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Construction coefficient in the settlements of Gllogoc Municipality (Republic of Kosova)

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Abstract. This paper evaluates the built area within “cadastral zones” (subdivisions of municipalities) in order to identify the expansion tendencies of settlements, with the aim of contributing to preventing future uncontrolled developments. Demographic growth always needs more construction so it is important to provide a spatial analysis of land use. The paper is focused on the expansion dynamics of built areas within cadastral zones due to rapid social and economic changes. The lack of researches for the Drenica region has affected land use, which has been unplanned and not-to-standard, and has not preserved agricultural land. In the last two decades – since 1999 – there has been considerable growth in the construction sector across all of Kosovo. Although, according to the spatial plan, property owners have the right to develop and use their own property in their own best interests, these regulations do not give them the right to work outside the legal framework of the local plan itself. Land use should be in full compliance with spatial plans, both national and local. This study will contribute to the sustainable urbanisation of settlements and preservation of agricultural land. The results of the study will also help to make important decisions for built areas, in also providing necessary recommendations for steps to be taken to have a land use based on common interests.

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1. Introduction

This paper focuses mainly on the importance of using spatial data in analysing and tracking social and economic developments in the municipality of Glllogoc/Glogovc territory, with the aim of getting results that will help in making important decisions about its future spatial development and expansion.

Administrative and legal spatial planning is based on land use patterns by defining clearly the areas for the development of socio-economic activities, in order to conserve the best agricultural land and increase citizens' quality of life. To achieve this, planning is settled by laws ranging from national spatial planning at the first level, municipal development plans at the second, and detailed urban plans at the third and lower levels.

According to the new law of administrative boundaries (Law no. 03/L-041), Kosovo is organised into 38 administrative municipalities. Each municipality is further divided into cadastral zones, i.e. areas containing one or more settlements.

If we analyse the legal framework of Kosovo we will come to the conclusion that there is still work to be done for its improvement, including to the planning regulations set out by the European Spatial Planning Directives.

Land use should be in full compliance with spatial plans, both at the national and local level, so the municipality of Glllogoc approved the Municipal Development Plan for the period 2010–2020.

In the case of Glllogoc, the implementation of numerous projects in infrastructure, education, culture, sport, and other economic and residential buildings, have rapidly transformed space, but the lack of political power and will to implement the rules set up in the development plans continue to be destructive to the land.

Over the last two decades – since 1999 – there has been a significant increase in the construction sector. Although, according to the local plan,

land owners have the right to develop and use their property to their own best interest, this should still remain within the legal provisions of the same local plan.

Due to the lack of administrative and legal rules and not following urban plans, the settlements in the municipality of Glllogoc (also known as Glogovc) have continued to spread in a chaotic and unplanned manner, causing distressing effects on the environment.

The results of this paper will help to make important decisions in the future to restrict the construction area. They will also help provide the necessary recommendations on steps to be taken to have land use in accordance with citizens' common interests.

The municipality of Glllogoc, which has a very favourable geographical location and very good agricultural land, has undergone continuous socio-economic changes, so the increase in constructed areas is highly expressed in the use of land both for residential buildings and for economic and service activities. Consequently, construction areas have continued to expand while agricultural lands have been constantly shrinking.

Since the 1980s, when the agrarian reform started, Glllogoc has used its agricultural land according to the criteria of landscaping defined in the project of Land Consolidation (Komasacion – the totality of unregulated lands converted into regulated land and then distributed to the owners according to the total area they had when they were unregulated. (<http://juridiksi.e-monsite.com/faq/e-drejte-civile/nocioni-i-pronesis-dhe-menytrat-e-fitimit-te-saj.html>), but after 1999 a large portion of projects changed purpose and were transformed into residential and economic areas (Meha, Idrizi, 2010).

In this situation it is necessary to draw up development plans and strategies to limit the expansion of construction areas on agricultural land and to set up strong administrative rules that will support the use of free spaces within current residential areas (Ramadani, 2004).

