


## Article

# Changes in Land Use and Food Security: The Case of the De La Vega Agrarian Shire in the Southern Spanish Province of Granada

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**Abstract:** Changes in land use that are taking place in many parts of the world are having varying effects, depending on the case, on food security in diverse environments. This article analyzes how these changes manifest themselves in the De La Vega territory, an agrarian shire located in the center of the southern Spanish province of Granada. Over recent decades, this shire has been confronted with deep socioeconomic, demographic, and urban transformations that have led and are leading to significant changes in the role of agriculture, land use, and the position of farmers. The results reveal that, over the last four decades, the population has increased (44%), the agricultural area has decreased (40%) as has the usable agricultural land (25%), olive groves have grown exponentially (144%), farms have decreased (68%), and levels of livestock have grown and become more concentrated. Finally, the actions and demands raised by the main actors and social organizations involved in the defense of farming in this shire are examined. These demands and actions have occurred especially in the peri-urban areas close to what is known as the Granada urban agglomeration, precisely where the changes have been most intense, according to the data analyzed.

**Keywords:** land use changes; agriculture; food security; southern Spain; De La Vega shire; Granada; Spain



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## 1. Introduction

The agrarian shire of De La Vega is located in the central part of the Granada province in the southern Spanish region of Andalusia (See Figure 1). This shire includes a relief in the form of a sedimentary basin delimited by the peaks of the Sierra Nevada and the foothills surrounding the flat area of the region where the Genil river flows. The physiography of the region is very heterogeneous, ranging from the high mountain landscape of the Mosca lagoon in Sierra Nevada where the Genil river rises under the Mulhacén peak, to the lowest alluvial lands around the Iznájar dam or the Huétor-Tajar Vega. The terrain has slopes of 1 to 17% with an average altitude between 500 and 2830 m. The most important river is the Genil, although the Maitena, the Monachil, the Dílar, the Cacín, and the Cubillas are also significant [1].

The diverse land uses that occur in the De La Vega shire differentiate zones in its territory that correlate with its physiographic and climatic variety. The physiographic variety is manifested in the difference between mountainous areas and the flat parts of the Genil valley. Regarding climatic variety, different climatic types coexist in the territory. In the lower areas of the western half of the shire are Mediterranean subtropical and Mediterranean continental climatic types. In the medium altitude areas, both in the Sierra de Loja and Sierra Nevada, the climatic type is temperate Mediterranean, and in the higher areas of the Sierra Nevada there is a cool temperate Mediterranean climate. In relation to this variety of climatic types, there are different temperature ranges according to each of the aforementioned zones. The cold or frost period, understood as the number of months

with an average minimum temperature of less than 7 °C, ranges very widely, varying from 5 to 6 months in the Genil river valley to 12 months in the upper regions of the Sierra Nevada. The warm period, that is, the number of months in which the average maximum temperature is greater than 30 °C, also varies from 0 to 1 month in the east and southwest of the shire, up to 2 or 3 months at its center. The dry or arid period, which indicates the number of months with water deficit, decreases as the altitude increases, reaching up to 5 months in the center of the shire and up to 1 month in Sierra Nevada. The average monthly temperature in the shire is 16.9 °C. The humidity regime is humid Mediterranean, except in the center of the shire where it is dry Mediterranean. The annual accumulated precipitation is 559.1 mm [1].



**Figure 1.** The De La Vega agrarian shire and its location in Spain. **Source:** Jesús Fernández [1].

The climatic and temperature diversity that exists in the shire is closely related to the variety of agricultural practices and land uses that can be found within it. Particularly, there are three main forms of land use. Primarily, the largest surface area is used for arable land, concentrated mainly in the flat areas of the sedimentary basin, that is, on the plain through which the Genil river flows. The municipalities with the greatest extension of arable land are Huétor-Tajar and Granada. Most of the arable land is irrigated and is associated with the fertile lowlands of the Genil River. Such land is mainly used for the cultivation of olives, corn, and vegetables. Woody crops represent the largest proportion of total cropland, followed at a distance by herbaceous crops. Woody crops are those that occupy the land for long periods of time, and do not need to be re-planted after each harvest. These crops include fruit trees, dry fruit trees, olive trees, vineyards, and so on, but exclude trees that produce firewood or timber. Herbaceous crops include temporary crops, temporary meadows for mowing or grazing, and land devoted to orchards, including greenhouse crops [2].

Among woody crops, olive groves clearly predominate, followed by fruit trees and vineyards. Regarding herbaceous crops, cereals (corn, wheat, barley, and oats, in order of importance) are prominent, followed by vegetables, fodder crops, tobacco, potatoes and sunflowers [1]. To a large extent, these distinct crops correspond to the differences in the relief of this agrarian shire, in such a way that the hilly mountainous part has been characterized by rainfed agriculture, while irrigated agriculture is located in the flatter parts of the territory [3]. The irrigated area has its origins in Roman times, although it was in the Islamic middle ages (11th century) when the complex hydraulic system was created, which has been maintained to the present day with a very high degree of material and functional authenticity, permitting centuries of agricultural activity [4,5].

The arable land is followed in second place by forest land, which is mainly concentrated in the Sierra de Huétor Natural Park and in the part of the Sierra Nevada National

Park that belongs to the De La Vega shire. It should be noted that this second National Park also extends to other agrarian shires of the Granada province [1].

The third main type of land use, in terms of surface area, is for meadows and pastures, which are mainly located in the Loja Mountain range and in the municipality of Huétor-Tajar [1].

Most of the shire's population is concentrated in what is known as the urban agglomeration of Granada, which includes the municipality of Granada's capital city and a series of municipalities bordering it, whose number of inhabitants has increased significantly in recent decades. This increase is mainly due to the fact that these municipalities have become the place of residence of a sizeable and growing volume of people, offering them the possibility of acquiring cheaper and more affordable housing for their level of income.

In this paper we do not intend to present a fixed picture to characterize the De La Vega shire, but instead consider that the best way to understand its current situation is to analyze the changes it has undergone over recent decades. During this period, the shire has been confronted with important socioeconomic, demographic, and urban transformations that have led and are leading to significant changes in the role of agriculture, the use of land, and the position of farmers.

The core objective of this research is to consider as a study area the agrarian shire of the De La Vega, a territory that until now has not been studied in its full expanse by previous works. This is necessary in order to understand the changes in land use that have occurred in this shire over the past four decades. The socioeconomic and demographic changes and urban transformations that have taken place there are also analyzed. The latter transformations are particularly important if sustainable development is to be achieved in the territories, which requires a multidimensional view that not only considers environmental problems but also possible socio-demographic decline or imbalance [6]. In addition, these changes are studied in relation to their impacts on agriculture, livestock, and food security. Thus, this article responds to the challenges of studying in depth how the aforementioned changes have affected this shire.

In this regard, we start from the hypothesis that these changes have had a greater impact on the area of the De La Vega shire with high urban pressure, due to its proximity to Granada city. This is the peri-urban area known as the Granada urban agglomeration, which is precisely the zone with the greatest urban and demographic dynamism.

To analyze the aforementioned transformations, this article uses secondary data on changes in land use in the De La Vega shire. In this context, the following pages analyze data on certain processes including the increase in artificial land to the detriment of agricultural land, with artificial land being understood as land dedicated to urban development, industrial use, mining, transport infrastructure, and technical infrastructure [7]. Furthermore, through the analysis of available statistical information, we highlight the specialization of export crops such as olive groves, the gradual decrease in the number of farms managers, the trends towards the concentration of agricultural and livestock farms, and the evolution of livestock farming.

Other previous studies on the De La Vega shire have analyzed sociodemographic and economic changes [3,8], and variations in land use [9–12]. Previous studies on the evolution of land-use trends in the shire mainly report the ongoing decrease of agricultural land. On the one hand, Sánchez del Árbol [10] reported that the artificial surface has expanded from 800 hectares in 1950 to 9000 in 2018. On the other hand, research by Aguilera Benavente [12] using different digital cartographic sources alluded to a loss of at least 8000 hectares of cultivated area between 1977 and 2004. However, these studies have been limited to the part of the De la Vega agrarian shire closest to the capital, i.e., the area known as the Granada urban agglomeration. In contrast to these studies, our main research contribution is the consideration of the entire territory of the De La Vega agrarian shire, analyzed with updated data. In this respect, data on changes in land use, as well as livestock and agriculture, both industrial and organic, are examined. All these changes are positioned in this study in relation to the evolution of food security. Finally, a further

contribution is that we consider and briefly analyze the actions and demands of several of the main actors and social organizations involved in one way or another in the defense of the territory and in the search for and proposal of solutions to overcome the problems faced by its traditional agriculture. Above all, these problems are particularly evident in the areas most affected by population growth and urban expansion, as is the case in the traditionally agricultural areas closest to the urban agglomeration of Granada.

