

# Land Use Changes in the Rural-Urban Fringe: A Case Study of Tel-Aviv Metropolitan Area

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Wilhelm Daniel, Arkadiy Shafran and Michael Sofer\*

Bar-Ilan University

*The purpose of this study is to explore the patterns and reasons for land use changes in three moshav-type settlements located in the rural-urban fringe of the Tel-Aviv metropolitan area. The study extends over six decades and investigates several possible explanatory factors: the period of establishment of the moshav; its physical planning; households' agricultural branches; and the influence of nearby towns. These factors may lead to several different outcomes in regard to the processes of local change. Three moshav models are indicated in the research: agricultural; non-agricultural; and in-between. The findings show that a population with a strong ideology and a long history in agriculture may have a significant effect on the character of the moshav over time, and may contribute to the preservation of the agricultural occupation and landscape. On the other hand, lack of ideology, combined with declining importance and profitability of the agricultural branches over time, leads to diversification and pluriactivity. The latter situation is supported by proximity to urban labour markets and the attraction of entrepreneurial ventures from both urban and rural populations.*

*Keywords:* Land-use, rural-urban fringe, metropolitan area, moshav, non-agricultural activities

In the past four decades, the rural space in Israel has been steadily transforming. The main drivers include a major economic crisis during the 1980s, together with a change in government policy toward the agricultural sector. The ongoing transformations have been marked by the decline of agricultural employment concomitant with a tremendous increase in the intensity of agricultural production, the evolution of non-agricultural activities and land uses as part of farm households' survival strategies, and the suburbanisation of the countryside. The decline in the importance of agriculture for the national economy over the years has forced farmers to look for alternative sources of income. This transformation is occurring with varying intensity nationwide and is characterised by evolving functions related to the secondary and tertiary sectors (Sofer, 2001; Sofer and Applebaum, 2006; Sofer and Applebaum, 2009; Kimhi and Menahem-Carmi, 2017).

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\* Department of Geography and Environment, Bar-Ilan University, Ramat Gan, Israel: danielm.wil@gmail.com; arkady.shafran@gmail.com; Corresponding author: Michael Sofer: Michael.Sofer@biu.ac.il

The outcome of the transformation process can be characterised as a shift in the rural space, from being almost entirely a productive space to a space used for both production and consumption purposes for local and non-rural inhabitants. This is expressed in the shift to specialised farming on a large scale, the emergence of non-agricultural activities on and off the farms, the expansion of the built-up area, a change in the pattern and form of residential buildings and farm premises, and emerging previously unknown environmental nuisances. The result is a more physically, economically, and socially heterogeneous rural space, and growing regional, inter-village and intra-village economic disparities.

Within the rural space, the 'rural-urban fringe' (RUF) – the interface between the urban area and the countryside – is the belt where the transformation process is most vibrant. The purpose of this study is to explore the land use changes in three moshav type settlements in order to discover and interpret different patterns of land use changes. The moshav is a planned smallholders' cooperative settlement. The three settlements are located in the rural-urban fringe of the Tel-Aviv metropolitan area, the largest metropolitan area in Israel. The study includes a deep timeline analysis extending over six decades (1950-2010) and discusses several explanatory factors: the period of establishment of the moshav, the physical planning of the moshav, local entrepreneurial patterns and the influence of nearby towns. These factors may contribute to several different outcomes in local change processes.

The paper begins with a theoretical discussion of the changes in the rural-urban fringe with some emphasis on the Israeli case study, and it is followed by an explanation of the methodology used in this study of changes in land use in three moshav-type settlements in the Tel-Aviv metropolitan area's RUF. Next, the factors that may affect different patterns of land use are explored. Finally, the discussion looks at the nature of the changes through an overview and proposes a model for better understanding the nature and patterns of change that may evolve in the RUF.

## STUDY OF THE RURAL-URBAN FRINGE - THEORETICAL ISSUES

For several decades the rural space in developed market economies, and more recently in developing countries, has been undergoing a major process of restructuring. Trends of concentration, specialisation, and scale economies have been the driving forces of agricultural change (Robinson, 2004; Woods, 2011). This has been coupled with an acceleration of urban encroachment on the rural space, flows of counter-urbanisation, increasing environmental awareness and protection, and changing national and local government policies (Geneletti et al. 2017). The rural space today is a diversified landscape, with its inhabitants representing a mixture of demographic and occupational profiles. It is multi-functional by nature and is characterised by new land uses and employment patterns (Holmes, 2005).

