

## AGRICULTURAL LAND USE CHANGES IN THE VALEA LUPULUI BETWEEN 1965 – 2010

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### Abstract

Valea Lupului is situated west of Iași and has become a village in 2004, separated administratively from the Rediu. Important land use transformations within Valea Lupului occurred due to its close proximity to the urban influence area. The present paper makes a detailed analysis of land use changes between 1965 and 2010. Changes took place both at the village level and at the built-up area level. These are accompanied by transformations of its territorial borders and surface, the built-up area increasing at the expense of agricultural land. The economic profile of the village has also changed from rural-agricultural to services, meaning that financial power is redirected to the tertiary sector. The results are depicted in a series of graphic and cartographic elements showing the human and economical pressure created by Iași upon the village. Urban - rural migration, real estate investments drive the settlement's administrative, land use, and real estate dynamics.

**Key words:** territorial evolution, land use, Valea Lupului, periurbanisation

The periurbanisation is the most dynamic and actively process that shapes the development of settlements in Romania, causing major changes in them, at socio-economic, urban and land use level. It is favored by proximity of large urban centers and accessibility of private actors to the lands located favorably to the development at low prices. (I. Ianos, 2000). Due to its size and economic status, Iasi is the engine for movement of periurbanisation in northeastern region (O. Stoleriu, 2008).

Urban sprawl caused permanent changes to the economical, social, urban fabric of settlements and usually has a profound effect on land use.

This paper aims to analyze the evolution of land uses and identify particular variables that determine its specificity in Valea Lupului area, west of Iasi, at two levels: the village and in built-up area.

The Valea Lupului village is a relevant case study for the periurbanisation process due to its proximity to a large urban center and to a important transport axis, the E586 European route. Land use changes have been significant in the last 20 years, luxury villas have been constructed, transforming the landscape and the socio structure of the village. Valea Lupului represents an opportunity for urban inhabitants to move back into a more rural setting, but without having to sacrifice any of the comforts associated with urban living. This urban exodus produces profound changes that are reflected in land use. Since 2004,

the small village Valea Lupului has declared a village, through population census, effectively doubling its old village plot, generating the opportunity of massive real estate investments. Two types of evolution have been identified: first, at village level, characterized by the fragmentation of different types of land use, and second, at built-up area level, characterized by the increased expansion of buildable plots, at the expense of agricultural land. Many variables contributed to this process, including urban development, real-estate speculation, and private initiative, and this study tries to analyze the general trends and quantify the results of the dispute between real-estate pressures and traditional agricultural identity.

### MATERIAL AND METHOD

In order to realize the objectives have been used several cartographic materials and databases, like 1:5.000 metropolitan area topographic plans - 1965 edition, 1:25000 topographic maps 1985 edition, 2005 orthorectified aerial images of Iași, 2009 Google Earth images, Valea Lupului G.U.P. (General Urban Plan) from 2002 updated in 2007, the topo-cadastral maps - 1980 edition and the 2000 Corrine Land Cover (CLC) datasets.

The topographic maps and the land use vectors have been processed using the ArcGIS 9.3 software pack, resulting a complex spatial database up to date with modern standards, then processed with Excel 2007 software.

For the first level of analysis, have been compared the topo-cadastral plans of 1980 along with the information from the 2000 Corine Land Cover vectors. Land use changes were mapped out and surfaces have been extracted for each type of land use, followed by the calculus of the ratios of changes for each one.

At the second level of analysis, were digitized and vectorised four time references, respectively 1965, 2002, 2005, 2009 for each construction lot (yard-building), summing all the surfaces, determined the average surface for each household, and the impact of the growing numbers of houses on the agricultural land.

## RESULTS AND DISCUSSIONS

For the two distinct but complementary levels of land use change analysis, the following results are:

### The village level

Analyzing topographical resources were identified following categories of land use: arable, shrubs (unused or degraded agricultural land), built space, mixed crops, orchards, grasslands (including pastures and meadows), vineyards. They vary in proportion to the village land use and their development was done to develop the built space, reducing arable land and increasing fragmentation of cultures.