## 2. Materials and Methods

The De La Vega agrarian shire is made up of 46 municipalities. Due to limitations of available space, their names are indicated by acronyms in Figure 3 and Figure 6, and are presented in alphabetical order in Table 1 together with the relevant acronyms. The sociodemographic and economic characteristics of these municipalities, as well as their exact geographic location, can be consulted in the interactive map of the Granada province available through the following link: <https://www.juntadeandalucia.es/institutodeestadisticaycartografia/sima/provincia.htm?prov=18> (accessed on 18 January 2023).

**Table 1.** List of municipalities in the De La Vega agrarian shire and their corresponding acronyms. **Source:** authors.

Alb (Albolote)	CeV (Cenes de la Vega)	FV (Fuente Vaqueros)	Ju (Jun)	Ni (Nívar)	SF (Santa Fe)
Al (Alfacar)	Cha (Chauchina)	Go (Gójar)	LZ (La Zubia)	Og (Ogíjares)	VG (Vegas del Genil)
Alh (Alhendín)	Chu (Churriana de la Vega)	Granada	La (Láchar)	Pe (Peligros)	VO (Villa de Otura)
Ar (Armillá)	Ci (Cijuela)	GS (Güéjar Sierra)	LG (Las Gabias)	PG (Pinos Genil)	VM (Villanueva Mesía)
At (Atarfe)	CoV (Cogollos de la Vega)	Gu (Güevéjar)	Lo (Loja)	PP (Pinos Puente)	Vi (Víznar)
BeG (Beas de Granada)	CuV (Cúllar Vega)	HS (Huétor de Santillán)	Ma (Maracena)	Pu (Pulianas)	Za (Zagra)
Caj (Cájar)	Di (Dílar)	HT (Huétor Tajar)	Mon (Monachil)	Qu (Quéntar)	
Cal (Calicasas)	Do (Dúdar)	HV (Huétor Vega)	MoZ (Moraleta de Zafayona)	Sa (Salar)	

The results of this paper are based on research work that combines quantitative and qualitative methodologies. From a quantitative viewpoint, a series of statistical data provided by the following official institutions were selected and processed:

- (A) The Multi-territorial Information System of Andalusia (*Sistema de Información Multi-territorial de Andalucía*; hereinafter, the SIMA) and the Land Occupancy Information System of Spain (*Sistema de Información sobre Ocupación del Suelo de España*; hereinafter, the SIOSE). The processing and analysis of the data collected from these sources made it possible to observe the evolution of land use in the shire studied here.
- (B) The agricultural censuses of the Spanish National Institute of Statistics (*Instituto Nacional de Estadística*; hereinafter, the INE). The analysis of the data from this statistical source was aimed at determining the variation in usable agricultural land, the evolution of agricultural land, the average and total surface of farming plots, the changes in the number of farms, the average age of farm owners and managers, and transformations in livestock and production in both intensive and/or industrial and organic farming.
- (C) The Population and Housing Censuses of the INE. Data from this source were used to analyze the demographic changes and increasing imbalances in the territorial distribution of the population that have taken place in the shire.

Based on the information provided by the aforementioned sources and the statistical work carried out on this basis, several figures, maps with georeferenced data (prepared with QGIS software), and tables were constructed. In order to make this statistical work possible, it was necessary to recategorize the information from the 1982, 1989, 1999, and 2009 agrarian censuses. This recategorization was required because these sources provided data disaggregated by municipality, while the data available from the 2020 census covered the entire agrarian shire of De La Vega.

The data analysis technique used in this research falls within the framework of what is known as descriptive statistical analysis. As is well known, the mathematical technique of descriptive statistics is applied to obtain, organize, present, and describe a set of data with the purpose of facilitating its use, generally with the support of tabulated, numerical, or graphic measures. These kinds of techniques are used when the researcher needs to process and analyze the data collected in a certain study. A basic purpose of this type of analysis is to determine the most relevant characteristics and profiles of the persons, groups, communities, or any other phenomena representing the object of the research [13].

From a qualitative standpoint, participant observation and a review of the documents found on different webpages related to these social actors were used to understand the demands of the main social actors and organizations involved in the defense of the territory researched here. Participant observation entails the researcher's attempt to immerse himself in some way into the daily social life, problems, and expectations of the population under study [14]. Particularly in the present research, participant observation was carried out by the first author of this article through his involvement in different meetings and encounters with social actors and organizations that in one way or another make demands aimed at improving the situation of the De la Vega shire. These social actors are representatives and participants of the citizen platform 'Salvemos la Vega' (meaning "Let's save the Vega"), the association 'Somos Vega, Somos Tierra', the Intervegas Federation, the Agroecological Network of Granada, and the Association of Mothers and Fathers of the Gómez Moreno School.

### 3. Results

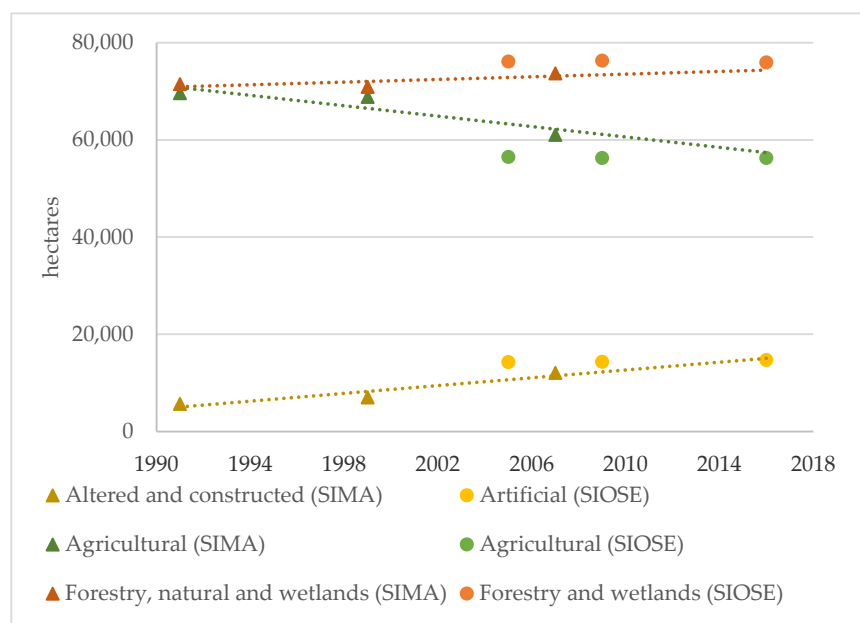
#### 3.1. Demographic Changes and Urban Pressure

Since the end of the 20th century, there has been an intense period of change in Spain in terms of urban occupation and infrastructure development [15]. This process is also taking place in the De la Vega shire, specifically in the area closest to its capital. The radical changes in the territorial model in recent decades have brought about strong expansion of urban activities to the detriment of cultivated land, with rampant conurbation processes in the southern, southwestern, and northern areas of the city, as well as growing urban agglomeration in all these areas. In addition, new industrial zones have been developed in the municipalities of the northern zone. This is part of the constitutive process of what is known as the urban agglomeration of Granada. The process began in 1990, developing in a mostly irrigated agricultural area that had been configured by a group of municipal settlements that were characteristically rural [9]. Urban expansion and the building of infrastructures typical of the contemporary metropolitan model have meant that the urbanized surface area within the limits of the urban agglomeration, which was less than 800 hectares in 1950, has grown to 9,000 hectares. This area mainly occupies land traditionally devoted to farming uses [10].

To promote this model, it has been necessary to build new roads for transport and land communications, and these roads have fragmented the traditional agrarian landscape. The Granada ring road was one of these new communication routes. Later, the southern ring road was built, occupying irrigated land near Granada. The elevated roadway of this highway has broken the urban agricultural continuity between the capital and its next fertile irrigated plain, known as the Granada Vega, thus increasing the disconnection of the city's inhabitants from that plain [16].



Figure 2 shows that the two available databases that we considered provide different data on the variation of artificial land, as well as agricultural and forestry land, in the De La Vega shire. Obviously, these differences arise because the databases use different methodologies. In any case, according to the two databases, artificial land has increased to the detriment of agricultural land.



**Figure 2.** Evolution in hectares of land use in the De La Vega agrarian shire (1990–2018). **Source:** authors with data from the SIMA and the SIOSE.