The ‘rural urban fringe’ (RUF) – the interface between the urban area and the countryside – is a transitional zone, where urban and rural uses mix and often clash (Heimlich and Anderson, 2001). The result is conversion and succession of land uses within this belt, affected by contesting forces as well as by changing agricultural and planning policies (Fazal, 2013). Several underlying mechanisms impinge upon transformation processes in the RUF such as: population mobility; changing location advantages of the fringe rural communities; changes in desired lifestyle; housing availability; declining agricultural income; employment opportunities locally and in the surrounding area; and public policy (Sofer, 2013; Wadduwage et al. 2017; Pawlak, 2018). These mechanisms affect the physical-spatial structure and the socio-economic systems in the RUF itself and the surrounding areas. The major outcomes include: the changing nature of rural communities and their socio-demographic structure; increasing social inequality between the small-hold farmers, commercial farmers and higher-income newcomers from urban areas; the loss of prime agricultural land; the diversification of the economic base; the appearance of environmental issues and nuisances; the changing landscape and an ever-increasing income gap within and between communities (Bryant, 2002; Bunker and Houston, 2003; Qviström, 2007; Sofer and Applebaum, 2006; Fazal, 2001). Studies of land use in this zone have revealed a mixture of uses that reflects both the irregular growth in the area and the encroachment of the city on rural space. Both outcomes share the aspect of the “nearby city” as a driving factor and the difficulties faced by the rural space and its inhabitants in facing this bow wave (Antrop and Van Eetvelde, 2000; Lewis and Brabec, 2005; Sofer, 2013).

Discussion of the RUF sometimes proposes that it be considered a part of the peri-urban interface. The RUF is the least urbanized part of the peri-urban area, having a rural nature and some degree of resistance toward urbanization. The notion of a transitional zone between urban and rural areas is not new although it has defied a precise and universally acceptable definition (Buxton and Low Choy, 2007). Some have asserted that such a transitional zone will ultimately be converted to urban uses. Bryant (Bryant et al., 1982) describes it as “land in the advanced stages of transition from rural to urban uses – land under construction, land for which subdivision plans have been approved – in short, land where there is little doubt over much of its area about its urban oriented function and ultimate conversion to urban uses” (Bryant et al., 1982). Others see the RUF maintaining its agricultural functions, while also being a location for recreational activities and a destination for suburban migration. The RUF is also the location for urban activities which require a lot of space (cemeteries, greenfield investments) and/or are a nuisance for the city’s inhabitants (e.g., wastewater treatment plants). The RUF is not just a zone of land use changes, but also a zone of possible land use conflicts. Bryant defined the RUF as “an arena in which a variety of forces and processes operate to influence the structure and dynamic of human activities” (Bryant, 1995, 256).

To a large extent, land use changes in the RUF are related to rural household-level strategies of adjustment or adaptation to macro-level development and to changing government policies. According to Sharp and Smith (2003) there are three types of farmer adaptations: positive adaptations; normal or managerial adjustments characteristic of the entire agricultural sector; and negative adaptations. The positive adaptations include intensifying production on the existing land base or involvement of non-traditional enterprises. The normal or managerial adjustments imply adoption of standard agricultural technology. The negative adaptations suggest a reduction in production intensity in anticipation of a future sale of farmland, and gradual disinvestment in the farm operation due to recognition that long-term prospects for farming are limited, or actual abandonment of farming. Thus, to some degree, land use changes in the RUF represent a decline in the importance of agriculture for a significant number of farming households, and increased demand from the rural population for non-agricultural economic activities, as well as the entry of non-farming population into rural settlements.

The continuous process of transformation, which is reshaping and redefining the basic features of the RUF rural settlements, raises doubts about their ability to retain their identity as rural communities and their future course of development. At this stage, several trends can already be discerned; others can only be speculated upon.

## THE ISRAELI EXPERIENCE

The rural space covers over 85% of the land area of Israel and houses about 8% of its population. Administratively, it is composed of 54 municipalities, termed regional councils, which contain all the rural settlements, of which not all are agricultural settlements. It contains 980 communities of various types and forms of organization (The Authority for Planning and Development, 2015). Over time, the rural space has experienced a transformation process and socio-economic reshaping and is currently characterised by a tremendous increase in productivity, expansion of farms and specialisation of production, decline of agricultural employment, and suburbanisation of the countryside. Nationally, the contribution of agriculture to the GNP declined from 4.8% in 1980 to a mere 1.2% in 2019, and its share in the total value of exports in 2019 was 1%, about one tenth of its share in 1980 (Central Bureau of Statistics [CBS], 2020). The total number employed in agriculture was 77,000 in 2018, or 1.5% of the total economically active population. Only 16% of these are self-employed, indicating a gradual increase of wage labour over time, mostly low-paid foreign workers. Within the rural space, the percentage of the population employed in agriculture dropped from 34% in 1980 to about 9% in 2015 (CBS, 2016). The current major source of employment for rural residents is in tertiary activities; about two-thirds of the residents are employed in public and personal services.

The rural space in Israel is characterised by planned settlements, many of which were established in the first half of the 20th century as part of a national settlement plan, based originally on farming as a major source of employment and income. The planning principles of these settlements were rooted in ideological concepts of equality and mutual aid that found expression in the allocation of resources and in the organizational structure of the rural communities. The land was given to all farmers through long-term leaseholds, and the settlement authority supported and accompanied the settlers until they could prove their ability to handle their own affairs independently. After the establishment of the state, this task of institutional support was taken over by the Israeli government (Weitz and Rokach, 1968). Most of these settlements are registered as cooperative societies in which the membership of all farm owners is generally obligatory.

