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THE INFLUENCE OF THE ETHNIC AND CONFESSIONAL PARTICULARITIES ON THE INFANT MORTALITY AT THE LOCAL LEVEL (IAŞI COUNTY)

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Abstract: The world is today a healthier and safer place than ever, and children have the chance to become responsible adults and to enjoy their lives. Romania has made unquestionable progress, especially in the last two decades, with infant mortality rates increasingly approaching the European average. However, our country still occupies leading places across the European continent on child deaths, with children remaining in our society, the most vulnerable social category. Strong territorial and social disparities mark this positive development. In our study we intend to identify the particularities (ethnic and confessional) that influence, in some cases, child mortality in Iaşi county (four types of communes with distinct ethnic and confessional). Whereas a clearing-up is taking place in Iaşi county between vulnerable socio-economic communities and those with higher levels of development. The results of the study show a stronger correlation between the ethnic factor and the level of infant mortality as opposed to the confessional factor, closely linked to the incidence of educational, economic or demographic factors.

Key words: infant mortality, ethnic component, confessional component, living standard

* * * * * *

INTRODUCTION

Child mortality is one of the most important demographic indicators, expressed in terms of the number of child deaths in the first year of life, and is calculated by reporting deaths under one year of age in 1000 live births in the same year (Reidpath, 2003; Rotariu, 2009). Roland Pressat believes that the infant deaths can be divided into in two categories: endogenous deaths (usually

* Corresponding Author

heritable, congenital malformations or traumatism caused by birth) and exogenous deaths (caused by external risks: infectious, respiratory, food, accident) (Pressat, 1974; Trebici, 1975). In the literature, intense knowledge of infant mortality by age subgroups is very important, especially in the first week of life (0-6 days - early morality), in the first month (0-29 days - neonatal mortality) or up to 11 months (1-11 months post-neonatal mortality) (Dumitrache, 2004).

Both at global and local level this indicator surfing social and economic trends in society, the level of development, the standard of living or the efficiency of the health system. There are high levels of child mortality worldwide in sub-Saharan Africa, but overall progress is being made in reducing child deaths also in Latin American, North Africa or Asia (Onambele et al., 2019; Storeygard et al., 2008).

At European level, the decline in infant mortality which being in the first decades of the nineteenth century, in special in mercantilistic state, economically developed, with a well-organized bureaucracy (state controlled Protestant Church) (Corsini and Viazzo, 1993).

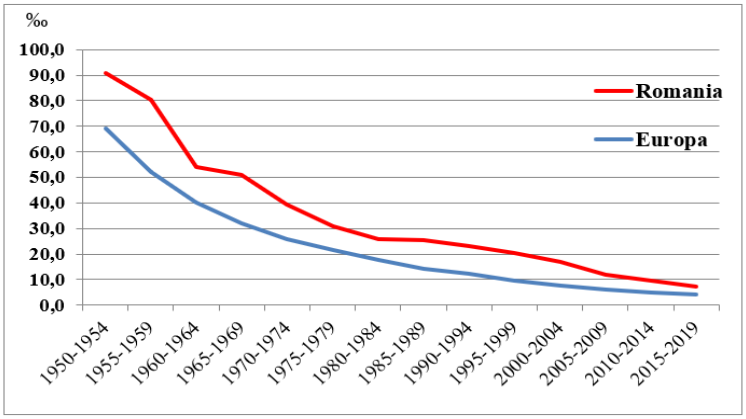

Figure 1. Comparative evolution of infant mortality in Romania and Europe
Data source: Bardet and Dupâquier, 1999; World Population Data Sheet, 1995-2019 series, Population Reference Bureau, Washington

Differences between European countries have been steadily decreasing over the 20th century, not only in terms of recent infant mortality but also in terms of decline in fertility or the modicing of matrimonial property (Bardet and Dupaquier, 1999). In this context, Romania, despite the delay caused by the lower level of economic and social development, does not ignore it, and is part of the same general trends at continental level (figure 1). If by 2000 the difference between Romania's average values and the European average values was still considerable, during the last two decades there has been a significant closeness of convergence at continental level with the above mentioned authors.

In present, higher values are noted by the former communist countries (Eastern Europe), but also the Balkan countries that suffered as a result of the military conflicts (Albania, Macedonia, Serbia). The Nordic countries are considered to be the benchmark for health policies with very low values of the indicator analyzed. Within the European Union, the leading place is occupied by our country, even though there has been a constant decrease in child mortality rates in recent years.

At national level infant mortality in 1990 was 26.9‰ and by 2007 it had fallen to 12‰ (Kurkó, 2010), in the context of the transition period, the main drivers being the accessibility of abortion, contraception and family planning, which morning the risk of the unwanted child. However, the North-East region is the region with the highest level of fertility in Romania (Jemna, 2015). The regional city with complex functions, Iași, (after the 1992 census, it ranks third in the urban hierarchy- after Bucharest and Constanta; in 2002 - the second metropolis of the country) is

characterized by the highest birth values of all regions of the country, with remarkable natalist behavioris (Istrate, 2008).

Infant mortality is on of the most widely used indicators to assess population health status and at national scale registred an important descendant trend (Burlea, 2012). According to some researchers, child mortality depends on many risk factors: social status and age of mother, gestational age, etc (Waldhoer et al., 2008).

Gabriela Alexandrescu, Executive President Save The Children Romania, believes that the child mortality rate is a good criterion to see the enormous distance between Romania and the more developed countries in the European Union.

METODOLOGY

The research was based on the data provided by the national Institute of Statistics and the report of 2011, which were further elaborated and corroborated by field surveys. We also used subjective methods in the form of interviews (with mayors, secretaries or social workers). The whole scientific approach was accompanied by statistical analyzes, the most important being the analysis in main components which indicated to us the factors that directly influence infant mortality.

In our research, we have tried to capture a possible influence of ethnic and confessional particularities in the dynamics of the analyzed indicator.

Following the analysis of infant mortality (2001-2017) at national level (in order to highlight trends in child mortality dynamics at Iași county level), we selected at a local level four communes with distinctive characteristics: Lungani, the municipality with the highest share of the roma community in the county, Ruginoasa, a commune with a high degree of accessibility and an interstitional position between the cities of Targu Frumos and Pascani, Mircesti, with a large share of the Catholic community and the Periurban Common Miroslava, who has experienced one of the most spectacular developments at national level in recent years (figure 2).

