Moreover, both villages experienced an increase in permanent crops and a decrease in olives.

According to table 14.gives the statistical changes of lulc in cluster 2 villages.

c.   Cluster 3

1994   2010   2017
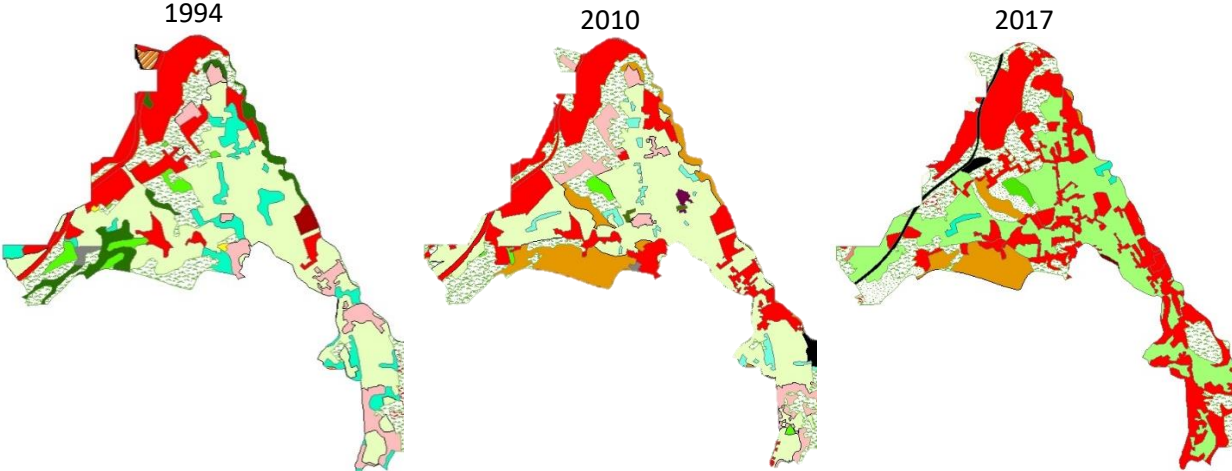
Figure 20 Ras Maska evolution

100

1994   2010   2017
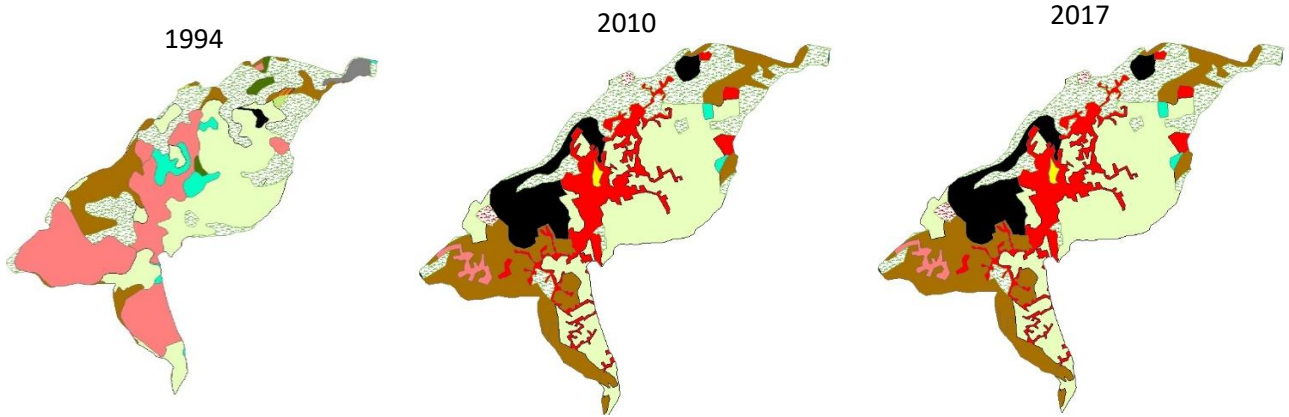
Figure 21 Dedde evolution