The analysis has highlighted three aspects of land use change such as:

#### a) The expansion of built space

In 1980 the built area of village was 113.3 ha, the area being placed on the old village center and around agricultural complex in the eastern part of the settlement.

Using the 2000 CLC data, built area increased by 60.2 ha totaling 173.5 ha, including both residential building as well as industrial and commercial centers, built area registered a powerful development after socio-economical flows liberalization in the metropolitan zone. The constructed surface is preferentially located near the main street (E583 route) and around the old village center. European route E586, is an important vector for flows in the region, ensure the communication between the metropolitan area and western regions, including the E85 European communications artery, a large number of business units being situated on the longitudinal axis of the European road.

Space for housing development represent a consequence of major flows of people who choose

to invest in real estate in the incorporated area of the village.

#### b) Degradation of agricultural land

The periurbanisation phenomenon involves an intake of land and financial resources. Mostly urban expansion is done unplanned and uncontrolled, ignoring the cultural aspect of the site, the agricultural traditions being the first to lose. This correlated with post-revolutionary decentralization led to degradation of land and crops, significant decrease of some uses and increase of fragmentation rate of cultures.

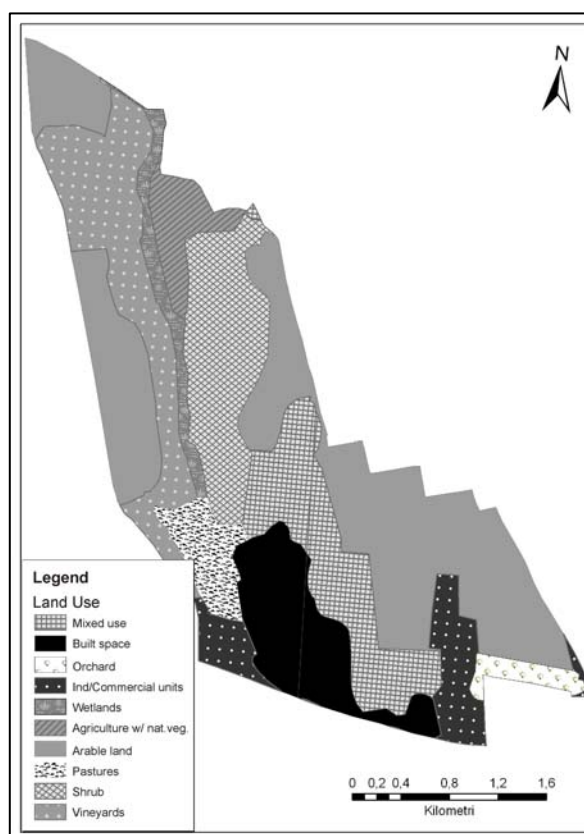


Figure 1 Land use in Valea Lupului (2000)

In just 20 years, from 1980 to 2000, mixed land uses, arable & pastures, arable & vineyards, pastures & vineyards have grown from just over 15 hectares to 170 hectares, meaning an increase of twelve times, leading to the fragmentation of land use (fig. 1).

Agricultural degradation is also shown by the expansion of shrub. Shrubs have no agricultural or economical importance. They are used to rehabilitate degraded lands, are found on areas affected by mass movements or gullying.