Over the years, the rural settlements went through several adjustments to the changing socio-economic environment, but the major transformation began in the mid-1980s, following a political upheaval and a severe financial crisis, accompanied by the withdrawal of most government support from the farm sector (Sofer and Applebaum, 2006). Since that time, the restructuring of the Israeli rural space has gained unprecedented momentum, as can be seen in most aspects of rural life. Under the steamroller of change and influenced by specific local economic conditions and regulations, the rural space has been losing some of its uniqueness, expressed in a decline in the degree of collectivism and cooperation between farmers and among settlement systems, and increased levels of inter-regional and intra-settlement inequality (Kimhi, 2009; Ben-Dror and Sofer, 2010; Sofer and Applebaum, 2006, 2012).

The moshav, a planned smallholders' cooperative settlement, emerged in the 1920s. There are 410 moshav-type settlements spread throughout Israel, comprising about 40 per cent of all rural settlements in the country. They generally contain about 60-100 family farms. The size of the farm is equitable within each moshav but differs among moshavim, according to physical characteristics of the region and the dominant farming activity, varying between 3 and 15 hectares. The farm is commonly divided into three types of plots: Plot A contains the house and farm buildings; Plot B is the main farming unit and may be divided into several parcels; Plot C is often a communally cultivated plot, with the profits equally divided among moshav households. In recent years, with the relaxation of the policy regarding allocation of land, in many instances plot C has been allocated for the establishment of a residential neighbourhood, originally intended for second-generation non-farming households, but expanded in many settlements to include the broader population.

The moshav plan was based on several principles – both ideological and practical (Rokach 1978; Applebaum and Margulies 1979; Schwartz 1999):

1. The land allocated to the moshav is nationally owned, leased to the settlers for a 49-year period for a token sum, with an option for renewal or transfer to heirs. Individual farms cannot be divided, even among heirs, and may only be transferred as a single unit.

2. The basic unit of the moshav is the family farm. The means of production were planned in a manner that would enable families to carry out most of the farm work without recourse to hired labour, and to obtain their income solely from agriculture.
3. A system of cooperation and mutual aid was established to handle joint purchasing and marketing, underwrite loans to individual farmers and the whole community, and aid in times of crisis. Eventually a formal cooperative association was established, which took over the management of all village affairs.

In the early 1990s the government initiated an “expansion” program, which allowed the allocation of residential plots inside the farming villages to non-members. This “expansion” program brought about major changes in these communities. The construction of suburban-style neighbourhoods changed the landscape of the villages and the entrance of the new population, composed mainly of young couples with children, with relatively high levels of education and white-collar occupations, changed the social and demographic composition (Uzan, 2002; Charney and Palgi, 2014). Furthermore, the newcomers often had their own views about the future development of the rural community, which were supported by the authorities who permitted removal of restrictions on farmland under specific circumstances, allowing the allocation of land for non-farming uses (Greenberg, 2012). Administrative amendments based on the recommendations of a special committee facilitated the use of premises and buildings on the home plots for non-agricultural activities (Sofer and Applebaum, 2006). These policy changes attracted new entrepreneurial interests and developers seeking land resources into the rural settlements (Sofer and Applebaum, 2009; 2012). Yet such changes frequently led to conflicts of interest with the established residents, and sometimes required the creation of mechanisms for conflict resolution (Applebaum and Rimalt, 1995; Orchan et al., 2001).

In-migration to the Israeli RUF has had a significant impact on the host communities in economic, social, cultural, and physical terms (Sofer and Applebaum, 2006; Greenberg, 2012; Regev-Metuki, 2016; Amit-Cohen and Sofer, 2016). The in-migrants established their new residences in settlements that were previously dominated by farming households; by introducing suburban development, they have affected the nature of the rural community. Urbanised residents are now living side by side with farmers and ex-farmers. The location of the RUF within commuting distance of urban centres allows the newcomers to enjoy a rural lifestyle while continuing to work in non-agricultural occupations – mainly white-collar jobs or independent businesses – located in nearby urban centres (Cohen and Sofer, 2007; Bittner and Sofer, 2013).

The changes in RUF communities have been strongly affected by several variables, and distance from urban centres is not necessarily the primary one. More important factors are the period of establishment of the settlement represented by the number of generations on the land, the area of origin of the settlers and the com-

munity's related social structure and ideological zeal, the entrepreneurial approach of the farmers, and the internal cohesion of farmers and non-farmers, as demonstrated by the degree of resistance and disagreement regarding the development of non-agricultural activities in the RUF settlements (Daniel, 2012; Bittner and Sofer, 2013).

The changes described above have led to some conflicts. The major aspects of these conflicts in Israel include: decreased demand for agricultural land and increased demand for land for economic investment, primarily for housing; regulations embedded in official national, regional and municipal planning policies that allow the construction of residential neighbourhoods in agricultural settlements; incoming population with concomitant differing demands for goods and services (Regev-Metuki, 2016); environmental considerations, represented mainly by NGOs and the Ministry of Environmental Protection; and spontaneous endogenous changes in the rural settlements caused by increasing industrial and commercial activities, often in violation of official planning policy (Sofer and Gal, 1996; Shoshany and Goldshleger, 2002; Maruani and Amit-Cohen, 2010). In the experience of other countries, the common outcome of these processes is an incoherent land-use pattern including agricultural and non-agricultural activities, open spaces, out-of-town retail and service centres, farms, and built-up suburbia, all of which compete for the same space (Hart, 1991; Bryant, 2002).