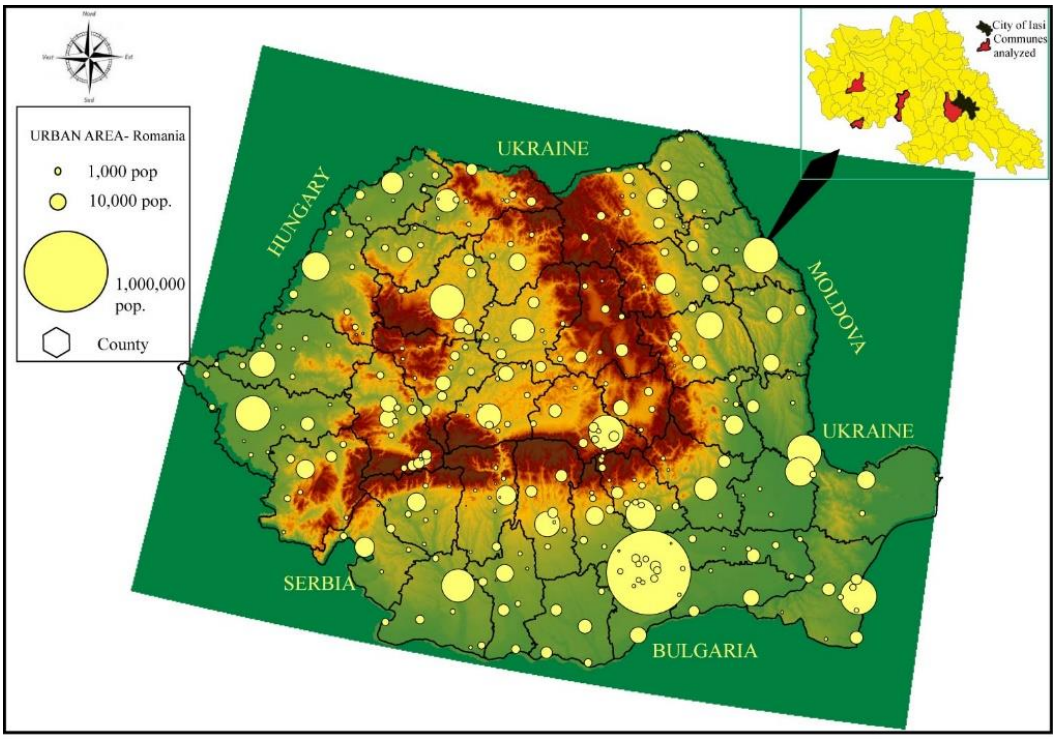

Figure 2. Study area: Iași county

The Presentation of Hypotheses:

H1: Even if our country has seen a significant decrease in child mortality in recent years, at local level there are high child mortality rates, which influence the dynamics of the indicator analyzed at county level.

H2: A number of factors directly influence the dynamics of child mortality in Iași county, which is why the decline in values is related to both the increase in living standards and access to quality medical services, as well as health, education and integration policies that reduce these disparities.

RESULTS

During the period analyzed, the Iași county was noticed at national level by a significant decrease in child mortality, reaching low values in the period 2013-2017, similar to the Cluj or Timisoara counties. The lowest values are recorded in the Iași municipality, recognized at national level as a university and medical center with a reputation, with differences between urban and rural areas remaining significant. In this context we considered it necessary to carry out field analysis at local level to confirm or rule out the assumption that infant mortality is higher where the proportion of the Roma population or population with a certain confessional membership has high or even very high infant mortality values (figure 3).

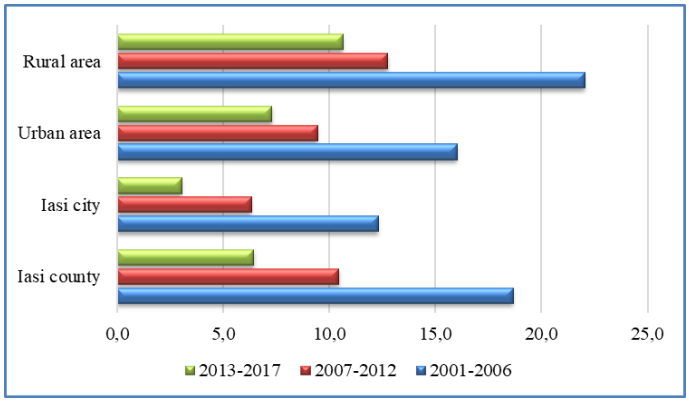

Figure 3. The dynamics of infant mortality in Iași county in 2001-2017
Data source: National Institute of Statistics 2001-2017, Bucharest

Lungani, the poorest commune in EU, it is one of the communes with the most infant deaths and implicitly a very high infant mortality value compared to the other communes in the county. At the same time, it is the commune with the most significant share of the Roma population, this aspect directly influencing the analyzed indicator. The birth rate decreases from 26.99‰ in the period 2001-2006 to 21.84‰ in 2013-2017, even though the birth rate remains very high compared to the county average or to the other compared municipalities. Following the field investigation conducted at the town hall and following the discussions with the chief secretary, with the personnel from the social assistance and the registry, it is noted that most of the infant deaths are among the Roma population, the main causes of death being pneumonia interstitial and bronchopneumonia, very serious respiratory disorders, encephalopathies and accidents caused by aspiration of gastric contents (one case of ingestion of faces by slipping into the septic tank). This commune is a typical example of correlating the values of infant mortality with the ethnic component, in the case of the Roma minority, the most frequent being the problem of the high illiteracy rate, the lack of a stable job, a very low standard of living and an endemic poverty, the phenomenon of the unwanted child or the inadequate care of the baby due to too much responsibility pressing on the shoulders of large families or even leaving the babies in the care of younger siblings frequently causing accidents or even deaths

(figure 4). There are also a significant number of social workers in this commune. The rate of illiteracy is declining strongly influenced by the fact that many families live only on the allowance of children, an income they receive only if the children attend a school. From the point of view of proximity the commune is about 45 km from the city of Iași, an urban center with the best health system and the highest maternity in Moldova and about 15 km from Târgu-Frumos, an urban center that provides medical services. We can therefore say that the Roma minority influences this indicator, and the development of special States dedicated to them seems the only solution. Even if the integration of the Roma population was raised before the accession to the European Community, the process is long-standing and difficult, with ethnic discrimination still present in European Romania, most likely favored by the lack of involvement of the Roma.