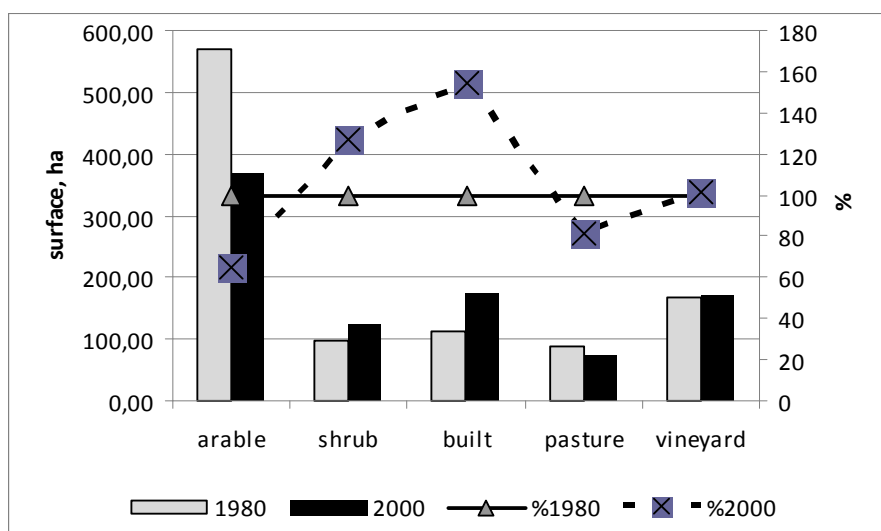


Figure 2 Changes in land use surfaces between 1980-2000

Initially was identified 98.6 ha characterized by landslides and gully, on the left bank of Lupu stream. Due to the high slope and brittle substrate, susceptible to landslides, the area was improved by planting shrubs to stabilize the slope. In 2000 it is noted that the area occupied by shrubs remained around the same nucleus, the area extending by 26 hectares, reaching to 125 hectares, due to some degradation of agricultural practices, the disappearance and degradation of technical facilities and speculative real estate practices (acquisition of plots of land at low prices, then left vacant often covered by reed and shrubs, pending increase value).

Field observations indicate a widespread of unused land, covered by shrubs, especially in the area east of the settlement, where land transactions and urban sprawl are the ones that dictate the land use.

#### c) The evolution of arable area

Between 1980 - 2000 the arable land is mostly reduced, from 570.1 hectares to 368.2 hectares, mainly due to statute administrative changes, by redrawing settlement built-up area by integrating the south and southeast of the village (fig 2).

The factors that contributed to the decreasing of 201.9 ha of arable area is identified as follows: land building extension and communications network, landslides prone slope degradation, transforming use from arable to mixed crops, entirely built-up of the southern part, to create accommodations for the industrial or commercial units.

Another category affected by the incidence of urban pressure, is the pastures and meadows that have fallen by 20% from 89.3 ha to 72.4 ha,

particularly in built-up area, as a consequence of the lots for new construction.

This decline is also an indicator in changing of economical practices, many farmers has given up growing livestock, the principal consumer of pastures. This reflects a increased trend in the economical structure of the population, which has turned from subsistence agriculture towards the tertiary sector, services and trade.

The village landscape is not entirely affected by changes caused by urban assault or continues land degradation. Thus, the western part of the village, on the right side of the Lupu stream, presents a continuous band of 15.5 hectares of vineyard, currently kept fully, that gives a certain space stability being located near the old part of the settlement, which is much less influenced by the wave of newcomers. This is driven by greater distance to Iasi, slope and lack of optimal infrastructure for development projects.

#### The built-up area level

Factors influencing territorial dynamics of built-up area of the localities have a high magnitude, being larger changes. The population represent the changing vector, due to the increasing number of settlers coming from Iași to the village, after 1989. Maps analysis reveals a high dynamic of residential buildings starting in 2005, emphasizing two evolutionary aspects namely: the number of houses and the household surface occupied in relation to available agricultural land on built-up area.

#### a) Relations between built area and agricultural land

The evolution of the area occupied by buildings illustrates a continuous and almost linear