## METHODOLOGY AND RESEARCH AREA

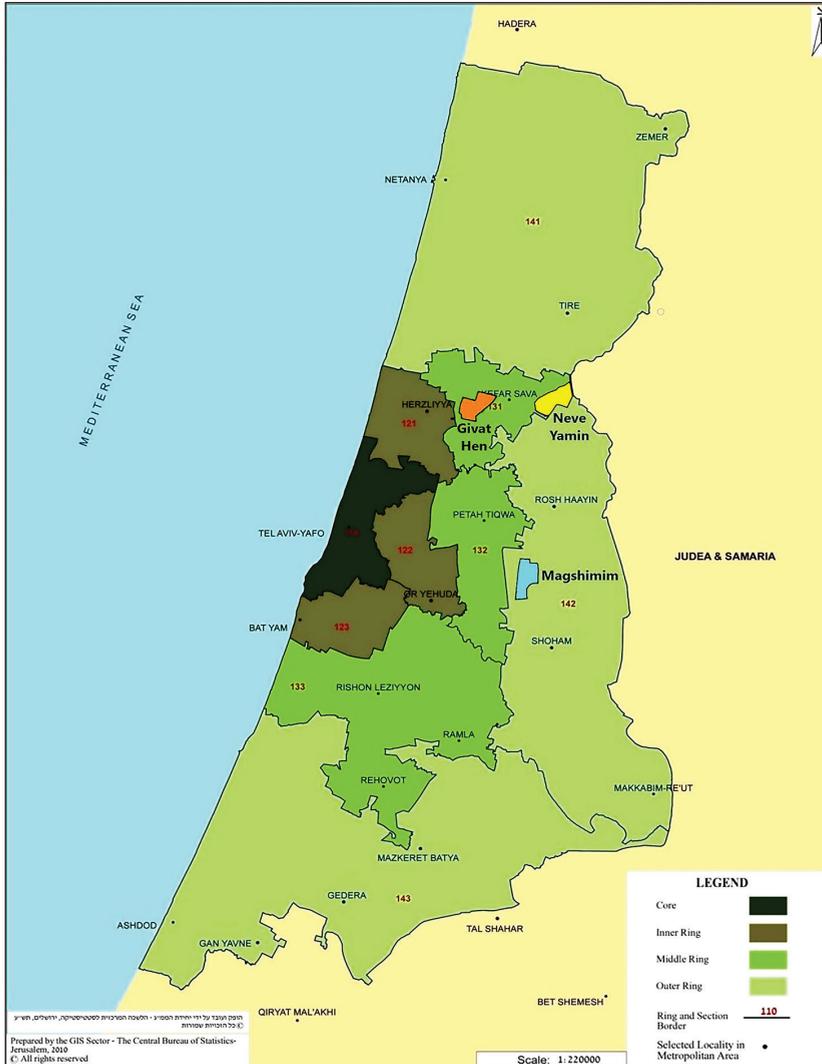
Tel-Aviv metropolitan area, the largest in Israel, has expanded faster than other areas with increasing pressure on the land resources, and its RUF population has a wide range of alternative employment opportunities. The three settlements studied are located in the Drom HaSharon (Southern Sharon) regional council, a rural region comprised of 31 rural settlements, located on the northern and eastern sides of the Tel-Aviv metropolitan RUF area. These moshavim – Givat Hen, Magshimim and Neve Yamin (Figure 1) – were chosen as an initial analysis of their land use patterns showed great variation, and they may represent different types of development strategies used by settlements.

Moshav Givat Hen was founded in 1933 by families who immigrated from Poland, Russia, Lithuania, and Germany and sought to establish an agricultural settlement in Israel. The current population is 359 (CBS, 2017) and the total area is 130 hectares. Moshav Magshimim was settled in 1949 by army veterans. Over time, the settlement was inhabited by immigrants from Poland, Iraq, and Germany. The settlement covers an area of approximately 270 hectares and there are 1074 residents (CBS, 2017). Moshav Neve Yamin, located next to the eastern industrial zone of the city of Kfar Saba, was established in 1949 by immigrants from Greece, Libya, Iraq, Iran, and North Africa. The moshav currently is the residence for 1210 people

(CBS, 2017). The settlement covers an area of 330 hectares, which makes it the biggest and the most populated moshav of the three under study.

All the moshavim under study are in the same coastal plain area and their geo-physical background is similar. Soil quality, physical planning, and accessibility to road transport are important issues that affect land use. However, the purpose of this study was to discover the other factors that have significant impact on land use changes.

**Figure 1:** The Tel-Aviv metropolitan area and locations of the three case studies



To increase the accuracy of the study, several practical tools were applied. The research methods are based on GIS data analysis, field surveys, available statistical data, and household questionnaires.

### *GIS Data Analysis*

The primary goal of the research was to gain an overview of the settlements' land use transformation over six decades. The 1950s decade was taken as the initial basis for the analysis. This was followed by a study of aerial photographs of the settlements taken in 1960s, 1970s, 1980s, 1990s and 2010s, all of which were analysed by GIS methods.