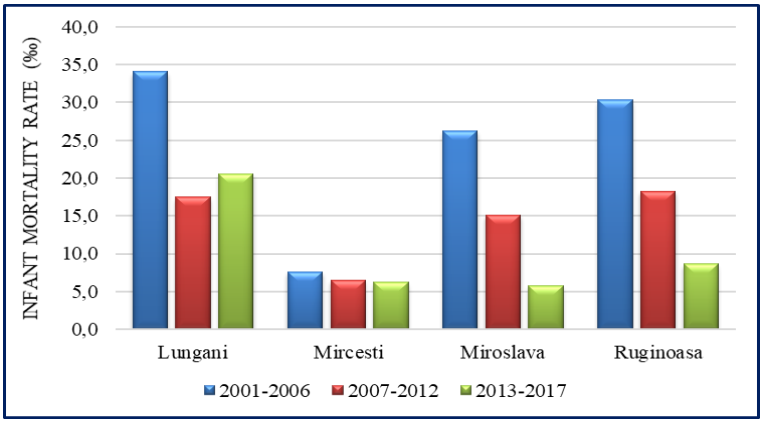

Figure 4. Infant mortality in the analyzed communes, between 2001-2017
Data source: National Institute of Statistics 2001-2017, Bucharest

Investing in their education, ensuring adequate technical-public infrastructure (access to the water network, sewerage, gas), creating jobs, accessing medical services and information (many of the roma women presenting to the doctor even on labor day because the addressability to the doctor is directly influenced by the income), it should be a priority for the local authorities. From a confessional point of view, we chose to compare with Lungani commune, Mircești communes with a Romanian population, homogeneous and predominantly Catholic and Ruginoasa commune, with an exclusively Romanian population and of orthodox religion.

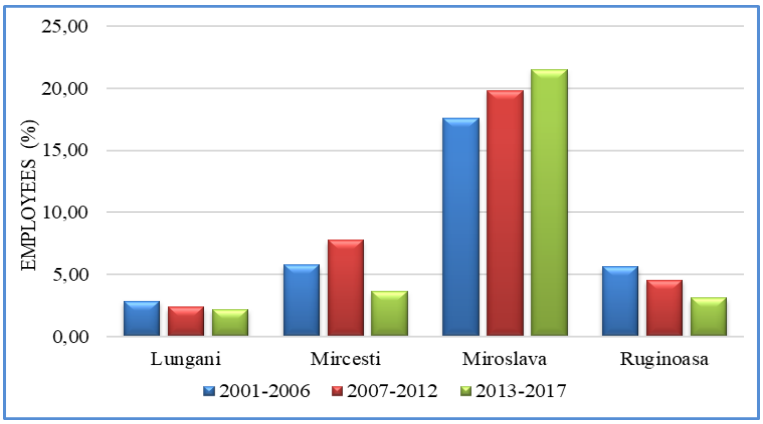

Figure 5. Evolution of the share of the employed population (%) in 2001-2017
Data source: National Institute of Statistics 2001-2017, Bucharest

With a peripheral position, on the border with Neamț county, on the right bank of Siret, about 75 km from Iași, Mircești commune registered one of the lowest values of infant mortality in the county, from 2001 to 2006, 17.6‰, a value that drops to 6.3‰ in the period 2013-2017. A worrying decrease is also recorded in the case of the share of employees that almost halves during the reference period (5.77% in 2001-2006, an increase in 2007-2012 - 7.74%, 3.62% in 2013-2017) (figure 5). Following the field investigation we found that in the case of the Catholic population, the migration of the active population is the main problem, the mayor of the commune declaring that about 30% of the commune's population is abroad.

According to him, the Catholic population was much more receptive than the Romanian population, after 1990 because the young people, helped by relatives or by the Catholic communities from other countries, left with job security that allowed them to later support their families left in the country. This aspect can be observed most easily for example by the material condition of the population of the 100% Catholic village of Iugani, in comparison with Mircești, in which the orthodox population is predominant. This aspect can be observed during the Siret valley, where the Catholic population is the majority. Recall that the number of social workers increased from about 40 in the period 2001-2006 to 100 in 2013-2017 and the main causes of infant deaths are congenital malformations or pneumonia. An essential aspect is the fact that over time the communal medical services have been greatly modernized, with 3 medical offices in Mirești, a working point of the Medical Foundation Speranța Barticești, Emergency Center and Permanence Center (operating in the interval 15 : 00-8: 00).

Even if the Catholic communities are conservative, prohibiting abortion or contraception, the migration of the fertile population is reflected in the low birthrate and the low infant mortality rate.

Ruginoasa Commune, with a predominantly Romanian, Orthodox population, is also noted for low birth rates, with much higher values of infant mortality (30.3‰ in 2001-2006, 18.3‰ in 2007-2012 and 8.6‰ in 2013-2017) than in Mircești commune. The standard of living is low, the share of employees decreasing from 5.62% in 2001-2006 to 3.10% in 2013-2017.

Following the field investigation we found out that in the Ruginoasa the employees are predominantly employees of the companies Delpfi Diesel Systems, one of the most important in the county of Iași, provider of advanced propulsion solutions for the car manufacturers, Avicola, a company specialized in poultry farming based in Târgu-Frumos or Lear Corporation based in Lețcani, factory of car seats, these also ensuring transportation from the free home (the shuttle thus represents the only chance to a better paid job, the interstitial position between the cities of Easter and Târgu-Frumos facilitating this appearance). However, migration of the young population remains a problem. Juvenile delinquency is also a problem reported by local authorities, which is becoming increasingly worrying. The number of social workers in the period 2001-2006 was around 170, decreasing in the period 2013-2017 to 120, but at present the number is increasing. From the point of view of accessibility to the medical services, the commune is privileged by the location in the proximity of two urban centers quite devolved from this point of view, 12 km from Pașcani, 15 km from Târgu-Frumos and about 60 from the city of Iași. In the commune work four doctors.

Miroslava commune is a peri-urban commune in Iași County, and since 2004 it is also part of the metropolitan area. It is one of the most successful joint ventures in Romania, after joining the European Union, with impressive development. In 2015 and 2016, the commune was declared the richest in the country in terms of income, paradoxically the pole of wealth but also of poverty being in Iași county. One of the main factors that generated revenue growth in Miroslava was the fact that many companies in Iași and not only moved their administrative and financial headquarters here. During the analyzed period, officially, the commune doubled its total population (from 7550 to about 14838), but unofficially the population seems to be greatly underestimated. The share of employees is very high compared to the other communes analyzed, 21.51% for the period 2013-2017 and is growing. However, the birth rate does not decrease very much, from 15.12‰ in 2001-2006 to 13.91‰. As it is natural in a community where there are jobs and a high standard of living that brings well-being, migration is lower.