1994   2010   2017
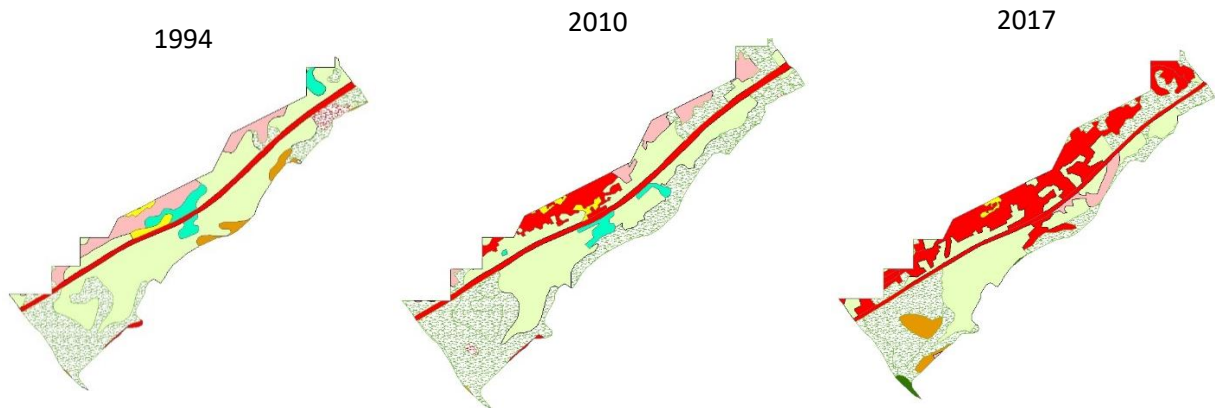
Figure 22 Qalamoun evolution

1994   2010   2017
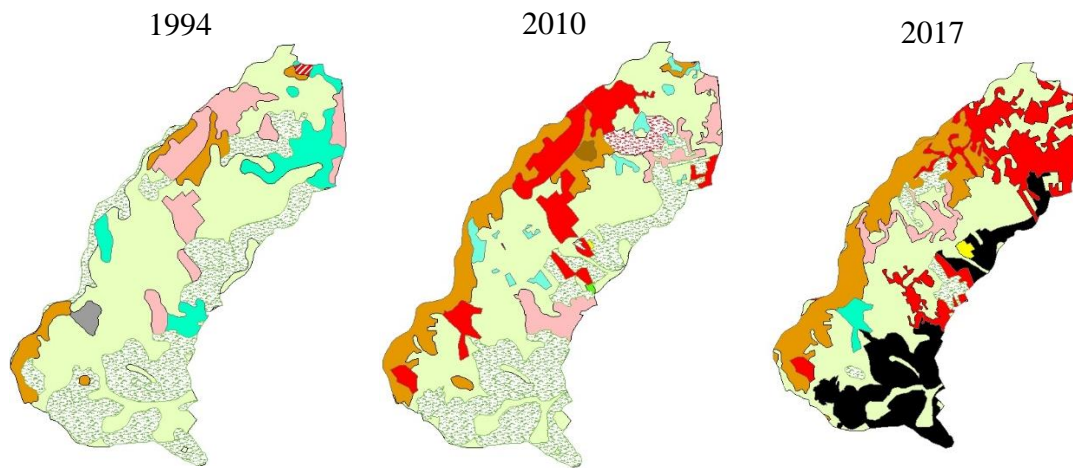
Figure 23 Nakhle evolution