### *Field Survey*

Field surveys were carried out to investigate the nature of land use in each settlement and to support the analysis of the aerial photographs. These surveys were designed to depict as correctly as possible all the changes in the land use through the years. The surveys covered 50 farm units in each moshav and were conducted by walking tours around the settlements and through data collected from the internet concerning the businesses located in the moshavim. The businesses were sorted according to their type and potential impact on agriculture.

### *Household Interviews and Questionnaires*

The research tools described above deal with physical aspects. In order to show the whole picture of the changes, the third tool used deals with the human factor, aiming to show the contribution of inhabitants' views and rural life ideology to land use patterns. Relevant information was gathered in two main ways: first, through interviews with members and officials in the moshavim and in the Drom HaSharon Regional Council. Second, questionnaires were distributed among the residents in each moshav (age group 51 and above) in order to examine the attitudes of people with relatively extensive agricultural experience. There were a relatively small number of responses from residents, which did not allow us to conduct a representative data analysis. The questionnaires were analysed and used as an accessory source of information, without a statistical-quantitative component, and no conclusions were based solely on this data.

## **CHANGES IN LAND USES IN MOSHAV-TYPE SETTLEMENTS IN THE RUF**

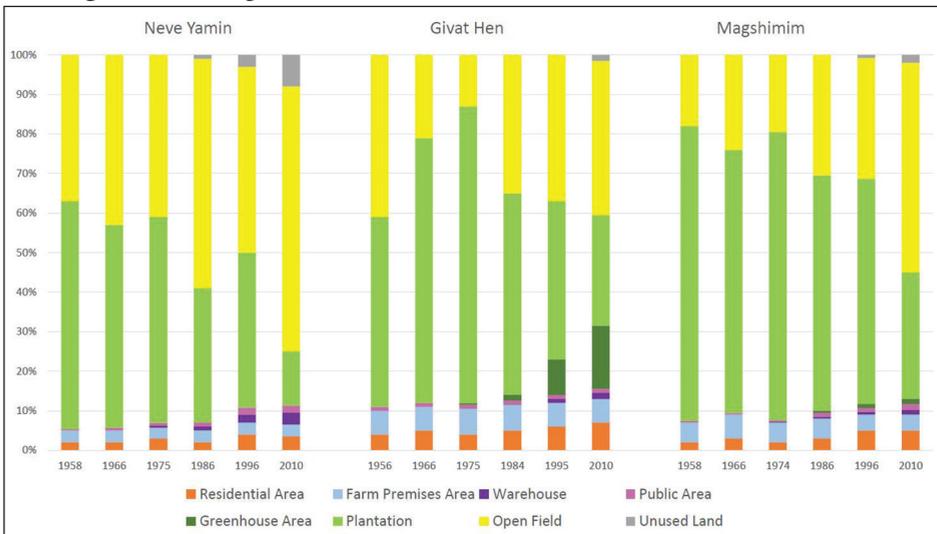
This section is focused on analysis of the changes in land uses in the three settlements over six decades since the 1950s. The major changes are emphasised and

discussed in three stages: 1950s-1960s, 1970s-1980s and 1990s-2010s. Throughout the periods most of the land was used for agricultural activities - open fields and plantations. With time, the general propensity was that the share of plantations declined, and the share of open fields increased. The relative share of the total land in use for non-agricultural activities also increased. During the period under study, in all the moshavim studied, most of the agricultural lands in the settlements were cultivated; only in the 1980s did limited empty plots begin to appear.

### *1950s-1960s*

During the first decade after its establishment in 1949, the land uses in Moshav Neve Yamin were completely agricultural, with approximately equal shares of open fields and plantations with a certain shift toward open fields (Figure 2). According to the Figure, the agricultural character of the land use in Givat Hen was similar to Neve Yamin in the 1950s but different in the 1960s when there was a sharp increase in the area under plantations. The Magshimim lands (Figure 2) were mostly used for plantations. The aerial photographs showed that parcelling is relatively high, which indicates mixed farming based on different types of crops.

**Figure 2:** Changes in land use distribution for six decades – 1950s-2010



### *1970s-1980s*

The first significant changes occurred during the 1970s and continued in the 1980s (Figure 2). First, there was a marked decrease in the number of agricultural plots in all the three moshavim. During this period, there was a clear shift to spe-

cialization as the main method of land cultivation, with most farms in Moshav Neve Yamin having just one major crop. This shift was aimed at increasing output and efficiency. There was also an increase in the combined area under warehouses and farm premises during this period.

Secondly, this was the first period in which greenhouses were detected – particularly in Moshav Givat Hen and in a limited area of Magshimim (Figure 2). They were located non-systematically, in different parts of the settlements, indicating the farmers' propensity toward more advanced and efficient agricultural activities. In Moshav Magshimim, there was an increase in the number of greenhouses and, at the same time, a reduction in the area of farm buildings in some of the farms and a further increase in the number of warehouses. At the same time, this was a more moderate phenomenon than what was seen in Moshav Neve Yamin in this decade.

Land use allocated to warehouses kept growing during this period, but they were placed unsystematically, in different areas of the settlement. It is important to note that the warehouses were originally used to store agricultural products, but they were potentially useful for relatively wide range of purposes, including non-agricultural activities. The latter phenomenon is particularly prominent in Neve Yamin. In the 1980s, the first unused lands appeared in the moshav. However, some of the warehouses were located on these lands. Finally, the public area expanded considerably, which we consider to be related to the process of restitution of land that had not been previously used for its initial purposes. This may be evidence of economic growth in the settlements.