As I mentioned above, in order to complete the statistical analysis and the survey on the field, we have also carried out an analysis in the main components, taking into account the above-mentioned socio-demographic indicators.

As we can see in the figure below the factors that best correlate with infant mortality are birth rate, share of the Roma population, share of the number of unemployed looking for the first job, share of the population employed in health and social assistance, the share of employees and of population with higher education (figure 6).

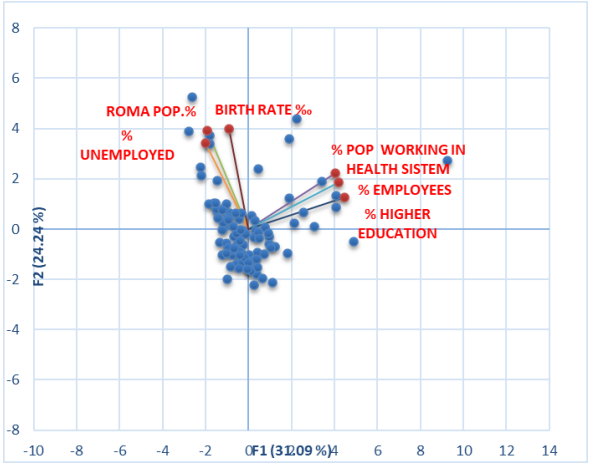

Figure 6. Analysis in main components - the contribution of the factors

In the case of the municipality of Iași and of the peri-urban communes (Rediu, Ciurea, Miroslava) or of the cities of Harlau, Târgu Frumos or Pascani, child mortality seems to be influence by the population in health and social care, by the proportion of the population with higher education and by the share of the employed. Settlements with high accessibility to primary educational services are located in favor of the system of communication routes or the big cities, and are usually localities that have known after 1990 the effects of periurbanization of the socio-professional structure: Miroslava, Tomesti, the Valley of the wolf, Barnova in the Metropolitan area of Iaşi. In the case of Lungani we can also signal the existence of a highly low-qualified educational stock in the adult population, which is why we can believe that the propensity of a community to education is inherited behavior, with both negative and positive states tending to perpetuate (Tudora and Muntele, 2012).

Tabel 1. The Pearson correlation matrix

Correlation matrix (Pearson (n)):									
Variables	**INFANT_MORTALITY**	**BIRTH_RATE**	**POP_WORKING_HEALTH_SISTEM**	**ACTIVE_POP**	**EMPLOYEES**	**UNEMPLOYED**	**POP_WITHOUT_EDUCATION**	**POP_HIGHER_EDUCATION**	**RROMA_POP**
INFANT_MORTALITY (2007-	***1***	*0,1418*	***-0,2809***	*0,0081*	*-0,2196*	*0,1896*	*0,0702*	*-0,2013*	*0,0592*
BIRTH_RATE (2007_2016)	*0,1418*	***1***	*-0,0891*	***-0,3781***	*-0,0633*	*0,3882*	*0,3073*	*-0,1577*	*0,4229*
POP_WORKING_HEALTH_SISTEM (%-2011)	***-0,2809***	*-0,0891*	***1***	*-0,2272*	*0,6569*	*-0,0823*	*-0,0991*	*0,7587*	*0,1158*
ACTIVE_POP (%-2011)	*0,0081*	***-0,3781***	*-0,2272*	***1***	*-0,2414*	***-0,2621***	*-0,1299*	*-0,0654*	*-0,2368*
EMPLOYEES (%-2011)	*-0,2196*	*-0,0633*	*0,6569*	*-0,2414*	***1***	*-0,1316*	***-0,2527***	*0,7582*	*0,0273*
UNEMPLOYED (%-2011)	*0,1896*	*0,3882*	*-0,0823*	***-0,2621***	*-0,1316*	***1***	*0,2497*	*-0,1564*	*0,3856*
POP_WITHOUT_EDUCATION (%-2011)	*0,0702*	*0,3073*	*-0,0991*	*-0,1299*	***-0,2527***	*0,2497*	***1***	*-0,3112*	*0,2355*
POP_HIGHER_EDUCATION (%-2011)	*-0,2013*	*-0,1577*	*0,7587*	*-0,0654*	*0,7582*	*-0,1564*	***-0,3112***	***1***	*-0,0054*
RROMA_POP (%-2002-2011)	*0,0592*	*0,4229*	*0,1158*	*-0,2368*	*0,0273*	*0,3856*	*0,2355*	*-0,0054*	***1***
Values in bold are different from 0 with a significance level alpha=0.05									

According to the correlation matrix, infant mortality correlates negatively with the population employed in health and social assistance, with employees and with persons with higher education, therefore it is higher where they have low values. The strong correlation of the employed population and the employees with the higher studies shows that these factors constitute a favorable context for the decrease of infant mortality, explaining types 1-2 of the AHC and the Roma population is positively correlated with high birth rates, unemployment and poor education, practically resulting in two distinct where the extremes are Iași and Lungani (table 1). It certifies the results of the descriptive statistical analysis and the field surveys carried out.

CONCLUSIONS

From the point of view of the reference indicator, our country has gone a specific road to countries in transition, characterized by a significant reduction in child mortality.

The main contribution of this article is to analyze local events and trends, which are necessary following the analysis of general trends, at national and county level. It is partially confirmed that the high values of the indicator analyzed can be associated in some counties/communes with the existence of important Roma communities. The confessional component has much less influence on child mortality than ethnic, with some principles or rules of religion directly influencing the family's standard of living, the number of members per family or the level of morality, to be open to the West or to deny modernity and to promote traditional principles. The peri-urban areas of large cities have significantly improved the impact of this indicator, in contrast to isolated municipalities that are disadvantaged in terms of access to health infrastructure, where high values are maintained. The results of the study show obvious limitations, generated by the sometimes incomplete information, the general nature of analyzed parameters or the subjectivity of local administrative bodies.

According to the Save The Children Foundation, the main cause of child mortality in our country is premature births; one third of these could be prevented by developing support programs for mothers and children and by the development and modernization of maternity and newborn sections, therefore the development of economic policies, Health and education and investment in these fields seems to be essential at local level in Iași county.