This increase of artificial land in the De La Vega territory has not reached a turning point, despite the planning efforts made and reported in the Territorial Urban Agglomeration Territorial Management Plan (*Plan de Ordenación del territorio de la Aglomeración Urbana Territorial—POTAUG*), which has supra-municipal scope, and the General Urban Development Plan (*Plan General de Ordenación Urbanística—PGOU*), whose scope is municipal. Thus, new land infrastructures such as urban agglomeration roads (*Vías de Aglomeración Urbana—VAU*) continue to be built. Moreover, the municipal government has planned to move Granada railway station to one of the traditionally fertile and irrigated agricultural areas near the capital, giving rise to protests by different social actors interested in preserving the traditional agricultural area of De La Vega [17].

In terms of demographic changes, the population of the De la Vega shire has grown by 44% from 1981 to 2021, i.e., from 413,987 inhabitants to 595,822. However, its municipalities have experienced uneven demographic growth. Although most of the municipalities have increased their populations, the greatest rise has occurred in those closest to the capital, especially in Ogijares, Cenes de la Vega, Cúllar Vega, Jun, Vegas del Genil, Las Gabias, Churriana de la Vega, Cájar, Gójar, and Villa de Otura, as shown in Table 2. Thus, several small municipalities in the shire have become small dormitory towns due to their proximity to the core city. This has been favored, to a large extent, by the increase in land prices in the capital, where there is a shortage of available space for urban growth. In addition to all this, the improved accessibility of these municipalities close to the capital, as well as the fact that they generally have fewer legislative limitations for the urbanization of land previously used for agricultural purposes, contributes to making housing noticeably cheaper there than in the capital [18].

The municipalities that lost population in the period from 1981 to 2021 are those that are either far from the capital or have reduced or worse accessibility. These are Güejar Sierra, Salar, Quéntar, Pinos Puente, and Zagra. In particular, Zagra was a district of the municipality of Loja until its segregation in 1987. For this reason, there are no data for its

population in 1981, so we calculated the percentage difference in this town between 1991 and 2021. Furthermore, the data available for Zagra in the 1989 agricultural census were used to elaborate the rest of the tables and figures.

**Table 2.** Population change 1981–2021 (in percentages) and distance in Km (in parentheses) to the capital city in the De La Vega agrarian shire. **Source:** authors with data from the INE.

Percentage (%)	Municipalities and Distance to the Capital City
>300	Alhendín (9 km), Cájar (6 km), Cenes de la Vega (6 km), Churriana (6 km), Cijuela (21 km), Cúllar Vega (8 km), Gójar (9 km), Jun (6 km), La Zubia (7 km), Las Gabias (9 km), Ogíjares (8 km), Vegas del Genil (7 km), and Villa de Otura (11 km).
250 to 299	Albolote (17 km), Güevejar (10 km), Huétor Vega (5 km), Nívar (11 km), and Pulianas (6 km).
200 to 249	Armillá (5 km), Atarfe (11 km), Maracena (5 km), and Monachil (13 km).
150 to 199	Alfacar (9 km), Chauchina (19 km), Dílar (12 km), Huétor Tájar (44 km), Láchar (23), Pinos Genil (10 km), and Víznar (9 km).
100 to 149	Beas de Granada (15 km), Calicasas (15 km), Cogollos Vega (14 km), Dúdar (12 km), Fuente Vaqueros (19 km), Huétor de Santillán (12 km), Loja (54 km), Moraleda de Zafayona (36 km), Santa Fe (12 km), and Villanueva Mesía (41 km).
0 to 99	-
−1 to −9	Granada (0 km) and Güéjar Sierra (17 km),
−10 to −19	Quéntar (14 km) and Salar (48 km).
−20 to −39	Pinos Puente (17 km) and Zagra (64.5 km).

Moreover, Granada capital has also lost population, which can be explained by the trends in the gradual movement of many of its original inhabitants to the new urban settlements that were built in nearby municipalities during the past decades, for the reasons explained above.

As can be seen in Table 3, population density is also higher in the municipalities closest to Granada city. Among these Armillá, Cájar, and Maracena stand out with more than 3.000 inhabitants/km<sup>2</sup>. According to the INE data, the city of Granada has a population density of 2.654 inhabitants/km<sup>2</sup>, compared to 297 inhabitants/ km<sup>2</sup> in the De La Vega shire and 73 inhabitants/ km<sup>2</sup> in the Granada province.

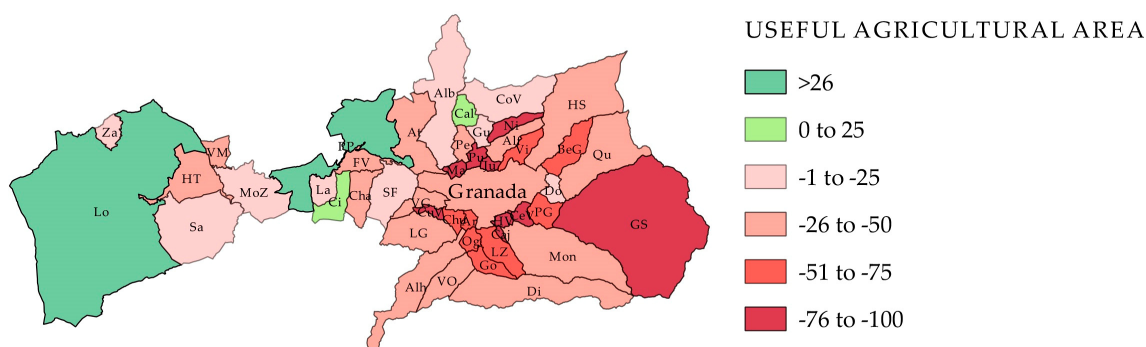
**Table 3.** Population density in 2021 and distance in Km (in parentheses) to the capital city in the De La Vega agrarian shire. **Source:** authors with data from the INE.

Population Density (inhab/km <sup>2</sup> )	Municipalities and Distance to the Capital City
>3.001	Armillá (5 km), Cájar (6 km), and Maracena (5 km).
2.001 to 3.000	Churriana de la Vega (6 km), Granada (0 km), Huétor Vega (5 km), and Ogíjares (7 km).
1.001 to 2.000	Cenes de la Vega (6 km), Cúllar Vega (8 km), Jun (6 km), and Peligros (8 km).
401 to 1.000	Atarfe (11 km), Gójar (9 km), La Zubia (7 km), Las Gabias (9 km), Pulianas (6 km), and Vegas del Genil (7 km).
201 to 400	Albolote (17 km), Alfacar (9 km), Fuente Vaqueros (19 km), Huétor Tájar (44 km), Láchar (23 km), Santa Fe (12 km), and Villa de Otura (11 km).
101 to 200	Alhendín (9 km), Chauchina (19 km), Cijuela (21 km), Güévejar (10 km), Pinos Genil (10 km), Pinos Puente (17 km), and Villanueva Mesía (41 km).
51 to 100	Monachil (13 km), Nívar (11 km), Víznar (9 km), and Zagra (65 km).
26 to 50	Beas de Granada (15 km), Calicasas (15 km), Cogollos de la Vega (14 km), Dílar (12 km), Dúdar (12 km) Loja (54 km), Moraleda de Zafayona (36 km), and Salar (48 km).
<25	Güéjar Sierra (17 km), Huétor de Santillán (12 km), and Quéntar (14 km).

### 3.2. Changes in Land Uses

Demographic growth and the urbanization processes that it has brought have meant that the De La Vega shire has lost 40% of its agricultural land over the last forty years, from 190.000 hectares of cultivated land to 114.000 hectares. The average annual disappearance of agricultural land is 8%. In this regard, Figure 4 reveals that the disappearance of agricultural land use has been steady during recent decades. However, such disappearance has not occurred with the same intensity over time, since 4.5% was lost between 1982 and 1999, and from that latter date to 2009 the loss amounted to 27%, indicating that more than 47.000 hectares of arable land ceased to be cultivated.

Figure 3 shows that, although there has been a generalized loss of usable agricultural land in most of the municipalities analyzed, the municipalities most affected by this process have been those located in the urban agglomeration of Granada, where demographic and urban pressure has been greater. These municipalities have been Cájar, Cenes de la Vega, Cúllar Vega, Huétor Vega, Jun, Maracena, and Pulianas. Municipalities such as Güejar Sierra and Nívar, with less urbanistic pressure than others and a little further away from the capital, have also experienced an important loss of usable agricultural land. However, in the other municipalities far from the capital, the useful agricultural area has not decreased to the same extent, and in some, such as Cijulela, Loja, Calicasas, and Pinos Puente, it has even increased. In general terms, the De la Vega shire has lost 25% of usable agricultural land.