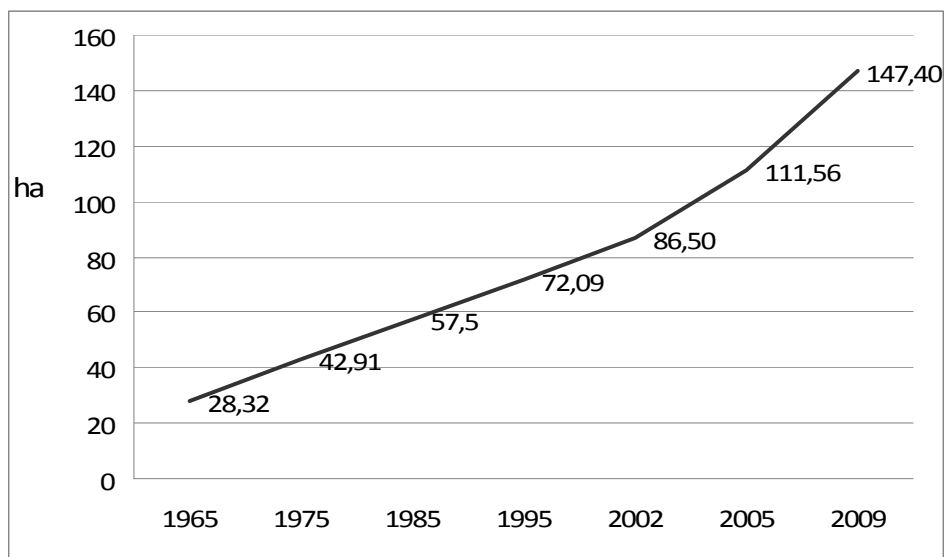


Figure 3 The evolution of the area occupied by buildings in Valea Lupului

growth due to the territorial expansion of Valea Lupului. In the last 45 years, inhabited area increased from 28 hectares to 147 hectares, an increase of 5.2 times, caused by increasing number of established families. To analyze this evolution, a synthetic indicator was used, namely the medium surface of each individual built plot (building yard). In 2002, the mean surface of a built plot was 863 sq m. Analyzing real estate offers after 2004, most plots had 1000 sq m surfaces, even though some of the plots being sold had up to 2500 sq m. To simplify calculations and evaluate the impact of these plots on land use changes were considered, from 1965 to 2002, an 860 sq m mean surface, and from 2002 to 2009, a 1000 sq m mean surface, making 2002 a turning point for the increase of the area occupied by built plots. (fig.3).

In 1965, built plots occupied only 28.3 ha, the main land use being agriculture, of which, 288.9 ha arable, 16.1 ha shrub, 11.2 ha orchards,

22.1 ha vineyards and 9.7 ha pastures. The 1965 edition of topographic maps indicated 10 km of roads with 5 ha combined surface, most of them with a width under of 5 m, the typical width of two-way streets in the village center.

In 2002, the building area increased to 86.5 ha occupying important agricultural land. Among the most significant changes is highlighted losses of arable lands, with a decrease of 65.2 hectares from 288.9 to 223.7 ha and the area covered with vineyards, 6.14 hectares, from 22.09 to 15.95.

The other land uses have milder changes such as: shrubs 0.42 ha, 2.93 ha orchards, pastures and meadow 3.45 hectares, caused mainly by land reparcelling. In 1965 the majority of these uses appear complementary to households being included on the same property, these cultures being lost and replaced by new building yards once of the land reparcelling after 2002 (fig. 4)

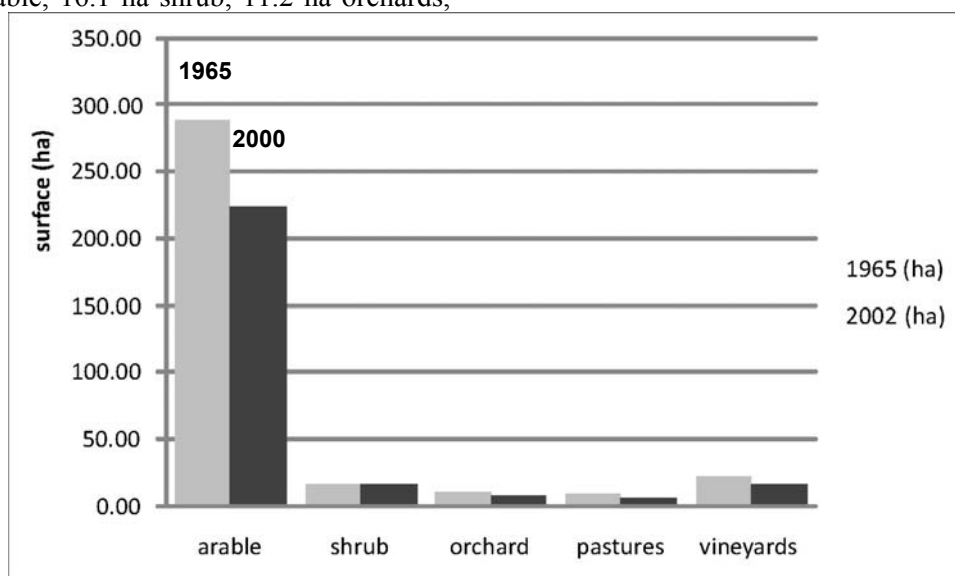


Figure 4 Agricultural surface changes between 1965 and 2002 in Valea Lupului

*b) The evolution of the number of buildings*

The evolution of the buildings in the period under review can be analyzed both in terms of actual number of dwellings or buildings which were completed at each stage, as well as in terms of spatial distribution and the evolution of their nuclei concentration. Analysis shows an increasing trend of accelerated growth in the number of houses from 17 to 113 new houses per year.