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EFFECTS OF URBAN WASTE ON HEAVY METALS CONCENTRATION IN CARICA PAPAYA LINN AND SOIL IN ENEKA DUMPSITE, PORT HARCOURT, RIVERS STATE, NIGERIA

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Abstract: The study examined the heavy metal concentrations in the tissues of Carica papaya (CP) tissues and soil in Eneka Dumpsite, Port Harcourt, Nigeria. A transect of 100 m x 300 m was laid from the center of the dumpsite. In the transect a 20 m x 20 m quadrat was established at 10 m, 20 m, 50 m, and 300 m (control) from the dumpsite whereby the soil samples and CP tissues (leaf, fruit and root) were collected. Standard laboratory techniques were used to determine the heavy metals in the soil samples and CP tissues. Results showed that heavy metals in CP and soil decreased with increasing distance from the dumpsite. Fe, Pb and Cu in CP tissues varied significantly with distance. In conclusion, there is accumulation of heavy metals in CP around dumpsite and human consumption of such CP should be reduced or totally avoided.

Key words: dumpsite, heavy metals, carica papaya, human health, medicinal

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INTRODUCTION

Solid waste disposal releases toxic substances into the environment (Kouznetsova et al, 2007). Toxic substances which include heavy metals accumulate in the environment above their normal level and cause alterations in the air, plants, soil, water and micro-organisms. The heavy metals which have densities higher than 5g/cm^3, are non-biodegradable and persistently accumulate in the ecosystem; hence heavy metals are serious environmental pollutants (Nubi et al., 2009; Ukpong et al., 2013; Obasi et al., 2013; Aladesanmi et al., 2016; Romocea et al., 2018). The contamination of the soil and plants in the ecosystem may pose health hazards to humans by ingesting the contaminants directly and indirectly through the contaminated soil, food chain (soil-

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plant-human or soil-plant-animal-human), drinking of contaminated groundwater or surface water (Herman et al., 2019a,b,c). Subsequently, the solid waste dumpsite contaminates the soil through disintegration and oxidation processes which in the long run discharge leachate from dumpsites into the neighbouring soils and groundwater (Nagarajan et al., 2012).

The release of heavy metals to the ecosystem would have been reduced in the developing countries but the use of landfill as a way of waste disposal has been a major problem; however open dumps have been the most common method of solid waste disposal.

The threat of heavy metals to the ecosystem would have been reduced especially in the developing countries but the preparation of landfill is a major system of arranging waste in numerous under-developed nations including Nigeria (Adewole, 2009). Thus, open dumps have been the antiquated and commonest way for solid waste dumping. Subsequently, producing solid waste and inadequate dumping system is dangerous to the earth because it leads to ecological contamination particularly in the urban communities (Amadi et al., 2010). Perpetual movements from the provincial ranges to urban zones and population increase in sub-Saharan African nations have aggravated the rate of pollution increase (Awomeso et al., 2010; Najib et al., 2012). Furthermore, lack of extension services and terrible system execution are significant reasons for urban contamination from urban waste especially in Nigeria as this behaviour can result in exposure to heavy metals which exceed health standards.

Studies have shown that dumpsites are used for cultivating crops like cassava, maize and vegetables because of the perceived fertility of the soil in and around the dumpsite (Amadi and Nwankoala, 2013); but this attitude may be deadly if there is no proactive measure to intervene and enlighten the public. This is because the crops absorb heavy metals from the polluted soil and when consumed by man, it could constitute health challenges in the body system (Rotich et al., 2006; Njagi, 2013). It is already established that, the uptake of heavy metals in crops generates a threat to humans and may lead to death of man particularly children. World Health Organization (WHO) assessed that most of the diseases confronting mankind in the recent times came about due to continued contact to environmental contamination (Rotich et al., 2006; Pruss-Ustun and Corvalan, 2006).

Several studies had been carried out on the uptake of heavy metals by crops or plants. This included the study that examined the impacts of dumpsite on spinach, cowpea and potatoes in Mpape dumpsite, Abuja whereby the concentrations of mercury, copper, and cadmium in plants of the dumpsite were above FEPA limit, except spinach that contained Iron and zinc values within the safety limit (Magaji, 2012). Futhermore, the concentration of Cd was more than other heavy metals in all the vegetables investigated (Magaji, 2012). The impacts of dumpsite on the Amaranthus sp vegetable around the dumpsite in Anyigba, Kogi State showed that the concentration of Fe, Zn and Cu at the dumpsite was 7.27 ppm, 6.53 ppm and 6.53 ppm respectively and higher than that of the abandoned dumpsite; though the heavy metals were found to be within the acceptable limits (Musa and Ifatimehin, 2013). A study considered the ecological status of heavy metals in soil of waste dumpsite in Ido-Osun, Osogbo and it was observed that the concentration of Zn was the highest (1133±897 mg/kg) and Cr was the lowest (3.63±2.46 mg/kg) (Olayiwola and Onwordi, 2015). Also, a study investigated the heavy metals contents in both soils and plants in a non-functional waste dumpsites in Port Harcourt whereby the concentrations of Pb and Cd in the plants were higher at the dumpsite than the control site (Eshalomi-Mario and Taneel, 2015); while another study assessed various metals on edible leafy plants of Umuka and Ubahu dumpsites in Okigwe, Imo State, Nigeria whereby heavy metals (Cd, Fe, Pb, Mn, Zn, Cr, Ni and Cu) were significantly higher in different parts of Amaranthus hybridus, Talinum triangulare, Carica papaya, Ipomea batatas and Luffa aegyptica; and that the concentration of Cd among other heavy metals was found to be the highest in the leafy plants (Obasi et al., 2013). None of these studies considered the heavy metal absorption by Carica papaya tissue in a functional dumpsite. Besides, most of the dumpsites in Port Harcourt Metropolis are functional and lots of farming activities are going on around them to subsistently cultivate some crops especially vegetables

(pumpkin, okro, pepper), yet some crops grow naturally and Carica papaya is inclusive. Against this background, the study examined the heavy metals uptake by Carica papaya tissues and soil in Eneka Dumpsite, Port Harcourt, Nigeria.