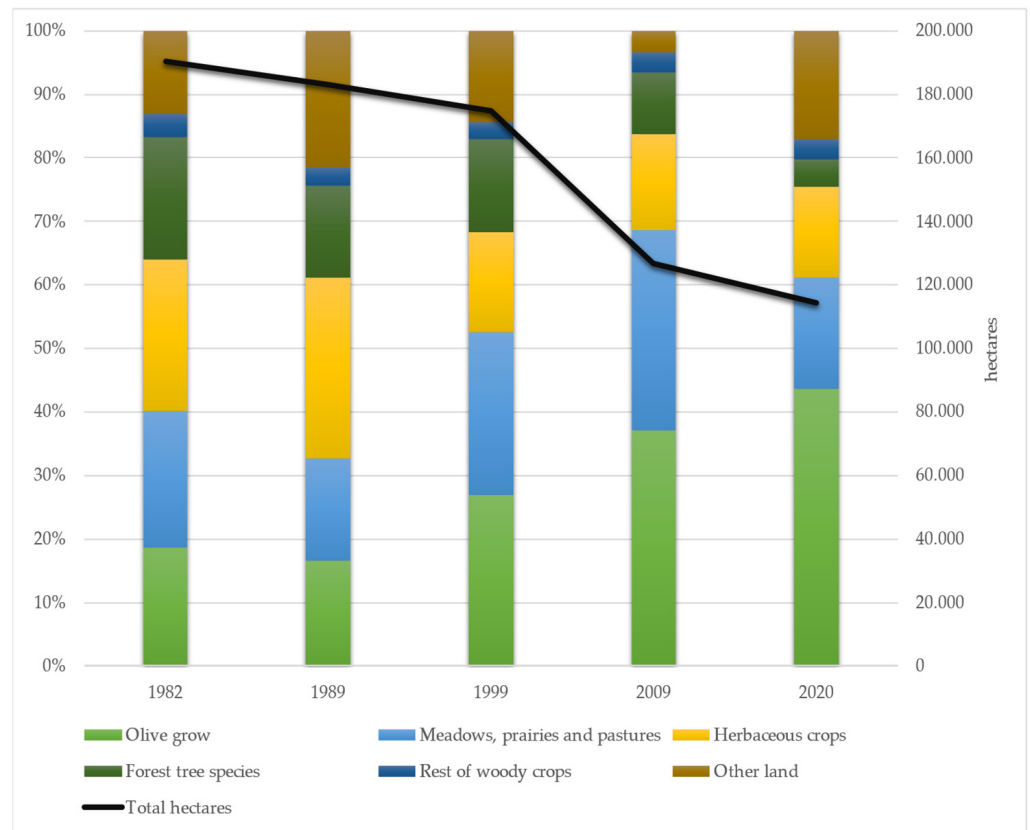
**Figure 3.** Percentage of variation in useful agricultural area (1982–2020) in the De La Vega agrarian shire. **Source:** authors based on the agricultural censuses of 1982 and 2020.

Despite this continuous loss of agrarian land, it is striking that the olive grove area has doubled during the last four decades, as can be seen in Figure 4. Thus, olive groves have gone from representing 19% of cultivated land in 1982 to occupying almost half of the agricultural area in 2020, at 44%, representing an increase of 131%. Olive groves in the De La Vega shire represent 26% of the province and, according to official data from Datacomex [19], Granada province has increased its olive oil exports outside Spain seven-fold from 1995 to 2020. In addition, Granada province exported 11% of production abroad in 2020 (65.451 tons [19] of the 619.680 tons of oil produced in that year [20], not counting the large quantity of oil exported to the rest of Spain).

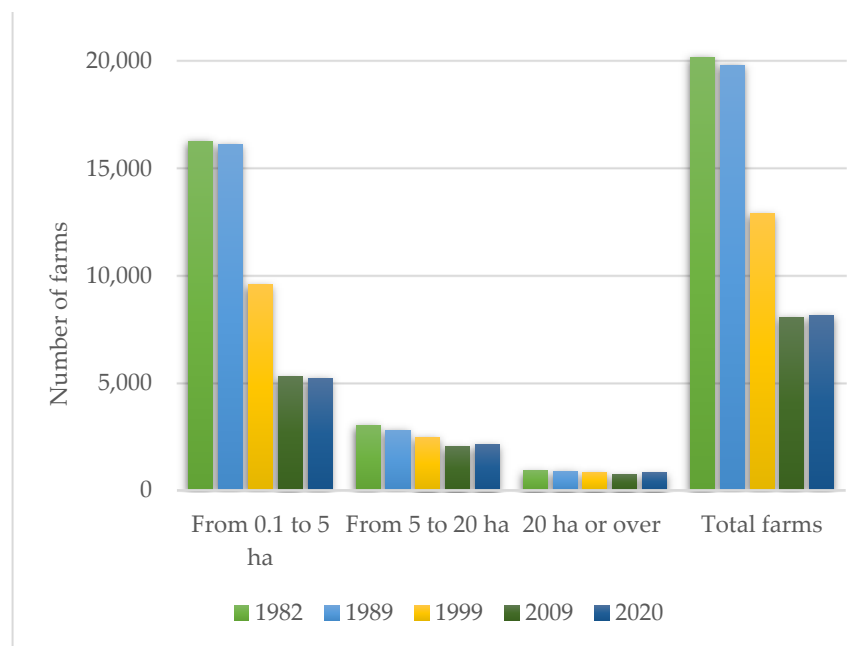
Regarding herbaceous crops, land occupation has decreased by 64% in the period 1982–2020, from 45.000 hectares to 16.000 hectares. Meadows, prairies, and pastures, characteristic of Mediterranean agroecosystems, whose function is essential for the replenishment of fertility through the livestock that graze them, have decreased by half in the same period, as have other woody crops. Finally, forest tree species have suffered the greatest decline, losing almost their entire surface area (87%), with less than five thousand hectares remaining in 2020.

Another fact to highlight is that, during recent decades, there has been a tendency to increase the size of agrarian plots, meaning that small growers have been the most affected, since 68% of plots smaller than five hectares have disappeared, as shown in Figure 5.





**Figure 4.** Evolution of agricultural land use in the De la Vega agrarian shire (1982–2020). **Unit of measurement:** hectares. **Source:** authors based on the agrarian censuses of 1982, 1989, 1999, 2009, and 2020. **Note:** Other woody crops include vineyards; other land includes the remainder agricultural land, such as fallow land and other unused land.

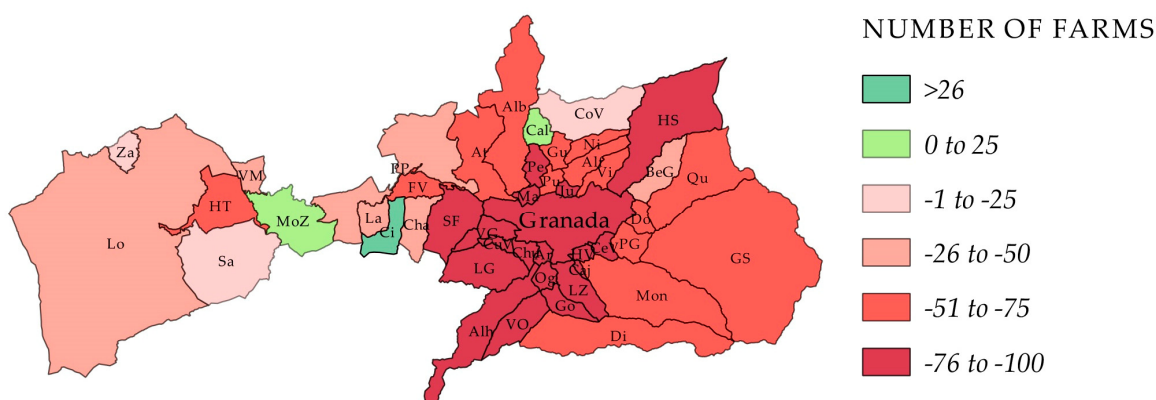


**Figure 5.** Average and total surface area of agricultural plots in the De La Vega agrarian shire (1982–2020) (In ha = hectares). **Source:** authors based on the agrarian censuses of 1982, 1989, 1999, 2009, and 2020.

Available data from agricultural censuses show that farms of any size have decreased from 20,190 farms to 8,172 between 1982 and 2020, representing a decrease of 59%. However, 92% of the farms that have disappeared were the smallest kind (<5 hectares). In contrast, the average surface area of farms has grown from 9.4 hectares per farm to 14 hectares.