People live and depend on the land, which is one of the most important and vulnerable resources, but frequently they have had major unintentional impacts on its loss (Richter, 2007). Agricultural lands in the peripheries of cities serve as transitional areas from natural and rural habitats to urban landscapes. They also serve to offer food and clean air and water for urban areas and are also known as buffer zones that reduce the negative effects between urban and peripheral natural ecosystems (Doygün, 2009). The urban, peripheral and suburban expansion into agricultural landscapes and in other rural environments has brought about numerous public concerns over land use patterns (Berry, 1978).

The growth in global population over the last five decades has resulted in unprecedented spatial expansion of many cities in all directions (Hardoy et al., 2001). The rapid and casual expansion of urban areas has caused many changes in land coverage. Forests and catchment areas are continually threatened by large and dense settlements (Archer, 1989; Mount, 1995). Agricultural capacity is being reduced by the urbanisation of high quality agricultural land (Kim, Mizuno, 2003). In fact, the impact of the urban activities of cities of all sizes on environmental trend is increasing on a local, regional and global scale (United Nations, 2001).

Population growth in Kosovo is expressed in the chaotic expansion of settlements, which are spreading in productive areas. Up to the 1960s there were few changes in the population's spatial and social mobility, in settlements' concentrations and in the territorial expansion of cities. After those years, there were significant changes in the demographic concentration and spatial expansion of cities and in all aspects of lifestyle, such as housing, food, clothing, personal hygiene, etc. In 1953 the urban population of Kosovo was 139,130 or 17.1% of total population; in 1981 it was 31.9%; in 1991 about 38%; and it has now reached 45%. The size of the urban population grew from 71,340 inhabitants in 1948 to 739,196 in 1991. In the period 1953–1981 the urban population increased by to 365,599, or by 362.8%, while in the period 1953–1991 it grew by 600,066 inhabitants, or by 531.3%. Nowadays, about 45% of Kosovo's population lives in cities, which is 8% lower than the global average. Housing stock and its area have increased both in villages and in cities. In the urban settlements of Kosovo,

the number of flats increased from 21,000 in 1951 to 88,000 in 1981, which has since then doubled (Kosovo Agency of Statistics, 2013).

The impact of urbanisation on agricultural land became an academic concern during the 1950s (Bogue, 1956). By the late 1960s, Gilbert conducted a comprehensive study on the impact of cities on different environmental resources and had a whole chapter on lands (Gilbert, 1989). Land use plans in the municipality of Glllogoc/Glogovc and almost throughout Kosovo have not been fully implemented and have led to changes in the repurposing of agricultural lands, which have now become construction sites. The changes in land use patterns have also affected other processes such as: reducing productive land resources; erosion; local climate; and so on. The population and settlements in hilly and mountainous areas are shrinking due to migration and settlement in the highly fertile lowland areas. The number of residents in these settlements is increasing and they are expanding rapidly, occupying larger areas.

In the past, the peripheral area around settlements (towns and villages) has served as a transition area between urban landscape and natural habitats, but now the settlements have expanded rapidly and the periphery has been transformed into a construction area. Thus, urbanisation has also caused changes in land cover. Inappropriate planning has affected large agricultural areas, especially those lying alongside the region's main roads. Therefore, it is necessary to design and implement zoning of settlements to protect the agricultural land from improper uses that will affect the long-term economic sustainability of the area within the region (Kruft, 2001).

This problem is analysed with a focus on the demographic potential, patterns and intensity of land use, patterns and style of construction, etc. The implementation of zoning control indicators in the development plans of every level – municipal, urban and regional – is an indispensable and key element, since the entire activity and organisation of urban life is and will be related to them. The main objective of zoning should be rational land use in accordance with sustainable development principles (Riddell, 2004). These principles are comprehensively investigated in Williams (2010), Guy and Marvin (1999), Jenks et al. (1996), Holden (2004), Hoyer and Holden (2003, 2001), McLaren (1992) and Ban-

ister (1992), who discuss this process as an interaction between social and technical solutions for sustainable cities. Sustainable settlements are developed based on some important criteria: high density and integrated land use (Kenworthy, 2006); the diversity of activities (Jacobs, 2002); mixed land use or heterogeneous zoning; compactness of built environment (Rudolf et al., 2017); sustainable transportation (Acioly, 2000); passive solar design through the orientation of construction and the density of construction; and “greening” of the city, where greening enables the integration of society with nature (Dagmar et al., 2017).