MATERIAL AND METHODS

Study Area

The study was carried out in Eneka Dumpsite, Port Harcourt Metropolis, Rivers State, Nigeria. The study area is located between latitude 4^{o} 47' 14'' and 5^{0} 06' 58'' North and longitudes 7^{o} 00' 14'' East and 7^{0} 02' 47'' East (figure 1). The criteria used in selecting the study area included proximity to the urban area, accessibility and availability of Carica papaya. Eneka Dumpsite is about 200 m in length and 425 m width tapering to about 130 m along Igwuruta/Eneka highway (Abah and Ohimain, 2010). The area is located in the sub-equatorial region and enjoys the tropical climate. The topography of the area ranges between 16 m and 40 m above the sea level (Mmom and Fred-Nwagwu, 2013) and has the vegetation type similar to tropical rainforest. Generally, the vegetation is consistently nourished with high rainfall and high temperature which provide favourable condition for the growth of varieties of tall and big trees like Swietenia macrophylla, Triplochiton scleroxylon, Terminalia superba, and Elaeis guineensis (Eludoyin et al., 2012). The soils of the area can be categorized as freshwater brown loams and sandy loams.

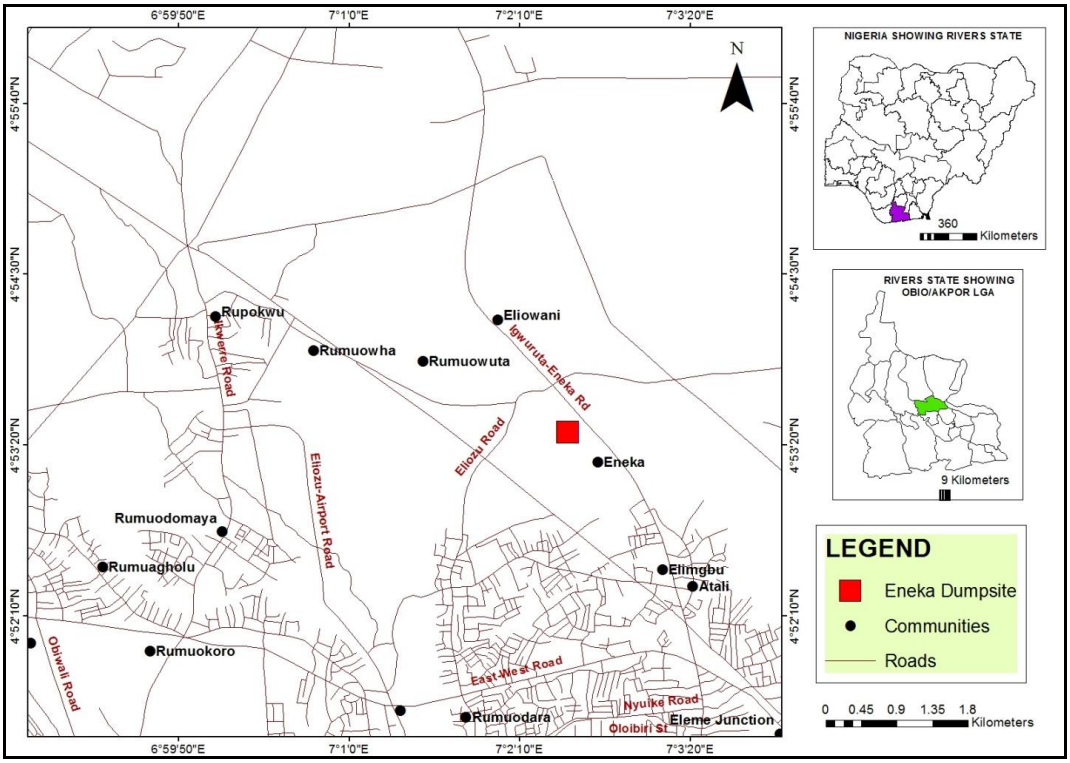

Figure 1. Port Harcourt Metropolis showing Eneka Dumpsite Location
Source: Rivers State Ministry of Lands and Survey, 2019

Research Design and Site Description

The research design of this study was experimental design whereby the study made use of both experimental plot (Eneka Dumpsite) and the control plot. The experimental location of

the study was Eneka Dumpsite while the control plot was a fallow land of about 5 years and about 300 m away from the dumpsite. Waste deposited at this site included plastic materials, bottles, cartons, textile materials, electrical wires, cans, leather materials, metal objects, used oil cans and commercial and domestic wastes of various compositions (Eludoyin et al., 2012; Abah and Ohimain, 2013; Mmom and Fred-Nwagwu, 2013; Avwiri and Olatubosun, 2014).

Carica papaya Sampling Technique

A transect of 100 m x 300 m was laid from the center of the dumpsite. In the transect, a 20 m x 20 m quadrat was established at 10 m, 20 m, 50 m and 300 m (control) from dumpsite whereby the tissues (leaf, fruit and root) of Carica papaya were collected on the identified papaya stand (figure 1). Three Carica papaya stands of at least 10 m apart were sampled in each 20 m x 20 m quadrat at each distance from the dumpsite. From each Carica papaya stand, 3 composite samples of each of fresh and mature leaves, mature fruits and roots were collected after being homogenized (Tigist et al., 2014). Each composite sample was properly labelled according to their stands and distance from the dumpsite. Thus, a total of 9 samples of each Carica papaya tissue were taken to the laboratory for further analysis.

Laboratory Analysis for Carica papaya tissues

The leaf, stem, fruit and root samples of Carica papaya were thoroughly washed with running tap water and rinsed with deionized water to remove any soil particles attached to the plant surfaces. The fruit samples were scrapped to separate the seed from the fruit and thereafter the fruit only were crushed. Similarly, the leaf and root was crushed. All the tissues were oven-dried at 70 °C for 24 hours. After cooling at ambient temperature, the dried tissues were weighed and ground into fine powder and thereafter were kept in pre-cleaned screw capped polyethylene container for further metal concentration analysis. The sample digests of the fruit, leaf, stem and root were analyzed in five replicates for Iron (Fe), Lead (Pb), Nickel (Ni), Cadmium (Cd), and Copper (Cu). These heavy metals were determined by Atomic Absorption Spectrophotometry (AAS) of the Association of Official Agricultural Chemists (AOAC) standard (Akinola and Adenuga, 2008). All the samples were quantified in quadruplicate. The analysis was carried out in the Agronomy Laboratory of the University of Ibadan, Ibadan, Nigeria.

Soil Sampling Techniques

A transect of 100 m x 300 m was laid from the center of the dumpsite. In the transect, a 20 m x 20 m quadrat was established at 10 m, 20 m, 50 m and 300 m (control) from dumpsite whereby soil samples were collected from the topsoil (0-15cm) (figure 1). Three soil samples were collected around every selected Carica papaya stand into the well-labelled polythene packs. Thus, nine soil samples were collected at each distance from the dumpsite. The soil specimens were air-dried and sieved with 2 mm mesh for laboratory examination.