Nevertheless, this growth has not occurred exclusively in olive groves, as one might expect due to the constant expansion of this crop over the past decades. Analyzing the data on useful agricultural area from the most recent agrarian census, we find that the average surface area of the farms with useful agricultural area is 11.3 hectares. However, the average surface area of olive groves is 8.5 hectares and the largest surface area is for herbaceous crops (pastures) with an average of 70.8 hectares. The latter is related to the increase in agro-industrial livestock farms, as discussed below. Herbaceous crops, especially polyculture (i.e., forms of agriculture using different crops on the same area), and horticulture (15.6 and 11.9 hectares on average, respectively) are the next largest farms.

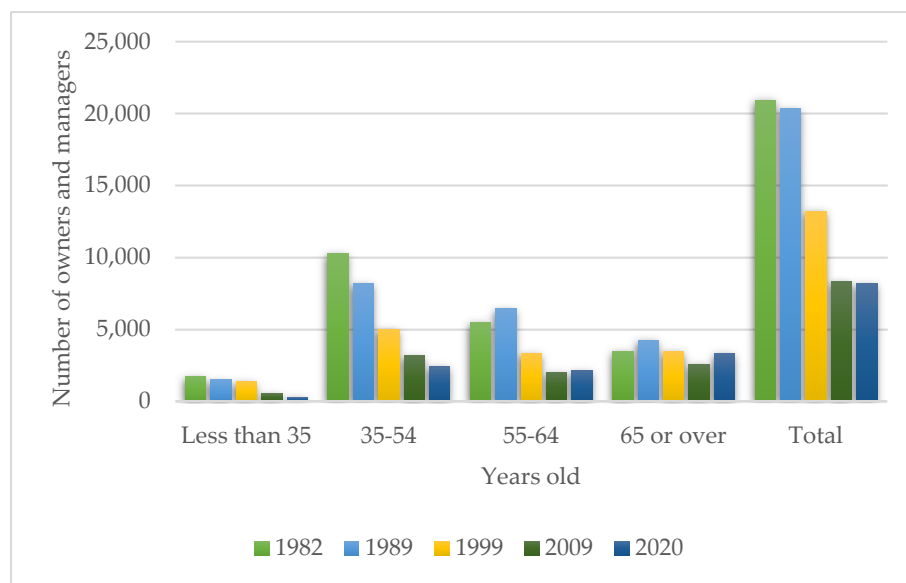
Municipalities that between 1982 and 2020 lost a greater number of farms with useful agricultural area for the most part match those in which there has been greater demographic dynamism and urban pressure, that is, those that are closer to the municipality of Granada, as can be seen in Figure 6. In contrast, numbers of farms have decreased more moderately in certain municipalities that are somewhat further away from the capital of Granada, such as Cogollos Vega, Salar, and Zafra, and have even increased in three of them, Cijuela, Moraleda de Zafayona, and Calicasas.



**Figure 6.** Percentage of variation in the numbers of farms (1982–2020) in the De La Vega agrarian shire. **Source:** Authors based on the agricultural censuses of 1982 and 2020.

The phenomenon of the aging of owners and managers of farms is related to the decrease in the overall number of farms, as shown in Figure 7. Although the total number of owners and managers has decreased by 60.93%, the age group that has lost the most owners and managers has been the group under 35 years of age, with a decrease of 83.91%. The second largest age group was the 35 to 54 age group, with a decrease of 76.5%, followed by the 55 to 65 age group with a decrease of 60.5%. However, the 65 and over group only lost 4.58%. This indicates that owners and managers of farms are becoming older.

With respect to livestock farms, there has been a process of concentration, as has happened with agricultural farms, as shown in Table 4. The number of livestock farms has decreased, but the quantity of animals per farm has increased. Although no data on the number of livestock farms were found for 1991, from 2009 to 2020 cattle farms decreased by 18%, pig farms by 11%, and poultry farms by 79%. However, the numbers of animals have increased by 15%, 74%, and 23%, respectively, in the same period. This means that agro-industrial livestock farming, characterized by a greater number of animals with reduced space per animal, is increasing in the De La Vega shire. However, the opposite is true for sheep and goats, for which both the number of farms (45%) and the number of animals (45%) increased from 2009 to 2020.



**Figure 7.** Average age of farm owners and managers with useful agricultural area in the De La Vega agrarian shire (1982–2020). **Source:** authors based on the agricultural censuses of 1982, 1989, 1999, and 2020.

**Table 4.** Evolution of the number of livestock farms and the quantity of animals in the De La Vega agrarian shire. **Source:** authors based on the SIMA and the agricultural census of 2020.

Year	Bovine		Sheep and Goats		Pigs		Poultry	
	Farms	Number of Animals	Farms	Number of Animals	Farms	Number of Animals	Farms	Number of Animals
1991		12,723		92,364		19,845		111,652
2009	80	8925	322	76,786	47	12,597	101	129,000
2020	66	10,342	467	111,714	42	21,986	21	159,537

Considering organic production, this has increased greatly in recent decades. Thus, as shown in Table 5, the number of farms using organic methods grew by 219% from 73 in 1999 to 233 in 2020. Similarly, the number of hectares devoted to this production expanded from 978 in 2009 to 15,271 in 2020, at an increase of 1461%. The average area of farms has also increased by 609%, varying from 9.27 hectares in 2009 to 65.7 hectares in 2021. From 2009 to 2020, the number of farms in a conversion period decreased, understanding by conversion period the time that the farm must spend from beginning the cultivation of the fields until the resulting products can be marketed as organic. The aforementioned decrease in the number of farms was because these lands changed from areas in conversion to zones with organic farming methods.

**Table 5.** Evolution of organic farming in the De La Vega agrarian shire. **Source:** authors based on the SIMA and the agricultural census of 2020.

Year	Area with Ecological Exploitation Methods		Area in Conversion Period	
	Farms	Hectares	Farms	Hectares
1999	73	-	-	-
2009	99	978	37	1311
2020	233	15,271	31	525

As happened with organic agriculture in general, organic livestock has experienced a sizeable growth in popularity, which has been especially intense in the sheep and goat sector, as shown in Table 6. The average number of animals per livestock farm in the bovine and sheep and goat sectors has increased significantly. Accordingly, when the number of animals was divided by the number of livestock farms in the period from 2009 to 2020, the average number of animals per farm in the bovine sector was found to have increased by 71% (from 71 to 122 animals per farm), and for goats and sheep by 407% (from 170 to 863 animals per farm). Nevertheless, according to the agricultural censuses, organic pig and poultry farms have experienced a very low increase of only a single farm from 2009 to 2020. This contrasts sharply with the large increase in these two types of animals in conventional and/or intensive or industrial livestock farming.

**Table 6.** Evolution of the number of organic livestock farms and the quantity of animals in the De La Vega agrarian Shire. **Source:** authors based on the agricultural censuses of 2009 and 2020.

Year	Bovine		Sheep and Goat		Pigs		Poultry	
	Farms	Number of Animals	Farms	Number of Animals	Farms	Number of Animals	Farms	Number of Animals
2009	4	285	20	3403	0	0	0	0
2020	108	13,208	33	28,481	1	5	1	961

### 3.3. Possible Outcomes of These Changes for Food Security

In this section, the changes analyzed above are considered from the viewpoint of their possible outcomes for the evolution of food security. Because of the link between this concept and that of food sovereignty, it is necessary first to differentiate between the two concepts.

On the one hand, food security is achieved when “all people have permanent physical, social and economic access to safe, nutritious and sufficient food to meet their nutritional requirements and food preferences for an active and healthy life” [21].

On the other hand, the concept of food sovereignty refers to “the right of peoples to define their own food production, distribution and consumption policies and to be able to produce healthy, nutritious and culturally accepted food locally” [22]. The distinction between the two concepts is that food security refers to the guarantee of food supply, and food sovereignty is understood as the power of the inhabitants of each territory to determine their own agricultural and food policies in accordance with the objectives of sustainable development and food security.

The changes analyzed, which have manifested themselves mainly in significant variations in land use, have led to the fact that in the De La Vega agrarian shire the artificial land has been significantly augmented to the detriment of other uses, especially agricultural land. Such intense urban pressure may cause environmental problems and deteriorate the landscape surrounding Granada city, in addition to entailing a continuous loss of fertile land and the negative outcomes that this could have on the food security of this territory.