Construction density is one of the most important factors and criteria for urban development and regulation planning. Many studies emphasise a strong correlation between urban density and sustainability, especially in relation to transport (Newman, Kenworthy, 1989; Næss, 2012) with numerous benefits (Van der Waals, 2000; Burton, 2001; Gordon and Richardson, 1997; Thinh et al., 2002).

Construction density should be in full compliance with road, technical, social and educational infrastructure. Construction density should also ensure the fulfilment of other conditions such as the conditions of natural lighting, ventilation and fire extinguishing. This will also be reflected in protection of agricultural land, protection of the environment, and the proper management and use of land within the urban territory. Good management would also yield concrete results for resource conservation for future generations.

2. Study area

The Drenica region, where the municipality of Glogoc is situated, has an area of 1,356.54 sq. km. Geographically it is between the plain of Kosovo and the plateau of Dukagjin. The central part of the Drenica commune is occupied by the plain of Drenica at an altitude of 700 m. On the western and eastern part of this plain there are some terraces, small hills and low-to-average altitudes of up to 1,100 m. In the south of the Drenica plain lies the municipality of Glogoc, which has an area of 275.95 sq. km, 58,531 inhabitants, two urban areas and 35 small settlements, which are mostly spread around

the region and less compact, with mixed typology (Group of Authors, 2013). Its very favourable geographic location at the intersection of important national roads (Morinë-Merdare Highway) with regional roads, gives it a unique geocommunication and geo-strategic position. Its natural resources and demographic potentials with a relatively young population are two important factors that support the economic and social development of the municipality of Glogoc.

The dynamics of socio-economical activities according to the participation of the active population have changed for the Glogoc municipality. In 1961, by functional categorisation, the Glogoc municipality was characterised by the active population participating in: agriculture – category A (very high); industry – category C (partially); construction – category D (low); and other activities such as commerce, hotels, crafts, cultural, educational, health and administration – category E (very low). In 1981 the functional categorisation of this municipality changed, with the participation of the active population in agriculture now in category C (partially), in industry D (low), in communication C (partially), in commerce, hotels and tourism D



Fig. 1. Geographical position of Glogoc municipality

Source: Çela T, 2018

(low), in education, culture, health, and administration C (partially).

This is an indicator that the development of socio-economic activities has stimulated the functional and spatial transformation of the municipality due to the increase in economic and administrative activities for two decades when the participation rate of the active population in the primary sector decreased (Pushka, 1990).

The development of socio-economic activities has continued to have a positive impact on housing and economic capacity building, but in recent years these developments have had significant impacts on the construction of residential, commercial and industrial buildings without plans and not following urban standards, which have damaged the physiognomy, structure and compactness of settlements in general.

The advantageous geographic position and the natural resources of this area and of the whole of Kosovo have offered favourable living conditions for groups of people and populations since ancient times. The Drenica region has been at an intersection of important roads that connected different regions of the Balkan Peninsula since antiquity. The territory of Glllogoc's municipality was crossed by the Pristina–Peja road, a branch of which goes through the territory of Llapusha and connects Dukagjini and Kosovo region.

In the region, there are many ruins testifying to the existence of its settlements since ancient times, such as Gradina Fortress in Llapushnik; the remains of Ndreka Church in Gllavica (Kishnarekë), etc. This region, as with the other parts of the Balkan Peninsula, was inhabited by Illyrian tribes (Encyclopaedia of Kosovo, 2018).