Laboratory Analysis for Soil Samples

Extracts to be used for determining heavy metals were obtained by leaching soil samples using 0.1N EDTA and 5 g of each sample was weighed into a clean, dry silica dish, covered and ignited in a furnace for 6 h at 500 °C until a grey white ash was obtained (Nwaichi et al., 2014). The cover of the dish was opened to allow for escape of gases. To cool ash samples, 5 ml of 10 % HCl was added to enhance dissolution and 5 ml of 10 % HNO_3 was added thereafter and set on a water bath to dissolve completely. The solution was later relocated into a clean dry 50 ml standard volumetric flask and marked up with distilled water (Khan et al., 2008). Extracts used for determining heavy metals were obtained by leaching soil samples using 0.1N EDTA. The concentrations of extractable trace metals including Fe, Pb, Ni, Cd and Cu were determined using AAS of AOACs standard (Nazli et al., 2010; Naeem et al., 2012). The blank reagent and standard reference soil materials was included in each sample batch to verify the accuracy and

precision of the digestion procedure and also for subsequent analyses. All the samples were quantified in quadruplicate. The analysis was carried out in the Agronomy Laboratory of the University of Ibadan, Ibadan, Nigeria.

Method of Data Analysis

Descriptive and inferential statistics were used to analyze the data obtained on soil samples and tissues of Carica papaya. Analysis of variance (ANOVA) was used to determine the significant differences at $p<0.05$ of heavy metals in soil and Carica papaya with respect to distances from the dumpsite. Relationships between heavy metals in the soil and tissues of Carica papaya were determined using Spearman's rank correlation statistics while scatter diagram was used to depict the correlation between the heavy metals in soil and tissues in Carica papaya. The mean values of the heavy metals in soil were compared with the permissible levels set by United States Environmental Protection Agency (USEPA), Department of Petroleum Resources (DPR) in Nigeria while that of C. papaya tissues were compared with the permissible levels of the World Health Organization (WHO). Pollution Load Index (PLI) for each study site was evaluated (Tomllinson et al., 1980). The PLI was obtained as a contamination factor (CF) of each metal with respect to the natural background value in the soil was computed using Equations (1) and (2) (Ogunmodede et al., 2016). CFs were the heavy metal loads at the baseline and CF>1 indicated heavy metal accumulation or pollution in soil from the test site (Agunbiade and Fawale, 2009). Translocation factors were computed for the heavy metals to quantify the efficiency of Carica papaya to accumulate in a given heavy metal and can be PLI>1 or PLI<1. When PLI>1, the location is being polluted and is of pollution concern (Uwah et al., 2012; Ololade, 2014).

Translocation factor (TF) was determined using the standard method (Ogunmodede et al., 2016).

$$CF = C_{sample} / C_{background} \quad \ldots\ldots (1)$$

$$PLI = [CF1 \times CF2 \times CF3 \times \ldots \times CFn]^{1/n} \quad \ldots\ldots (2)$$

where,
CF=contamination factor, n = number of metals = 5;
Csample= metal concentrate on in polluted soils;
Cbackground= mean natural background value of that metal.

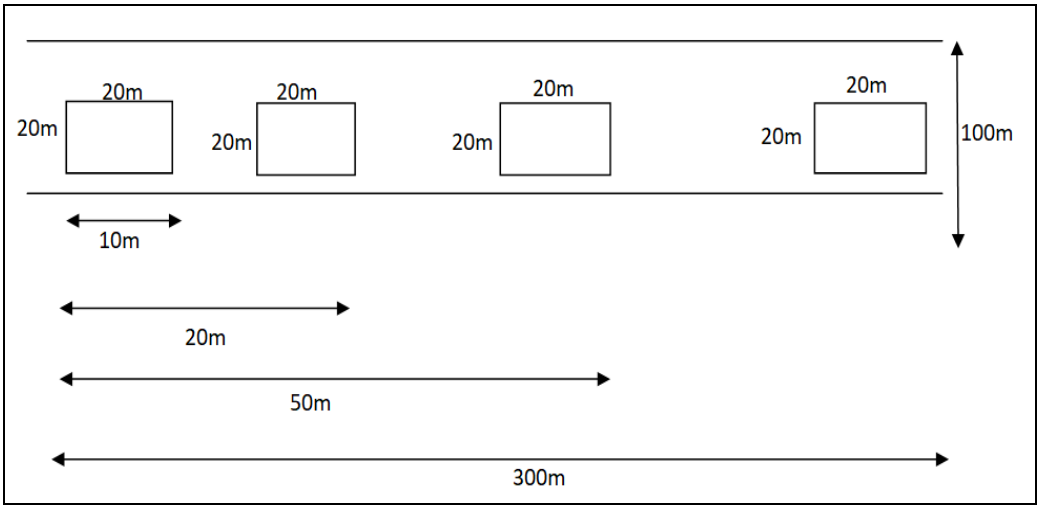

Figure 2. Layout of the sampling sites for Soil and Carica papaya sample collection
Source: Researchers' Fieldwork, 2019

RESULTS

Heavy metal uptake by Carica papaya with increasing distance from dumpsite

The findings revealed that the mean concentration of Fe decreased with increasing distance from the dumpsite. The mean concentration of Fe was lowest in the Carica papaya tissues in the control site (table 1). However, the concentration of Fe was the highest heavy metal at all the distances from the dumpsite considered for the study. The concentration of Fe was highest in the leaf at all distances from the dumpsite. More importantly, Fe concentrations at different distances from the dumpsite varied significantly among the tissues of Carica papaya ($F=7.18$, $p<0.05$). The mean Pb was highest in the root of Carica papaya at 10m (4.8±8.6 mg/kg); 20 m (3.5±0.3 mg/kg) and 50 m (2.7±0.3 mg/kg) of distance away from the dumpsite. In the root, leaf, and fruit; the concentrations of Pb decreased with increasing distance from the dumpsite. Furthermore, Ni and Cd were lower in concentrations compared to the level of availability of other heavy metals investigated. Their concentrations were slightly varied with increasing distance from the dumpsite. The concentration of Cu was highest in the root at all points of study from the dumpsite and the mean Cu significantly varied among the tissues in the study area ($F=1.27$, $p<0.05$). Summarily, majority of the heavy metals were concentrated in the root, followed by the leaf and lowest in the fruit. Generally, the mean concentrations of heavy metal contents in the tissues of Carica papaya in the dumpsite occurred in the decreasing order of Fe>Cu>Pb>Ni>Cd (table 1). Comparing the level of concentrations of heavy metals with the WHO permissible level, Fe, Ni and Pb concentrations were higher than the permissible level (table 1).