### *1990s-2010s*

By the year 2010, the expansion program, involving the appearance of residential neighbourhoods, had taken effect in two moshavim, but not in Givat Hen (Figure 2). The warehouses and unused agricultural lands in Neve Yamin continued to increase, indicating that farmers were abandoning their agriculture activities and developing alternative non-agricultural enterprises. Givat Hen maintained its agricultural character by expanding the area under greenhouses along with enlargement of land lots. This also took place in Neve Yamin, indicating a move toward the phenomenon of relatively large farms (for the Israeli context). This meant that some farm owners ceased their own cultivation and sublet their land to their neighbours, who became "big farmers" in Israeli scale.

The emergence of non-agricultural activities in Magshimim was considerably slower than in Neve Yamin. The public space in this moshav kept growing in various parts of the settlement, occupying the largest area of the three moshavim, apparently due to the moshav's larger total area. Another change that took place in Neve Yamin and Magshimim was a reduction of the agricultural land for the purpose of the residential expansion plan which began in the 1990s.

Thus, our study shows that the agricultural lands decreased to a certain degree over the years (Figure 2), replaced by residential areas and warehouses, which to-

gether indicate an obvious trend toward increasing involvement in non-agricultural activities. The prevalence of open fields (approximately 71% of the total area of Neve Yamin) suggests a shift to more extensive cultivation based on farmland mergers (under subleasing contracts) in order to maximize profits for the declining number of active farmers.

Moshav Givat Hen has undergone some changes over the years but not in the same direction as Moshav Neve Yamin. According to Figure 2, only about one percent of its land is not cultivated, and warehouses occupy approximately an additional 2%. On the other hand, the area allocated to greenhouses has increased significantly (to about 16% of the total area of the settlement). These Figures indicate the high interest of the residents in farming activities and in searching for new methods of cultivation. Moreover, an expansion neighbourhood has not been built in this moshav.

Moshav Magshimim has undergone similar changes to Neve Yamin, but the changes have not been as extensive. According to Figure 2, the area occupied by warehouses has grown relatively slowly, while unused lands, which exceeded one percent of the total area in the 1990s, rose to about 3 percent in 2000s. In other words, the moshav is currently experiencing the dilemma between preserving the agriculture model and shifting into non-agricultural occupations, some of which may use vacated farm premises.

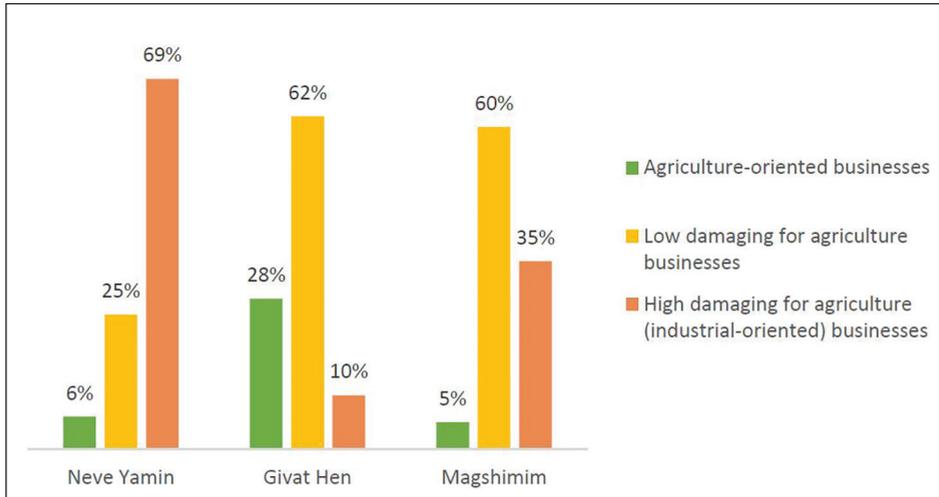
### *Types of Businesses and their Impact on Land Use*

Another factor analysed in the current study was the types of farm household businesses and their influence on land use in the moshavim. Our hypothesis is that the changing nature of the moshav depends on the degree of farmers' desire to keep the farming property for agricultural activities only, or alternatively, to abandon agriculture for the purpose of focusing on other activities, or to be involved in both agricultural and non-agricultural activities. To study this issue, a landscape survey was carried out in the three moshavim covering 50 households in each moshav, focusing on the conditions of the agricultural area and the types of buildings and premises on the farms, including residential buildings.

Figure 3 summarizes the data presented in this section and illustrates the differences between the three moshavim in terms of business impact on land use. There is a correlation between the types of businesses and the general specialization of the moshavim. Sixty businesses in each moshav were examined, as several households had more than one business. Less agriculture-oriented businesses – so-called “industrial workshops” – are rather common in Moshav Neve Yamin – 69% of all businesses. Their main activities are plastic, furniture production, garages, storage facilities and so on. These types of businesses are not set up as agricultural, and they take up a lot of space. The lowest rate of these businesses is in Moshav Givat Hen – 10%, along with the highest percentage of agriculture-oriented businesses – 28%. Most of the businesses in Magshimim (60% of all the businesses) are based on services and

are defined as businesses with a relatively low possibility of damaging agriculture. These types of businesses do not take up much space and some are located in the existing farm premises.