The Drenica region and its population were frequently the target of different invaders, especially the Serbs. Drenica's people have been a symbol of resistance for freedom in their territory since antiquity. Numerous Serbs and Montenegrins have settled in the Drenica region in different periods. In the territory of Glllogoc municipality, from the 1920s to the 1940s, over 330 families settled in the settlements of Çikatova e Re, Çikatova e Vjetër, Pokleku, Korrotica e Epërme, Korrotica e Poshtme, Gllanasella, Dobrosheci, Baica e Elshanit, Gllbari, Krajkova, Tersteniku, Abria e Epërme, Qirezzi, and Polluzha.

Glllogoc municipality became known for its economic development in the 1980s when the “Ferromickel” factory was built and put into operation and the Ibër-Lepenc watering system was set up to provide water for over 3,500 hectares of agricultural land.

The population of this area is also known as the main supporter of armed resistance in the mid-1990s, specifically with regard to the formation of the first UÇK (Kosovo Liberation Army) cells, which on March 5th, 1998 publicly defended the innocent population, helping them also to bury the victims of the massacre of Likoshan and Qirez. The last war for Independence in Kosovo left the region of Drenica with much damage, both in terms of the number of people who lost their lives protecting their country and the economic aspect, with 5,324 houses, 30 schools, 14 health facilities and 6 religious sites having been destroyed.

Nowadays, the municipality of Glllogoc is showing progress both in terms of the spatial distribution of settlements and in terms of economic development, transforming its businesses through the privatisation of public sector industries.

3. Data and methods

This research has used different sources for data collecting and scientific methods. It used satellite images, various maps, and the census for land cover to better understand the impact that the urbanisation process has had on the soil resources of Drenica territory. Furthermore, the gathered data were structured, processed and analysed to produce the final results of the paper. The statistical methods used in the GIS program also helped to increase the role of applied geography in spatial planning and spatial analysis processes for the land use patterns in the Republic of Kosovo. For this paper, it was necessary to prepare vector layers and a base map from aerial images and data gathered in the field. The data gathered through digital surveys give information on the families, operators and social activities at the settlement level, including also the spatial component. For this research, the desk work lasted 20 days to structure the records for 11,000 residential buildings and 35 cadastral zones, also including

data for areas with residential, economic and social functions. The gathered data were then systemised and structured to fit and be used in the appropriate programs for further analyses, including the GIS application. Lastly, the correlations between the socio-economic structure and land use were analysed, the data was systematised and processed, the legal framework was reviewed, analysis was carried out, and causes were interpreted, which led to the results of the research.

The analysis was done by processing both the digital data obtained by scanning and rectifying maps, and various thematic data needed to demonstrate facts and spatial developments. In this paper the material review analysis and interpretation are combined in the Geographic Information Systems (GIS). A GIS software application was also used to generate spatial data from topographic maps, thematic maps, and data from satellite images.

GIS techniques were used to accomplish the research. Spatial component data were structured in order to identify social and economic activities, and then, finally, were analysed in GIS software in order to present them using maps. GIS also offered professional support to identify the necessary suggestions for the development and spatial transformation of the settlements in the future.

4. Research results

Built areas and the construction coefficient

The municipality of Gllgoc has an area of 27,595 hectares, divided into 35 cadastral zones (settlements). They are classified according to their size as follows: 13 settlements (or 37.1%) with cadastral zones smaller than 500 hectares; 11 settlements (or 31.4%) with cadastral zones of 501 to 1,000 hectares; 9 settlements (or 25.7%) with cadastral zones of 1,001 to 1,500 hectares and only 2 (or 5.7%) settlements with cadastral zones larger than 1,501 hectares.