1994　　　　　　　　　　　2010　　　　　　　　　　2017
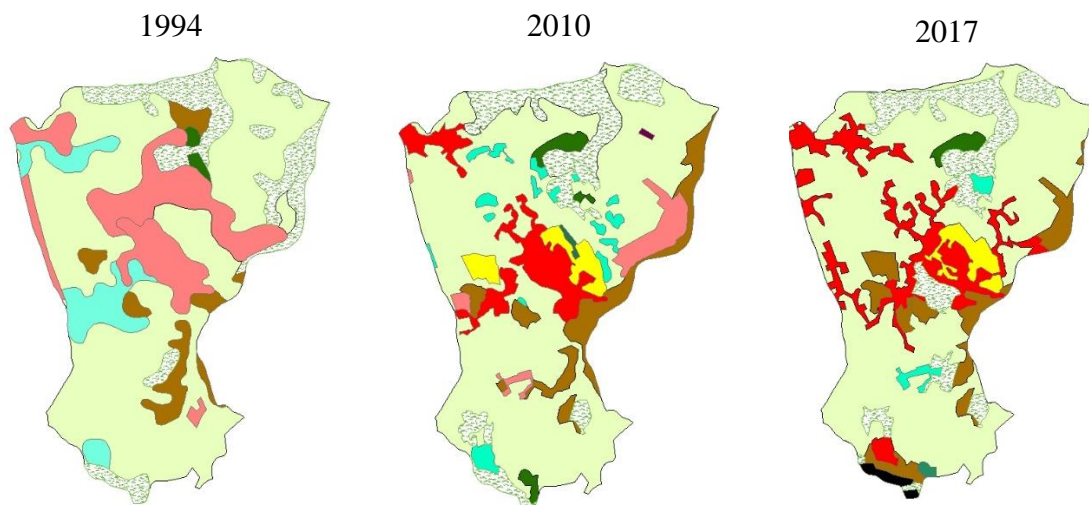
Figure 24 Batroumin evolution

| Land cover | Villages | | | | | | | | | |
| | Ras Maska | | Dedde | | Qalamoun | | Nakhle | | Batroumine | |
	1994	2017	1994	2017	1994	2017	1994	2017	1994	2017
Forest	5.5%	6.6%	10.56%	19.71%	2.3%	3.09%	5.4%	16.5%	5%	7.14%
Shrubland	15.46%	20.6%	22.2%	16.67%	22.2%	30.9%	27.94%	3.5%	12.32%	12.76%
Outcrop	0.08%	0.43%	0.42%	10.98%	0%	0.47%			0%	7.35%
Permanent crops	0.14%	0%	0%	0.2%	1.4%	0.47%			0%	2.3%
Field crops	2.3%	0.72%	1.1%	0%	0%	0%			0.58%	0.8%
Olives	37.5%	32.42%	29.5%	33.66%	48.57%	30%	45.59%	38.1%	57.23%	61.76%
Protected agriculture										
Abandoned agriculture land										
Vineyrad										
Cattle raising										
Poultry breeding										
Low density urban fabric	6.6%	0.1%	9.19%	1.3%	9.5%	2.3%	5.42%	3.5%	6.72%	
Medium density urban fabric	1.5%	18.73%	0%	13.76%	0%	24.57%	0%	15.93%	0%	12.38%
Dense urban fabric	0.7%	1%								
Urban sprawl on field crops										
Urban sprawl of permanent crops	7.63%	0.72%	3.5%	0.42%	4.6%		7.6%	1.3%	0%	0.88%
Urban sprawl of shrubland	1%	0.43%	0%	0.84%	2.09%	17.61%			6.76%	
Urban sprawl on forests	0.014%		0.19%	0%			5.4%			

Table 16 land cover evolution of cluster 3 villages

According to figures 20-24 and table.16 :

- Forested areas have increased

- Shrublands have increased

- Field crops and permanent crops dcreased

- The urban intensified: medium density urban fabric replaced the low density urban fabric