The loss and/or deterioration of fertile soil can also have harmful effects on local food sovereignty, since previously agrarian land ceases to produce food. This problem is especially worrying when it occurs in situations such as the present, in which climate change, the COVID-19 pandemic, and the escalation in prices of increasingly scarce raw materials such as oil are contributing to raising the prices of many basic foods. Prices are thereby reaching levels that make them almost inaccessible for the parts of the population with the least purchasing power. In these circumstances, in addition to the less affluent sections of the population, many farmers are also adversely affected because their cultivated land is being seriously damaged or even destroyed. As a result, the scarcity of fertile land in these spaces is becoming increasingly evident.

This has become particularly apparent in the peri-urban areas close to the Granada urban agglomeration, where a continuous loss of agricultural land has been experienced.

Nevertheless, the area of olive groves has expanded in the rest of the shire. The process of farming specialization in olive groves devoted mainly to olive oil exports reveals the growing insertion into the business dynamics of globalization that the De La Vega shire is experiencing. This globalization of the food trade obviously does not prioritize the local distribution of food produced nearby, but promotes transnational commerce and transportation of all types of products (including food products) over long distances. In short, it is a type of commercialization that involves the burning of fossil fuels and the subsequent environmental impacts that this may cause. Furthermore, this model of food marketing can also lead to high price increases for the most frequently exported foodstuffs.

The globalization of the food market could also favor trends of monoculture of the most successful foods in foreign markets, to the detriment of less profitable produce. In turn, these trends could harmfully impact biodiversity and the multiplicity of crops that were typical of many traditional rural societies. Likewise, the growing linkage of local economies with increasingly globalized imports and exports could be detrimental to the achievement of local food sovereignty, which will become more sovereign or independent to the extent that it is more closely related to the socioeconomic characteristics of each territory and the productive potential of its inhabitants. Meanwhile, the increase in olive groves has occurred in parallel with a decrease in herbaceous crops. Considering the importance of these crops for the Spanish food supply [23], one could infer that their decline in the face of increased specialization of olive groves could pose a threat to food security and especially to food sovereignty.

This research has also shown that farmers are an increasingly aging population, which means that they tend to be less motivated to introduce improvements aimed to augment agricultural productivity [24]. It is to be expected that this limitation, if not reduction, in productivity will have negative impacts on food production and food security.

Regarding livestock, previous analyses revealed an increase in size and a trend towards concentration, particularly in bovine, pig, and poultry farms. This increase, which is particularly evident in more industrialized livestock farming, can pose risks to animal health and therefore food safety in terms of meat consumption. Furthermore, it can have important environmental impacts, such as increased carbon emissions, eutrophication, and water acidification [25,26], as well as pressure on productive resources such as agricultural soils [27,28].

There has been there has been a considerable growth in organic production in the De La Vega agrarian shire, which is important to ensure food security, based on enhancing the degree of local food sovereignty, and to foster environmental care and sustainable land use [29,30]. Nonetheless, the consumption of organic food by the Spanish population (2.48% of total food expenditure) [31] is still very low compared to other European countries, and most of the national organic food production is exported abroad. In these circumstances, Andalusian organic production is entering the same market logic as conventional agro-industrial production [32]. This is a manifestation of a process that the scientific literature has called the conventionalization of organic agriculture, something that could limit the security and food sovereignty of local populations with less purchasing power and therefore lead to difficulties or even impossibility buying organic products [32].

In view of the above discussion, it could be stated that food security is guaranteed in the shire because both the Andalusia region and Spain are well connected with international food markets. Nonetheless, local food sovereignty is not assured because the increasing globalization of food distribution has meant that a large proportion of the food consumed in the shire comes from outside the region and a noteworthy part of it has even been produced in foreign countries.

In this respect, and to guarantee food security in the region, one of the main challenges for today's policymakers is to devise and implement measures aimed at addressing the problems caused by the transformations that have taken place in the De La Vega shire in recent decades. If these policies are not implemented in time, there is a risk of the persistence and even aggravation of such problems, which could threaten and even jeopardize some



of the sustainable development goals (SDGs): at least SDG 2 (zero hunger), 3 (health and well-being), 8 (decent work and economic growth), 11 (sustainable cities and communities), 12 (responsible production and consumption) and 13 (climate action).

#### *3.4. Proposals from Different Social Actors Aimed at Improving Land Use and Achieving Food Security*

Since the end of the twentieth century, the tensions caused by the changes discussed in this article have provoked various social actors to self-organize and occasionally mobilize to protect the agricultural soils of the De La Vega shire, seeking institutional and citizen support for this purpose. This section contemplates and briefly analyzes the demands of the main social actors involved in the defense of this territory, in their aims to achieve the rational and sustainable use of land and to achieve food security and sovereignty.

The demands of these social actors have focused mainly on the agricultural area closest to the municipality of Granada and on its neighboring municipalities, that is, the zone most intensely affected by the urban agglomeration of Granada, which is the part of the De La Vega shire most altered by population growth and the subsequent increase in urban pressure on cultivated land.

The citizen platform ‘Salvemos la Vega’, created in 2005, has been one of the main social actors in raising these demands. This platform has brought together more than fifty groups, including agricultural organizations, environmental associations, women’s associations, cultural associations, and university groups. As indicated on its website:

“The Vega of Granada has been the food resource of its spatial environment par excellence since its first settlers. Today, the food sovereignty of this territory is more limited than ever, mainly due to the abandonment of the fields, the strong urban pressures, and competition from external markets. From our Platform, we seek ways to cooperate, and boost agricultural activity, so that future generations can continue to feed themselves from their land, from their Vega” [33] (p.1)

A key milestone of the platform was the Local Pact for the Vega of Granada, signed in 2015 by all the political groups of the municipality of Granada. This pact reveals a citizens’ and institutional consensus to safeguard and revitalize the agricultural soils of the shire [34].

Among the numerous initiatives promoted by the platform ‘Salvemos la Vega’ to achieve the defense of agricultural land, the proposal for the creation of an agrarian park in the area of the De La Vega shire closest to the core city of Granada has been made, using models already recognized in Spain such as the Baix Llobregat Agrarian Park (in the surroundings of Barcelona), and in other countries such as the Milan South Agrarian Park. The agrarian park has been considered by various authors as representing a transitional phase towards new models of territorial and food governance, promoting the preservation of peri-urban agricultural spaces [35,36]. Although the views on the creation of an agricultural park are positive in general terms, there are also some difficulties in the way of its success. On the one hand, there is a lack of wide knowledge about the functioning and objectives of an agrarian park, which could cause confusion with other leisure parks that have been proposed and rejected in the Vega, such as the Millennium Park. On the other hand, certain farmers have shown a negative attitude towards the administration’s projects due to previous non-compliance. Furthermore, most of the farmers are elderly and do not have an entrepreneurial mentality. This is evidenced by the preference of these farmers for requesting aid or subsidies from the administration rather than opting for the search to diversification and modernization of their activity, seeking alternative marketing, or switching to organic production for sale in short local marketing channels [37].

Furthermore, the platform ‘Salvemos la Vega’ in 2015 recommended the creation of a federation at state level, the Intervegas Federation, with many adherents from different regional governments (i.e., the so-called autonomous communities’), municipalities, universities, and social and educational movements throughout Spain. The first Conference of the Intervegas Federation, held in Granada, encouraged a state pact between different

social representatives from different territories of Spain that promote the defense of fertile soils and food security and sovereignty. The Intervegas Federation has recommended a Proposition of Law (PL) aimed at the protection of agricultural soils. The Federation has stated that the approval of this PL is essential due to the important functions that agricultural areas play in the region's environmental, productive, and historical-cultural ambits, as well as their decisive contribution to food security and sovereignty, the fight against climate change, and the sustainable management of the territory. In the explanatory memorandum of the PL, it is stated:

“Agricultural soils are threatened today as a result of the expansion of the artificial surface, the fragmentation of agricultural areas due to the building of various infrastructures, the abandonment of professional agricultural activity and the loss of the tangible and intangible heritage linked to agriculture. To this must also be added the consequences of certain unsustainable modernization and intensification processes due to their highly polluting effects on water, air and soil, the drying up of wetlands, the overexploitation and depletion of aquifers, the loss of local ecological knowledge and collective governance practices and, as a consequence of all the above, the progressive deterioration of the high resilience capacity that has been characteristic of many inherited agroecosystems” [38] (pp. 1–2)

To this end, the creation of Agricultural Parks among other measures is envisaged as an instrument for the management and protection of fertile soils, as well as the promotion of local consumption through short marketing channels. However, although this initiative has the support of numerous social actors in the different regions of Spain, it has not been approved by the Spanish Government.

Certain proposals have been suggested by the social actors that so far have failed to materialize. In this regard, the following are some proposals that are currently being implemented.