While most of the municipal's settlements have cadastral zones smaller than 500 hectares, according to the land use for residential, economic, and social activities, the majority of them (48.6%) have built areas of 20 to 50 hectares, 31.4% of settlements have built areas of 50.1 to 100 hectares, and 14.3% have built areas larger than 101 hectares. It is important to emphasise that only 5.7% of settlements have built areas of less than 20 hectares. Table 2 shows that, of the total area of the municipality (27,595 hectares), 8.3% is built area for residential purposes, road infrastructure, social, cultural and economic

Table 1. Study Approaches

Methodology	Basic Materials	Data Structure	Data Formats	Used Applications	Submission forms
Survey and interview	Topographic maps: 1:25,000, (1979)	Alphanumeric	Excel file *xls	Microsoft Office Excel 2007	Textual
	1:50,000, (2000)				
Use of literature	1:100,000, (1976)	Raster	Word document *doc	Microsoft Office Word 2007	Submission forms
	Thematic maps				
Document Scan	Ortho photo; (2000, 2004, 2012)	Vector (Point, line, polygon)	*jpg	Paint	Cartographic
Observation	Satellite Images (2009)		*bmp	CSPro 4.1	Graphic
Comparison Analysis	Photography		*tab	MapInfo	Photographic
GIS	Legal base literature		pdf	Vertical Mapper ArcGIS	Schematic
GPS					

Source: Authors

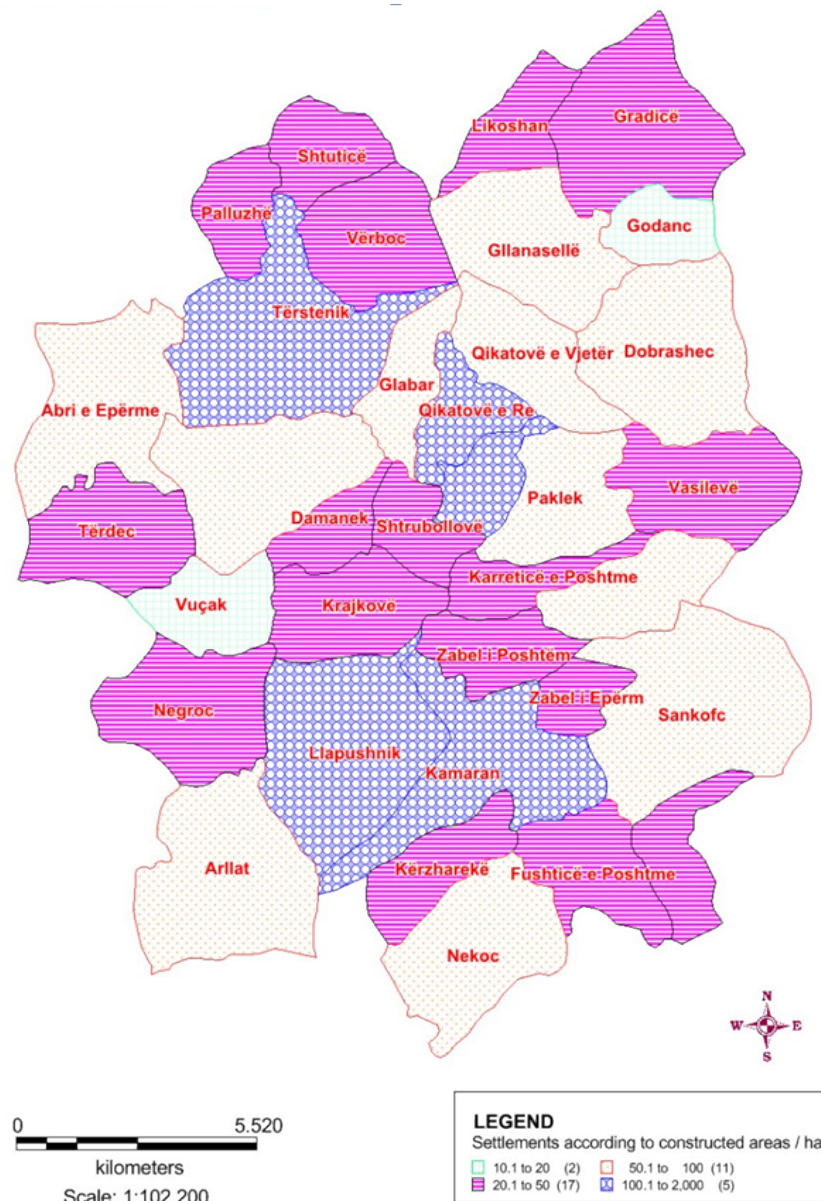


Fig. 2. Number of settlements according to the size of built-up area
Source: Çela T, 2018

buildings. The settlements that have cadastral zones larger than 1,000 hectares usually have a built area of less than 10% of their total cadastral area, except for the cadastral zone of Komoran, which has a cadastral zone of 1,226 hectares and a residential area of 181.5 hectares, or 14.8%. The settlements of Glogoc (49.6%) and Çikatova e Re (42.2%) have experienced a significant increase in built areas, firstly as a result of the increase in the number of households as an urban centre with administrative functions and secondly due to an increase in industrial activities.