- Olives are the dominant agriculture

d. Cluster 4

1994   2010   2017
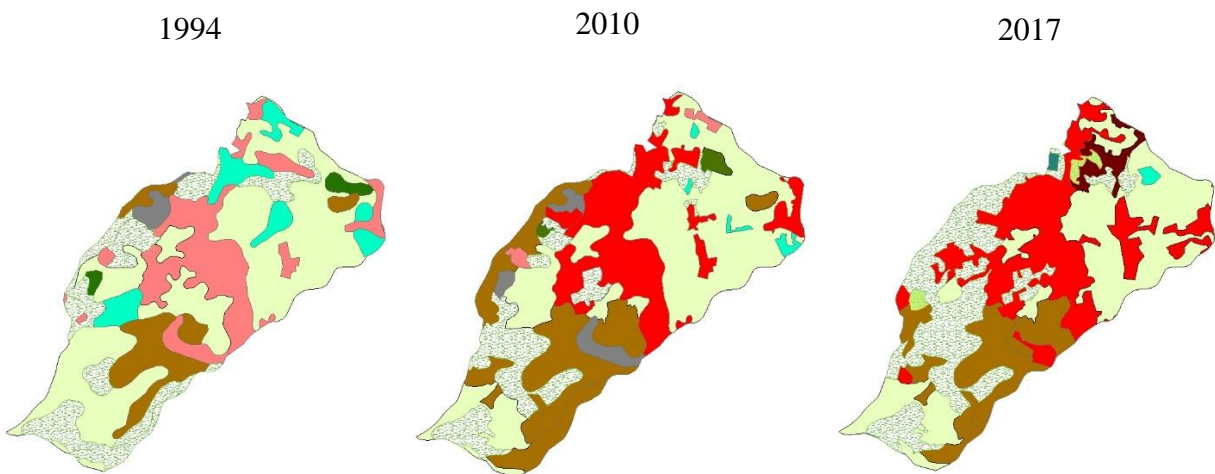
Figure 25 Barsa evolution

1994　　　　　　2010　　　　　　2017
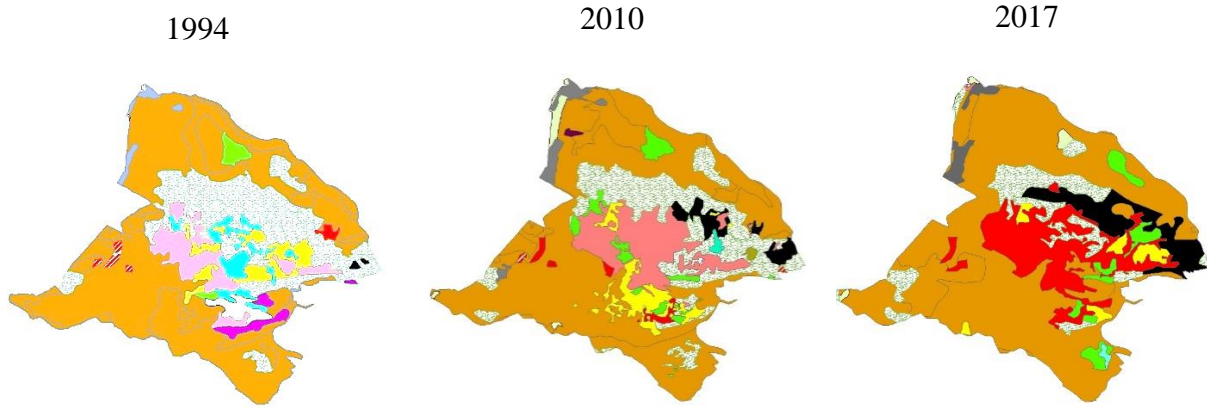
Figure 26 Miziara evolution

Land cover	Villages			
	Barsa		Miziara	
	1994	2017	1994	2017
Forest	9.41%	14.70%	56.70%	60.1%
Shrubland	16.47%	23.82%	20.82%	9.31%
Outcrop			0.17%	7.12%
Permanent crops			4.29%	2.09%
Field crops	0.88%	0%	1.18%	0%
Olives	44.1%	30.29%	1.47%	0.59%
Protected agriculture				
Abandoned agriculture land				
Vineyrad			01.46%	
Cattle raising				
Poultry breeding				
Low density urban fabric	15.23%	0%	6.70%	0.07%
Medium density urban fabric		22.9%		14.45%
Dense urban fabric		2.6%		
Urban sprawl on field crops				0.20%
Urban sprawl of permanent crops	7.6%	0.44%	3.45%	
Urban sprawl of shrubland				
Urban sprawl on forests			0.45%	

Table 17 Land cover evolution in villages of cluster 4

Figures 25 and 26 reveal an increase in natural and urban cover coupled with a decrease in agricultural cover. Miziarra has very little agricultural lands left. Barsa

Table 16 reveals the following:

- Both Barsa and Miziara experienced an increase in forests.