The dynamic of buildings for the last 45 years presents an upward trend regarding the number of houses being built, supported by the village population growth. 1965 represents the start of this real estate growth, when there were only 353 houses, gradually evolved from 1003 in 2002, 1284 in 2005 and 1734 in 2009. In the period 1965-2002, considering a linear upward trend of new buildings, was estimated an annual increase of 16-17 new houses. In subsequent periods, 2002-2005 and 2005-2009, annual growth reached 94-95 respectively 112-113. Analysis indicate an increasing trend of accelerated growth in the number of houses from 17 to 113 new houses per year. (fig 5).

Each period has different growth directions with a clear eastward tendency. In 1965, the buildings were devised into two groups, in the village center in the west, and next to the agricultural complex in the east. Between 1965 and 2002, new buildings appear east of the village center. By 2002, building directions become chaotic, constructions appearing all over the newly expanded village plot. Between 2005 and 2009 is noticed a new ordering of buildings alongside the newly constructed roadways. Figure 6 illustrates the distribution of buildings density across the built-up area in 2009. To classify the interpolated image, 11 statistical classes were used, varying from 0 to 1980 units per sq km, evidencing multiple high-density areas, with over 1260 units per sq km, with a longitudinal distribution alongside the main roads. Due to the continuous evolution of the village, the building density highest is noticed in the eastern part of the old village center, with an extension along the main road, followed by the old village center. There are several dispersed buildings centers in east, around the road that leads to the agricultural farm, one of the best roads in the village, which favors the installation of new inhabitants looking to have easy access with their cars.

In 1965, the maximum density was of 1080 units per sq km and the buildings were situated mostly in the western part of the village, on the banks of Lupu stream and on the northern part of the European road E583. 2002 shows a trend of eastward expansion along the existing roads, as

well as the evolution of a new built-up area along the road leading to the former agricultural complex. Four main density axes oriented perpendicular to the European road E583 can be identified, emphasizing the importance of the main communication road in the village's shape.

Between 2002 and 2005, residential houses are built in all directions perpendicular on the existing built centers. A possible explanation can be given by the need for cheaper land, in the northern part and to the proximity of the previously built areas of the newcomers families, with above average incomes, looking for a peaceful and clean environment for their homes.

From 2005 to 2009, new residential centers are defined, a lot more dispersed and heterogeneous in shape and location. These centers were formed by the more expensive southern plots, which offered easy access and utilities to homes, or by the northern plots, with low accessibility and bad infrastructure, which keep land price down. The year 2009, reveals a complex urban mosaic, created by the need for accessibility and land price. These newly built areas, a mix and match of one, two and even three story buildings, randomly built, unaesthetic, with no common spaces to consider.

The analyzed data indicate that the Valea Lupului village is divided in two different zones, west with the traditional village, keeping its cultural identity and rural aspects, and the eastern part, characterized by the heterogeneity, being impossible to preserve the agricultural lifestyle, the real estate companies imposing the constructible plots.

## CONCLUSIONS

Land use changes in the Valea Lupului are significant, both at the village level and at the built-up area level.

Agricultural land has been continuously degraded since 1989, land lots being more and more fragmented.

The land use changes in the built-up area are even more important. Agriculture has been severely affected by real estate development, arable lands and vineyards making way for the new housing complexes, personal villas and roads.

## BIBLIOGRAPHY

- Ianoș, I., 2000 - *Sisteme teritoriale*, editura Tehnică, București.  
 Stoleriu, O., 2008 - *Evoluția uman geografică și urbanistică a orașului Iași în perioada postbelică*, editura Terra Nostra, Iași.  
 \*\*\*, 2007 - *Planul urbanistic general al comunei Valea Lupului*.