The 2001 Report on Spatial Development of the Municipality of Glogoc indicates dynamic growth and development trends also in the socio-economic activities. Next in the paper, we will clarify the spatial development of settlements based on the area of the administrative municipality, the inhabited area and the residential complex area.

Table 3 shows that the total land surface area of the constructed zone is 2,304 hectares (8.3%), where the residential complex area occupies 240.2 hectares, or 10.4%. The construction coefficient of the inhabited zone in Glogoc municipality is later

Table 2. Surface area of cadastral zones and built areas, by settlement

Name of settlement	Cadastral area/ha*	Constructed area/ha**	% Constructed area	Households***	Density co. area/ HH	Density ca. Area/ HH
Abri e Epërme	1,199.42	66.02	5.50	249	0.27	4.82
Arllat	1,391.62	86.06	6.18	412	0.21	3.38
Baicë e Elshanit	1,174.51	86.89	7.40	326	0.27	3.60
Çikatovë e Re	434.90	183.45	42.18	331	0.55	1.31
Çikatovë e Vjetër	708.41	68.58	9.68	188	0.36	3.77
Damanek	332.72	26.89	8.08	99	0.27	3.36
Dobrashec	1,270.11	60.58	4.77	215	0.28	5.91
Fushticë e Epërme	461.30	27.14	5.88	125	0.22	3.69
Fushticë e Poshtme	653.02	42.47	6.50	130	0.33	5.02
Glabar	452.11	53.32	11.79	228	0.23	1.98
Gllagoc	355.78	176.38	49.58	1047	0.17	0.34
Gllanasellë	1,033.91	78.24	7.57	243	0.32	4.25
Godanc	367.62	14.40	3.92	56	0.26	6.56
Gradicë	1,220.76	40.55	3.32	131	0.31	9.32
Kamaran	1,226.13	181.47	14.80	802	0.23	1.53
Karreticë e Epërme	658.36	73.02	11.09	184	0.40	3.58
Karreticë e Poshtme	379.11	45.64	12.04	151	0.30	2.51
Kërzharekë	523.42	44.42	8.49	216	0.21	2.42
Krajkovë	744.44	48.04	6.45	181	0.27	4.11
Likoshan	447.15	27.31	6.11	88	0.31	5.08
Llapushnik	1,480.38	133.69	9.03	511	0.26	2.90
Negroc	953.06	42.95	4.51	191	0.22	4.99
Nekoc	1,054.56	90.65	8.60	453	0.20	2.33
Paklek	742.15	94.31	12.71	312	0.30	2.38
Palluzhë	410.86	43.21	10.52	136	0.32	3.02
Sankofc	1,679.97	52.35	3.12	205	0.26	8.19
Shtrubollovë	386.79	45.32	11.72	175	0.26	2.21
Shtuticë	467.79	32.29	6.90	136	0.24	3.44
Tërdec	821.31	39.67	4.83	159	0.25	5.17
Tërstenik	1,599.08	147.39	9.22	541	0.27	2.96
Vasilevë	876.16	24.53	2.80	89	0.28	9.84
Vërboc	796.54	46.51	5.84	180	0.26	4.43
Vuçak	530.93	13.18	2.48	48	0.27	11.06
Zabel i Epërm	272.64	20.78	7.62	72	0.29	3.79
Zabel i Poshtëm	488.97	46.59	9.53	170	0.27	2.88
Total	27,595.00	2,304.29	8.35%	8780		