- Olives are a dominant agriculture cover in Barsa

- Permanent and field crops area are uncommon in both villages.

e. Discussion

The land cover dynamics that were established in the previous section can be seen at the level of these clusters. the urban, rural, and natural cover have been interacting and shaping the space around them, forming different spatial models. The study established two models: ruralopolis and rurban.

After examining the evolution of the selected villages, the mode of land cover interaction was determined. In the ruralopolis model (cluster 1 and 2) the agricultural and urban cover replaced the natural cover. In some cases, the villages did not exhibit any natural elements. These two clusters have an agrarian economy; it is only natural for the resident to value agricultural land over natural. Thus , the replacement of forests by crops was necessary for the survival of their economy. Additionally, the population growth that the villages exhibited required an increase in urban development at the expense natural cover. The decline of shrub lands in these areas and their replacements by urban cover is because agro-pastoralism has been on the decline, and replaced by cattle farming.

The rurban model exhibited a dissimilar fashion of land cover interactions to the one seen above. Cluster 3 and 4 showed a growth of urban and natural cover, coupled with a loss of agriculture lands. The villages in the cluster are receiving urban dwellers. These resident are not

of an agrarian background and will not engage in any rural activities. Therefore to accommodate the influx of urban migrant the agricultural lands were replaced by urban areas. However, the villages did not completely lose their agriculture character. Many still retain large olive groves, which are used for commercial.

CHAPTER VI

CONCLUSION AND RECOMMNEDATIONS

A. Conclusion

The results from the study show that the RUC in Northern Lebanon has been growing in the last two decades. It went from having 1 urban core in 1994 to 11 in 2017. An expansion of the intermediate zone and a narrowing of rural areas accompanied this growth of urban cores.

Additionally, the research identified 4 clusters that exists in the RUC surrounding Tripoli. The clusters fit two types of spatial models: rurban and ruralopolis. Each of the cluster exhibits different spatial patterns and evolution.

Located between the rural and the urban, the RUC is subjected to a high degree of pressure that can be better managed and sustained if the RUC was properly defined. The following research develops a methodology that defines the RUC and gives insight into the different spatial typologies that exist along the RUC.

The following methodology can be applied and replicated in other regions of Lebanon. This will help in better understanding the nature of the RUC and the different spatial variations that exist within it. If fact, proper definition of the rural and urban is pivotal in spatial planning. This knowledge helps break the rural-urban divide, by calling to understand the hybrid nature of the RUC.

B. Recommendations

Lebanon's shortage of a proper spatial plan is due to the lack of understanding of the rural and the urban. The following research can be the stepping-stone towards the application of a holistic approach, one that takes into consideration spatial variations and rural urban linkages.

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The Agropolitan approach is such a policy. The application of the Agropolitan approach can prove to be quiet useful in Lebanon. It will help enhance the role of small towns and villages as activity centers. The approach helps improve the infrastructure in these areas, establish services and facilities, provide affordable housing, and support local production. It also enhances public transport to facilitate rural urban commuting.

The creation of these sustainable rural villages diverts rural urban migration away from cities and towards new regions. This will help in reducing urban poverty and help in the appropriate distribution of rural migrants. Additionally, these areas can provide an alternative retreat for the refugee community in Lebanon, thus relieving pressure off major cities.

Further studies should be carried out to refine the methodologies adopted in this study. The examination of land tenure maps can provide more insight into the relationship between people and land. This will help develop better policies, one that targets human interaction with their surroundings.

Before the application of a new spatial policy, proper land classification and zoning laws should be put in place. A more rational territorial organization of land uses will help properly guide development and protect the environment

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