An important actor for the revitalization of the traditionally fertile and irrigated flat areas of the De La Vega shire, through ecological agriculture and agroecology, has been the Agroecological Network of Granada. In 2007 it launched the *Ecomercado* in the Granada city, a recovery of the traditional markets that have traditionally existed, which operates with conditions regarding access to the market, products' origins, and their modes of cultivation, stipulating that they must be grown with agroecological criteria. It is, therefore, a way to integrate the practices of organic farming and agroecology in the cities. This initiative arose from the participation of small organic farmers. In the space of the *Ecomercado*, producers converge from different areas of Granada province, including the De la Vega shire. Specifically, the cooperative 'Valle y Vega' and the association 'Somos Vega, Somos Tierra' can be mentioned.

The latter association, which is also part of the platform 'Salvemos la Vega', have opted for organic farming and agroecology to encourage other models of agricultural development in the De La Vega shire. Their activity has focused, among other things, on the implementation of yearly courses, preferably aimed at unemployed people. These courses offer theoretical and practical training in agroecology. After the courses, people who want to develop a business idea can do so using the association's land bank.

Finally, it is worth mentioning the organic canteen of the Gómez Moreno Public School, managed by the Association of Mothers and Fathers of the same school. Its main objectives have been to promote healthy and sustainable food for schoolchildren to support the local economy, especially the farmers of the De La Vega shire. In addition, they try to foster healthy and sustainable eating habits, both in the school and family environment. The role of school canteens such as this has been evidenced to be effective in improving food security, especially in terms of stimulating healthy eating habits suitable for the prevention of childhood overweight and obesity, as well as promoting appropriate nutritional knowledge [39,40].

In sum, as shown in the previous paragraphs, those social actors referred to above express the need to promote organic farming as a requirement to safeguard the fertile soils of the De La Vega shire. Moreover, these actors are committed to the commercialization of the shire's local farming products through short marketing channels. They consider that this is the most appropriate way to achieve a kind of food security for the inhabitants of Granada, which they believe must be based on food sovereignty; that is, local food production sufficient to supply the needs of the shire's own population.

#### 4. Discussion

Through the data analyzed above, we have shown that one of the characteristics of the De La Vega agrarian shire has been the increase in artificial surface to the detriment of agricultural land. The greatest loss of agricultural land occurred between 1999 and 2009, a time when urbanization was booming in Granada. Urbanization as a phenomenon is not exclusive to the territory under study, but the expansion of the area of non-agricultural soil here considered as artificial land has been shown to be a widespread problem in other areas of Spain [41,42] and beyond [43–45]. This has also led to the emergence of different social actors claiming the defense of agrarian spaces, in other territories outside the shire studied here [46].

In this regard, the results obtained in the previous analyses with respect to the De La Vega shire can be framed in the broader context of the agricultural transformations that have taken place and continue to happen in many rural societies around the world, as they have modernized and been subjected to the dynamics of globalization and increasing urban pressure.

On this basis, it should not be overlooked that the analysis of what is happening in the De La Vega shire must be framed in the context of a series of transformations in the role of agriculture, land use, and the position of farmers, which are common to many other agrarian societies in Spain and abroad. Therefore, the loss of agricultural land closely related to these changes is a problem that is not limited to this region but is shared by many other rural or peri-urban territories across the world. This problem can pose a serious threat, as evidenced by the fact that the intense urbanization that occurred in Spain in the late twentieth century has rendered many fertile agricultural soils unusable, particularly flat alluvial soils. Thus, if urbanization were to continue to advance without any respect for traditional farmland, it could lead to a situation that would be a breeding ground for popular pessimism: the only land left to plow will be the poorest, located on steep slopes or in areas with adverse climates.

Under the current conditions of modernization and increasing urban pressure, land has long ceased to be basically space for food production through agricultural and livestock activities [47]. In traditional rural societies, the crucial importance of the land as an agrarian space for food production was one of the main reasons that its ownership or otherwise a decisive factor in determining the position of farmers and ranchers in the social structure. It is therefore understandable that a marked tendency towards the accumulation of land ownership in a few hands was common in many traditional rural societies. This tendency, which intensified especially as a result of the modernization and technologization processes of agriculture that began in many European countries over the last years of the 19th century [48], is more explainable if we bear in mind that the economic basis for survival in traditional rural societies was fundamentally based on food resources. From the agricultural and livestock activities carried out in these societies, the inhabitants obtained food for themselves which could be habitually traded among the people of nearby cities. In those circumstances, greater or lesser land tenure, as well as the fertility and the more or less productive use made of it [49,50], were key indicators to determine the situation that persons occupied in the social prestige scale. Consequently, land ownership indicated whether one belonged to the class of the 'rich' or to the 'poor' without land and therefore without the necessary guaranteed income for individual and family subsistence.

This explains why the aspiration to own land, as well as the competition for lands of better quality and fertility [51], have been frequent in many traditional rural societies, constituting the expression of struggles for access to better possibilities of social control, power, and privilege in such societies, in which the fact of owning land implied control of the core productive resource for collective subsistence. In contrast to that situation, land ownership in modern rural societies is no longer a key factor in the possession of power, in occupying a relevant position in the socio-economic structure, or in determining the way in which land space is organized and distributed.

Based on the analyses in the preceding pages, we can be assured that the De La Vega agrarian shire is no exception in this sense, and that it constitutes a very significant case of progressive loss of weight in the social scale of its traditional farmers. Many of the region's farmers, apart from suffering the pressures of urban development, are having serious difficulties in selling their products at reasonable prices, in a situation in which they are increasingly dependent on inputs (seeds, fertilizers, equipment, etc.) produced in global markets whose prices they do not control. Under these conditions, it is understandable that many farmers end up yielding to the temptation to get rid of their farms by selling them to be converted into land for development.

At a general level, the reasons why land ownership has ceased to be decisive in shaping the social structure, as well as in determining the position of farmers within it, are so considerably diverse that their explanation cannot be completed in the current discussion. A basic reason for this change is that the gradual strengthening of modern societies also implies the step-by-step development and preponderance of other economic sectors over the primary sector, such as the industrial or secondary sector and the service or tertiary sector. This is linked to rising functional specialization in today's societies, whether urban or rural, since the degree of cultural and socio-economic urbanization of rural societies continues to increase [52].

In these circumstances, both in rural and urban societies, their organizational complexity and degree of labor division tend towards sizable growth. In turn, all this entails a rising need for technical preparation and specific educational training of an increasing quantity of human resources, whose socio-professional status tends therefore to be more highly valued. As an effect of this, certain professionals end up having higher incomes than many landowners and occupying higher positions on the scale of social stratification, compared with farmers, whose position is sometimes in decline in increasingly industrialized, technologized, and bureaucratized modern societies. In these societies, the social structure of the rural milieu is being greatly affected by the gradual quantitative decrease in the active population engaged in agricultural work, as well as by the step-by-step reduction in the numbers of farmers and farms because of the mechanization of crops and the concentration of plots of land that is taking place [53]. In this regard, in this research we have seen how there has been a progressive increase in the size of the agrarian plots in the De La Vega agrarian shire, which has occurred in parallel to the steady reduction in the number of farmers over the years.

In the current situation, both in the De La Vega agrarian shire and in most of today's rural societies, other factors influence the determination of the social position of farmers more than the fact of owning or not owning land. Apart from technical preparation and their levels of educational training, among these factors we can highlight the greater or lesser capacity of growers to influence the decision-making processes that determine the control of the channels of information, social communication, and marketing of the inputs they need to carry out their work. However, these channels are increasingly externalized and in the hands of interests that farmers do not control. The same can be observed with the marketing channels for agricultural outputs.

It should be added that the relevance of land ownership as a determining factor in social stratification decreases further in the context of globalization in today's world, within which the agrarian shire under study increasingly operates. In such a world, the autonomy and maneuvering capacity of states and of farmers and ranchers to decide what they

produce, how they produce it, at what price they sell it, etc., is ever decreasing. All this is happening while large transnational agrifood corporations that extend their productive and commercial networks throughout the world are emerging or consolidating themselves more and more [54,55]. Consequently, an increasing polarization of agrarian social structures is taking place. Within these structures, productive units with a clear advantage are those that are more capable of introducing and making profitable new technological innovations to increase their competitiveness. This advantageous position is independent of the amount of land owned, because, although large productive units are usually in a better position to react to current market demands, it is also true that some small farms in many situations have adapted to the new requirements of the world market by increasing their degree of specialization, which has been favored by the improvement of transport channels and advertising techniques for the marketing of products.