**Figure 3:** Types of businesses and their impact on land use by moshav



Moshav Neve Yamin shows a high share of businesses which are characterised by high potential to affect the moshav's basic agricultural fabric (Figure 3). Farm holders in Neve Yamin have abandoned agricultural activities in favour of other more profitable (industrial) activities, while only a small percentage of moshav households continue to carry out extensive farming. Magshimim's households prefer a similar type of development, though according to the findings the difference is that the process is more moderate. Farming households in Moshav Givat Hen combine agricultural activities with other economic activities. They have comparatively high share of agriculture-related businesses, which may contribute to preservation of the current agricultural fabric. In both Givat Hen and Magshimim about 60% of the businesses belong to the personal services sector and thus have relatively low impact on the settlements' environment.

### *The Human Factor Impact on Changes in Moshavim Land Use*

Another tool we used to delve into the roots of different patterns of change was interviewing moshav residents and officials. The moshavim are characterised by similar physical conditions and so we sought to find out the role played by the human factor in land use changes. In this context, in ideological terms, the rural settlements, and the moshav as one of them, were one of the most important foundations for the establishment of Israel, when Jewish settlers saw rural space as a place where

they could strengthen the bond between the Jewish people and the land, through land cultivation activities. Therefore, we defined the human factor as the rural life ideology, views and deeds of the original residents that determined the initial economic nature of the settlement and its current and possible future development track. Altogether seven people were personally interviewed, and additional information came from six questionnaires that were collected.

The inhabitants of Moshav Givat Hen were highly motivated to cultivate the land due to their commitment to rural life ideology and its role in the establishment of the state, which resulted in their desire to engage in agriculture. This ideology was transmitted through generations, thus resulting in the farmers' will to maintain their farming activities even under difficult economic circumstances. The high level of determination was supported through acquisition of higher education and skills. The residents of Magshimim are diversified. Their moshav is characterised by several different groups coming from different origins with different ideologies. Some had higher ideological zeal than others, with strong link to the land and to farming. Thus, the development path in this moshav was mixed. By comparison, the rural life ideology was not central to the people who settled Moshav Neve Yamin. It was obvious that the main goal of those settlers, new immigrants who arrived after the establishment the State of Israel, was to find a permanent place for housing. As a result, these immigrants began to engage in non-agricultural economic activities not long after they were allocated their farms.

Thus, the path of economic development was different for the new settlers among these Moshavim each choosing its own economic survival strategy. Our analysis of the roots of attempts to support farming activities shows the following critical requirements for retaining the agricultural character of the settlement:

- The first generation of inhabitants holding a strong ideological concept of farming;
- A population that is relatively well-educated and determined to succeed in the agricultural sector despite the potential economic difficulties;
- The first settlers' ideology conveyed to the future generations based on agricultural education, teaching primarily agriculture and land management. Such education may even have led to fear of change among moshav residents; however, education about agriculture passed from generation to generation, which determined, to a certain extent, the line of thought of the moshav residents.

We suggest that if one of these conditions is not fulfilled, it would be difficult to maintain the agricultural character and pattern of the settlement over time.

## DISCUSSION AND CONCLUSIONS

The Israeli rural-urban fringe has undergone significant changes in recent decades. The local phenomena examined in this study reflect worldwide changes in the economic base and land-use characteristics of rural settlements. The aim of this study was to examine the changes in land use and reasons for these changes over six decades in three moshav-type settlements located in the rural-urban fringe of the Tel-Aviv metropolitan area. The intention was to find out whether there are different patterns of land-use change, whose main features can be described and categorized.

The results indicate that changes in the RUF communities were strongly affected by several variables, and specific location was not necessarily the primary one. More important variables were found to be the period of establishment of the settlement; the area of origin of settlers and the settlement's related social structure and ideological zeal; the entrepreneurial approach of the farmers; and the internal cohesion of farmers and non-farmers, as demonstrated by the degree of resistance or disagreement regarding development of non-agricultural activities in the RUF settlements (Cohen and Sofer, 2005; Bittner and Sofer, 2013). We aggregated the variables into three key internal factors that influence the development pattern of the moshavim in the RUF: location, the nature of land use and the human factor.

The results show three different patterns of land use change patterns in moshavim situated in the Tel-Aviv metropolitan area's RUF: agricultural; transitional; and non-agricultural (Figure 4). It is important to point out that this study does not claim to establish that the three patterns listed here are typical of all settlements in Israel. However, the current study presents the three models, which may contain features matching the settlements located in the rural-urban fringe of metropolitan areas.