Clarification: **Density co. area** – Density of constructed area, **Density ca. area** – Density of cadastral area, **HH** – Households

* Vector data, Cadastral Agency of Kosovo, Ministry of Environment and Spatial Planning

** Aerial images = 40cm/pixel, Cadastral Agency of Kosovo

*** Agency of Statistics of Kosovo, Census 2011 (census.rks-gov.net)

Table 3. Surface area of inhabited zones

Municipality	Land surface area of municipality	Land surface area of constructed zone	Inhabited zone complex
Glllogoc	27,595 ha	2,304 (8.3%)	240.2 ha (10.4%)

explained in the research, while construction intensity has been estimated using the appropriate parameters (Vresek, 1980):

- Construction coefficient (construction participation)

- Land use coefficient

$$Cciz = NCA / Sam$$

$$Cc = 2304 / 27595$$

$$Cc = 0.083$$

$$Luc = 1 / Cc$$

$$Cc = 1 / 0.083$$

$$Cc = 11.97$$

Cciz – Construction coefficient in the inhabited zone, NCA– Net constructed surface areas, Sam– Surface area of the administrative municipality.

Construction coefficient in the inhabited zone (Cciz) – The coefficient of land use indicates the empty areas with the potential to increase the density (congestion) in the future. Land Use Coefficient (Luc) – The respective value of the construction coefficient indicates the land needed for 1 m² of constructed zone.

The estimated ratio of the number of facilities/buildings constructed in settlements on the total municipality cadastral land areas is 1.99 ha for construction of facilities/buildings, while in fact, the ratio between residential buildings and the municipal cadastral land area is 3.52 ha/residential building.

$$Ccfml = NLAM / Ncf = 27959 / 1397 = 1.99$$

$$Ccml = NLAM / Ncf = 27959 - 7922 = 3.52$$

Ccfml – Construction coefficient of constructed facilities at municipal level, Ccml – Construction coefficient of residential buildings at municipal level, NLAM – Net land surface area of the municipality, Ncf – Number of constructed facilities/buildings.

Individual residences in the settlements of Glllogoc have small land plots, mainly in the central zone of settlements. The particular features of individual constructions are:

- Construction without plan,

- Low construction index = 0.083,
 - Low land plot use index = 11.97,
 - Low density in the residential zone = 0.47 inhab/ha.

Compared to others, some of the settlements of this municipality, such as Glllogoc, Çikatova e Re, Kamaran, Korrotica e Eperme, Korrotica e Poshtme, and Shtrubullova have 11% to 49% of the cadastral area used for economic and social activities. The spatial development trend is more rapid in the last decade because two of them (Glllogoc and Kamaran) are lately classified as urban areas and the others are located alongside important regional roads and highways. As the orthophoto (Fig. 3) shows, the administrative centre of the municipality lies in the cadastral zone of Glllogoc with a spatial development trend stretching toward the north-western part. This area, considering the expansion of socio-economic and housing activities extends to the cadastral zones of Çikatova e Re and Shtrubullova, which together form the urban area of the town of Glllogoc.

Most of the economic, administrative, cultural, sports and educational activities take place in the central, western, northern and southern part of the settlement of Glllogoc. The south-eastern part Çikatova e Re settlement is an integrated part of the urban area which tends to extend toward the north-eastern part of the Shtrubullova settlement.

It is important to emphasise that the development trend of the built area is more evident in the settlements located along the Pristina–Peja highway (Korrotica e Epërme, Kamaran, Orllat) and the Mitrovica–Carraleva regional road (Zabel i Poshtëm, Korrotica e Poshtme, Glllogoc, Çikatova e Re, Glllogoc, Terstenik and Polluzha) (Fig. 4).

5. Conclusions

The urbanisation process has changed the land cover of the municipality of Glllogoc. The changes in



Fig. 3. Constructed area in the town of Gllagoc
 Source: Çela T, 2018

land use are more evident as a result of the lack of municipal and urban development plans. Field observations and surveys identified a high concentration of settlements in the lowlands, with altitudes below 700 metres a.s.l., where most of the settlements and population are located. Also, the extension of the rural settlements has been unplanned and chaotic, causing a reduction in soil resources and fragmentation of agricultural lands. The settlements have mostly been extended along main roads to have better access to and connection with other regions.