Figure 5 The evolution of the number of buildings between 1965 and 2009 in Valea Lupului

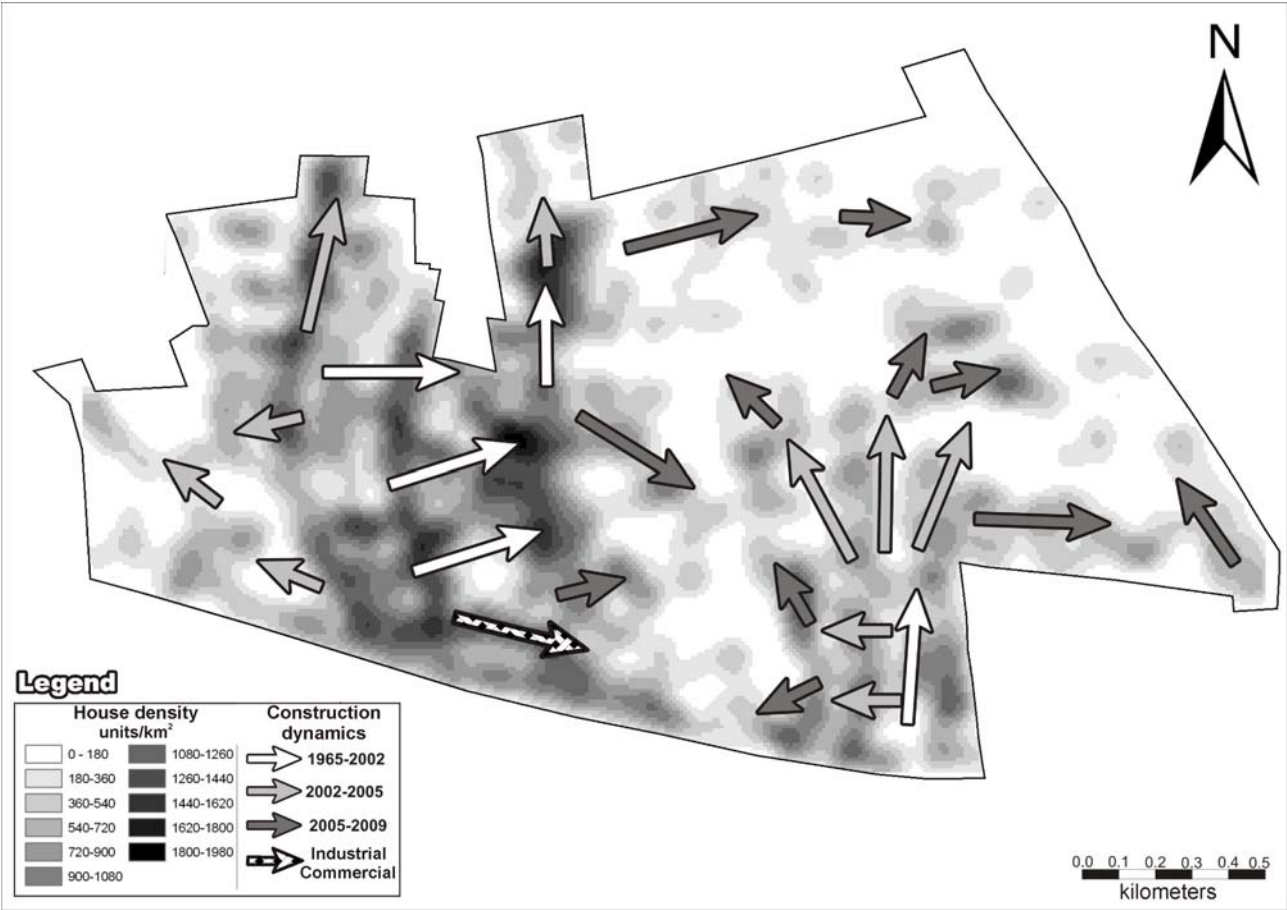


Figure 6 Building density and dynamics between 1965 and 2009 in Valea Lupului