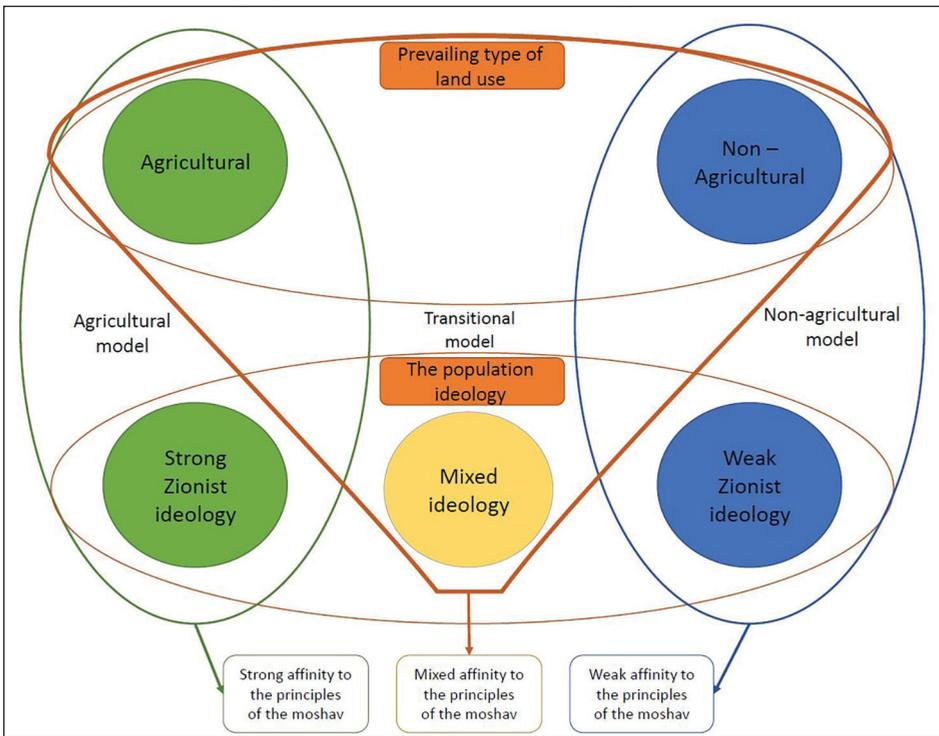
The agricultural model is represented by Moshav Givat Hen. Despite the changes in the Israeli economy and the restructuring of the rural space, this moshav, while developing a limited share of non-agricultural activities, has succeeded in retaining its agricultural character and has developed its knowledge base in the economic activities that contribute to agriculture. The ideology about the nature of rural life is the basis of this affinity.

The residents' desire to boost income, regardless of the nature of the settlement or its ideology, leads settlements to the non-agricultural development model with residents' engagement in a variety of economic activities. Moshav Neve Yamin corresponds to this type of the settlement development.

The transitional model, as shown by Moshav Magshimim, is based on a combination of the two previous models, characterised by a share of households interested in farming or business activities that do not endanger agriculture, while another share tends to maximise the profits regardless of the nature of economic activities. The population's ideology is undetermined, which allows balancing between two types of economic activities, counteracting to some extent the unchecked advancement of non-agricultural activities.

The changes in the RUF (Figure 4) are affected by the common tendency toward increased efficiency in the agricultural sector, which contributes to increased output per unit land, decline in demand for labour, and deteriorating terms of trade. Consequently, the restructuring process of the RUF is initiated, among other reasons, by farmers' new survival strategies. Farmers seek alternative sources of income, and there is a clear tendency for those who are still farming to expand their farming activities and to specialise. Another significant impact on land use has been caused by the neighbourhood expansion program, where in many cases agricultural lands were turned into residential areas.

**Figure 4:** A proposed model for land use changes in the moshavim



The nearby urban environment attracts and encourages the development of relatively large number of non-agricultural activities under the conditions of declining income from agriculture. At the same time, these new activities in each settlement are determined to a large extent by the nature of the local population, their way of thinking, ideology, and experience. In the wake of difficult economic conditions, farmers have taken advantage of their transitional location between urban and rural areas to promote new businesses and to search for other possibilities of employment

by interacting with entrepreneurs from urban areas. The urban entrepreneurs saw the economic potential in rural areas, mainly due to their proximity and lower fixed expenses in comparison with the urban areas. This phenomenon emerged in the late 1980's as a result of a major national economic crisis. The process developed rapidly, provoking fear of environmental imbalance as non-agricultural activities spread, but the fear has declined with time as internal and external regulation has addressed this issue.

The results of this analysis have implications for the development of policies for altering land use, such as purchase of development rights. Moreover, the main ideas raised here may also apply in the case of other metropolitan areas in Israel according to the specific characteristics of each region. The methods we use can pinpoint areas that are at a risk of conversion and discover which factors are associated with land-use change.

The RUF in Israel today is a diversified landscape, with its inhabitants representing a mixture of demographic and occupational profiles. It is multi-functional by nature and is characterised by new land uses and employment patterns. Moreover, the goods and services produced in this space serve broader local and national goals, beyond those of the national food security and rural development.

## NOTES

1. Plural of moshav in Hebrew.
2. In 1960, under Basic Law, Israel Lands, Jewish National Fund-owned land and government-owned land were together defined as "Israel lands," and the principle was laid down that such land would be leased rather than sold. Now, privately owned lands (those being private before the establishment of the State) are registered on the name of the purchaser in the land registry. On the other hand, title to a state-owned land property as a rule does not pass to the purchaser. Rather, the purchaser of a State Land property acquires a long-term development right, (usually for 49 years with an option for an additional 49 years).

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