The expansion of settlements has been affected by: a lack of detailed plans for urban areas; illegal constructions; a lack of spatial, economic and envi-

ronmental strategies; and a lack of political will to make important decisions on the spatial organisation of settlements. The extension of the settlements has been without plans, a well-defined organisational structure or the accompanying infrastructure, and with many illegal constructions, all resulting in the continuous loss of agricultural land and damage to settlements' physiognomy.

As mentioned above, the municipality has an unfavourable climate, but it has fertile agricultural land and an irrigation system that offer good opportunities for the development of this economic sector, which makes it very important to study the settlements' extension tendency and the built areas



Fig. 4. Expansion of settlements along transport routes
Source: Çela T, 2018

in order to decide on how to limit the construction area in these settlements.

The vectorisation of the inhabited areas by orthomaps was used to estimate the built areas at the settlement level, which is revealed to be 8.3% of the total area of the administrative municipality. Compared to the percentage of built area at the level of the Republic of Kosovo, which is less than 5.2%, we conclude that the municipality of Glogoc exceeds it by more than 3.1%. We have also noticed that the inhabited area of two settlements (Glogoc 49.6% and Çikatova e Re 42.2%), which tend to join, have expanded very dynamically, as almost half of their area is used for residential, social and economic activities.

The analysis of the ratio between built area and number of households shows that on average one household occupies 0.28 hectares of built area in rural settlements, and in average each households has an area of 4.2 hectares inside cadastral zones. The extension of the built area has a disturbing tendency in Glogoc's urban area, where each household has an average 0.17 hectares, and an average 0.34 hectares inside cadastral zones. A similar situation is also seen in the settlement of Çikatova e Re (see Table 2). In the other settlements, the expansion of the built areas is slower, but still the use of land plots is not well organised or structured, due to the unplanned construction patterns.

GIS has been used to measure the surfaces covered with objects of diverse purposes, as well as for the calculation of the ratio between built area and households.

The rapid growth of the population and rapid economic development have significantly influenced the spatial transformation of settlements. Comparing the number of inhabitants in the studied settlement at 16,150 according to the census of 1948, against 58,531 inhabitants in 2011, we note that in 65 years the population grew by 42,381 inhabitants, or an average increase of 652 inhabitants/year in the municipality. This rapid population growth has caused changes in the social, economic and spatial structure of settlements, especially during the post-war period after 1999.

The studied municipality is classified as an area of uncontrolled spatial development due to the lack of required infrastructure, the chaotic spatial development and the large-scale expansion of its settlements along national and regional roads. From the analysis of the demographic and urban data, we conclude that in the spatial perspective the municipality of Glllogoc has these characteristics:

- Average housing density of 0.47 inhabitants/hectares;
- Average number of members per household 6.7;
- Lack of quality urban infrastructure in settlements;
- Low Building Index of 0.083;
- Lack of detailed plans for urban areas;
- Lack of policies for the protection of agricultural land.

The main characteristic of the spatial and functional development in the studied settlements is its unplanned spatial extension with facilities/buildings of different heights and land use surface, as well as the uncontrolled and spontaneous development of residential and business areas. In the conclusion of this research, we state that the settlements of Glllogoc municipality are subject to dynamic and chaotic socio-economic activities, and therefore that it is important to change the situation by taking these measures:

Drafting a regulatory plan for the central area of the Komaran settlement and the urban zone of Glllogoc.

Limiting settlements' extension (spread) through designation and implementation of a construction line, with particular emphasis on the protection of agricultural lands.

Legalising residential and business buildings in accordance with standards established by law.

Incorporating the Çikatova e Re cadastral zone into the Glllogoc cadastral zone.

Implementing a project for a feasibility study on the height (floors) of buildings/facilities at the urban zone level.

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