However, the specialization and professionalization of agriculture has in most cases resulted in a significant degree of production concentration [56], and above all in the growing control of farmers' activities taken by a series of large agrifood transnationals that are in a better position to achieve greater economies of scale and withstand long periods of adverse market conditions. Specialization and professionalization have also led to a noteworthy increase in complexity and inequalities in the social structure of the labor division within agriculture, while at the same time restricting the autonomy of farmers and agricultural production units, increasingly dependent on inputs supplied from outside their sector by agrochemical, engineering, processing, or marketing industry complexes.

In the present-day situation, in which the farmers and agriculture of the De La Vega shire are also immersed, while traditional farmers are progressively losing ground, the relative importance of the intra-specific problems of rural society decreases; for instance, the classic tensions and confrontations between landowners and non-landowners tend to diminish [57]. This is one of the main reasons that the traditional conflicts or 'class struggles' between landowners and non-landowners are being diminished, while collective associations struggling in one way or another for the general interests of certain territories are gaining more and more influence and weight, as is the case with different organizations and/or associations in defense of the territory considered in this work. This move to the forefront of interest in the territorial setting is because rural societies are increasingly linked, in an asymmetrical and disadvantageous way, to the global economic system. As a result, farmers have gradually lost autonomy in establishing or controlling the rules regulating the productive and social organization of their environment. In this way, rural settings have ended up becoming a sort of heteronomous place, a kind of spatial heterotopias with respect to the highly changeable and hardly predictable rules guiding the management, organization, and distribution of space on a global scale [58]. In this situation, in both the De La Vega shire and any other current agrarian society, variables such as land prices no longer depend so much on the land's intrinsic quality and/or fertility, but on criteria established outside the rural environment; for instance, on certain financial interests, on the consideration of land as soil to be developed, or on the unpredictable and unstable fluctuations in world demand for certain agricultural products.

The influence of agricultural policies cannot be ignored in this discussion. In the European Union, the Community Agricultural Policy (CAP) conditions land use and farming activities throughout its territory. Thus, the CAP, in general terms, has adapted to the dynamics of the global economic system by favoring a specialized agro-industrial model that competes on a worldwide scale. This model differs substantially from those traditional forms of mixed farming consisting of planting different varieties in proximity, based on the old concept of 'companion plants'. In this way, mixed farming allows the preservation of biodiversity, while allowing the natural qualities of the different species to complement each other. However, the fact is that the CAP has not had the support of these types of agriculture as one of its preferred objectives, which would make possible ways of satisfying local demand for food mainly based on the support of the productive potential of local communities [59]. All this has led to the fact that diverse areas have



specialized in certain crops for export to the world market. Particularly, in our analysis we found an exponential increase in olive groves, something that is not limited to the De La Vega agrarian shire but affects the whole of Andalusia, because the CAP has promoted the specialization of this region in the production and export of olive oil worldwide [60]. The CAP has also favored the intensification and concentration of livestock farming [61]. This aspect has also been observed in the shire, with analysis of the growth of livestock farming and its concentration in recent decades. In addition, CAP subsidies have favored larger livestock farms, increasing disparities within the sector [62]. The latter could be related, as seen in the De La Vega shire, to the disappearance of smaller farms.

Instead of merely discussing the results of the previous part, this section has provided a general reflection aimed at showing how what is happening in the De La Vega shire constitutes a particular empirical materialization of a phenomenon that is widespread in many other places in Spain and overseas. A basic purpose of this reflection has been to reveal how the changes in land use, the role of agriculture, the impacts of urbanization on agricultural areas, the increasing loss farmers' socioeconomic standing, the decrease in the value of agricultural land, food security, etc., are phenomena that are not restricted to the De La Vega shire. Thus, such phenomena develop in line with a global logic of change that, regardless of the specific peculiarities of each case, follows common patterns in most agrarian societies immersed in processes of modernization, population, and urban growth, and experiencing the impact of urbanization. By adopting this discussion strategy, we have tried to go beyond only the description and analysis of the results from the empirical case studied here and have tried to infer from it a series of general ideas, which hopefully will be usefully applied in future lines of research in case studies about similar processes in other contexts in Spain or internationally.

In this scenario, support for locally sustainable agroecological public policies is a recommendation for decision-makers on these issues, which can have very beneficial effects in addressing problems such as those analyzed in this paper with reference to the De La Vega shire.

## 5. Limitations and Future Research

A limitation of this study has been the lack of more up-to-date data on increases in artificial land use. In this sense, a future line of research should focus on collecting and analyzing these data once they become available. In addition, future work will seek to investigate how farmers perceive the transformations referred to in this article, and how they perceive the influence of farming and urban policies. Another future line of research will be to analyze gender differences in all these changes.

## 6. Conclusions

The De La Vega agrarian shire has faced in recent decades deep socioeconomic, demographic, and urban changes that have brought about and are causing noteworthy modifications in land use, the role of agriculture and livestock, and the position of farmers. Regarding changes in land use, artificial land has been augmented to the detriment of other uses, especially agricultural land; the agricultural land area has decreased by 40%, and the usable agricultural land by 25%. These transformations were more intense from 1999 to 2009; that is, during the real estate boom that started at the beginning of the 21st century as a result of the urban development policies applied at that time.

The impact of this boom has been particularly noticeable in the peri-urban areas of the municipalities near the capital city that make up the Granada urban agglomeration. Specifically, in municipalities that have a higher population density and greater demographic dynamism, urbanization pressure has entailed a more widespread loss of agricultural land. Thus, although the population in the De La Vega shire grew by 44% from 1981 to 2021, it has been in the settlements close to the capital where population growth and demographic density have reached their highest levels.

However, while there has been a continuous loss of agricultural land in the peri-urban areas close to the Granada urban agglomeration, in contrast, in the rest of the shire the olive grove area has enlarged from 1982 to 2020 by 131%. The increase in olive groves has occurred in parallel with a 64% decrease in arable crops.

Another noteworthy fact has been the fall in the number of agricultural plots, with a 59% decrease between 1982 and 2020, above all in the municipalities near to Granada city. The most negatively affected have been farmers with plots of less than five hectares, which have decreased by 68%. Hence, in parallel to this, the average surface area of the shire's farms has increased by 9.4%.

The results of this study reveal that in the territories studied there is a close relationship between the increase in demographic dynamism, the intensification of urban pressure, the loss of agricultural land, and the decrease in the number of farms. This relationship, which corroborates the initial hypothesis of this research, is especially evident in the area of greatest urban and demographic dynamism within the De La Vega shire; that is, in the peri-urban area known as the Granada urban agglomeration.

In addition to the above-mentioned decrease in the number of farms, this research has revealed a step-by-step aging of the farm owners and managers. This has to do with the fact that agriculture continues to become less attractive for young people, due both to the great variability of agricultural prices and the low profitability of many agricultural and livestock sectors [48]. In this situation, although the total number of farm owners and managers decreased by 60%, the most affected were those under 35 years old, with a drop of 83%.

The analysis of the results with respect to livestock shows an increase in farm size and a trend towards concentration, particularly in bovine, pig, and poultry farms, where the number of farms has decreased by 18%, 11%, and 79% respectively. In the same order, the number of animals per farm increased by 15%, 74%, and 23%. As for organic production, agricultural and livestock farming have both increased considerably. However, most of this production is destined for export to foreign markets.

All these transformations, as argued in this study, could have negative effects on food security and could also threaten or even jeopardize some of the SDGs. In this scenario, support for locally sustainable agroecological public policies is a recommendation for decision-makers on these issues, which can have very beneficial effects in addressing problems such as those analyzed in this paper with reference to this shire.

It is hoped that this research will aid public policy decision-makers to better understand the situation of the De La Vega shire and, based on this, to apply actions related to the demands of social actors that benefit the common farmer. Policies of this type can also help common farmers to become aware of the transformations that are taking place in their territory and to perceive that the difficulties arising from these transformations are not their own individual problems, but rather structural issues that are part of a broader global dynamic.

In a setting as complex on a global scale as the present one, it is becoming increasingly difficult to understand and manage the intricacies of agriculture that is ever more conditioned by exogenous factors spawned outside the territory in which it is developed. For this reason, a key task of public policy is to further the training of common farmers, who should be required to improve their level of educational preparation and their technical knowledge of crop innovations. This will put them in a better position to know more about the functioning of agricultural policies and markets, enabling them to move more easily through the bureaucratic procedures for requesting financial aid and technical guidance. Furthermore, to the extent that these farmers become aware that their problems are not personal but those of their entire professional group, they will better understand the need to associate with others to defend their interests.

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