Table 1. Heavy metals in the tissues of Carica papaya at different distances from the dumpsite
(Source: WHO permissible levels: Bigdeli and Selsepour, 2008; Ogunkunle et al., 2014; Hailemariam et al., 2015; Researchers' Analysis, 2019)

Parameters (mg/kg)	Tissues	10m	20m	50m	300m (Control)	F value ($p<0.05$)$^{+}$	F value ($p<0.05$)$^{++}$	WHO
		Mean±SD	Mean±SD	Mean±SD	Mean±SD			
Fe	Root	134.2±21.6	127.1±12.3	108.3±10.1	98.2±6.2	4.81*	7.18*	425
	Leaf	189±20.2	156±11.2	121.3±5.5	98.0±7.3	5.27*		
	Fruit	143.0±19.5	106.1±15.4	97.3±5.6	80.0±9.3	12.95*		
Pb	Root	4.8±8.6	3.5±0.4	2.7±0.3	1.8±3.5	1.25*	1.17*	0.1
	Leaf	3.7±1.6	2.6±0.8	2.3±0.9	1.9±0.5	2.14*		
	Fruit	3.9±1.4	2.7±0.6	1.8±0.2	1.1±0.5	2.67*		
Ni	Root	0.8±0.1	0.6±0.1	0.3±0.2	0.2±0.1	0.07	0.29	67
	Leaf	0.7±0.2	0.6±0.1	0.3±0.1	0.2±0.1	0.35		
	Fruit	0.5±0.1	0.4±0.1	0.3±0.1	0.2±0.1	0.27		
Cd	Root	0.7±0.1	0.5±0.1	0.4±0.1	0.2±1.7	0.12	0.68	0.05
	Leaf	0.7±0.2	0.5±0.1	0.3±0.1	0.2±0.1	0.91		
	Fruit	0.5±0.1	0.3±0.1	0.2±0.1	0.1±0.0	0.34		
Cu	Root	7.6±1.8	7.5±1.1	7.3±0.9	7.2±0.8	0.74	1.27*	73
	Leaf	6.1±3.8	5.4±2.4	5.1±2.3	5.0±1.9	0.75		
	Fruit	6.0±1.5	5.3±0.3	4.9±0.6	4.7±1.9	1.32		

*F value is significant; + F value of each tissue; ++F value of heavy metals for all tissues; SD-Standard Deviation; n=36;

Effects of dumpsite on heavy metal concentrations in soil

The concentrations of heavy metals in soils at different distances from the dumpsite are shown in table 2. The result reveals that the concentration of Fe was 1663.0 mg/kg, 1571.0 mg/kg and 692 mg/kg at 10 m, 20 m and 50 m respectively while at the control plot, it was 605.0 mg/kg. The concentrations of Pb, Ni, Cd and Cu also decreased with increasing distance from the dumpsite. The concentrations of heavy metals investigated varied significantly with distance from the dumpsite. The result also revealed that the concentration of Fe was the highest while Ni was the lowest at all the distances considered for this study. The concentrations of heavy metals were significantly varied with distance from the dumpsite. The concentrations of

Ni, Cd and Cu (10 m and 20 m away only) were higher than the permissible limit of DPR while the concentration of Cd at 10 m away from the dumpsite only was higher than the permissible limit of USEPA (table 3). The mean concentrations of heavy metal contents in soils at different distances from the dumpsite occurred in the decreasing order of Fe>Pb>Cd>Cu>Ni (table 2).

Table 2. Heavy metal concentrations in soils at different distances from the dumpsite
(Sources: DPR, 2002; Chiroma et al., 2014; USEPA, 2016; Researchers' Analysis, 2019)

Parameters (mg/kg)	10 m	20 m	50 m	300 m (Control)	F value (p<0.05)	USEPA	DPR
	Mean±SD	Mean±SD	Mean±SD	Mean±SD			
Fe	1663±21.2	1571.0±18.4	692.0±7.8	605.0±9.2	13.06*		5000
Pb	220.0±8.6	175.0±6.4	105.0±5.2	102.0±3.5	5.41*	300	85
Ni	23.0±3.1	16.0±2.6	12.5±1.5	9.7±1.2	2.91*		35
Cd	80.0±5.8	65.0±4.7	45.0±2.4	17.5±1.7	4.70*	70	0.8
Cu	42.5±4.8	39.0±4.5	29.5±3.3	17.7±1.9	1.75*	250	36

*F value is significant; SD-Standard Deviation

Contamination Factor and Pollution Loading Index of Heavy Metals in Soil

Contamination factor (CF) and pollution load index (PLI) were used to assess heavy metal contaminations in soil located in and around Eneka Dumpsite (table 3). The CF for the five metals at different distances (10 m, 20 m, and 50 m) were relatively high ranging from 1.03 in Pb to 4.58 in Cd. The analysis has also shown that the CFs decreased with increasing distance from the dumpsite. Furthermore, the CF of Cd was the highest at all distances from the dumpsite considered in this study. Thus, CF at the distance of 10 m, 20 m and 50 m away from the dumpsite is arranged in the decreasing order of Cd>Fe>Cu>Ni>Pb; Cd>Fe>Cu>Pb>Ni and Cd>Cu>Ni>Fe>Pb respectively. The CF of all the heavy metals can be grouped into very severe contamination (table 4). Nevertheless, the PLI was highest at 10 m distance from the dumpsite while the least was observed at 50 m away from the dumpsite. All PLIs were greater than unity and the values fell within moderate pollution (table 4).

Table 3. Contamination Factors (CF) of Heavy Metals in Soils around the Mechanic Workshop
(Source: Researcher's Analysis, 2019)

Heavy Metals	10 m	20 m	50 m	Natural Background Concentration*
Fe	2.75	2.60	1.14	605.0±9.2
Pb	2.16	1.72	1.03	102.0±3.5
Ni	2.37	1.65	1.29	9.7±1.2
Cd	4.58	3.71	2.57	17.5±1.7
Cu	2.40	2.20	1.67	17.7±1.9
PLI	**2.74**	**2.27**	**1.45**	

*Mean natural background concentration (±SD, n = 5)

Table 4. Significance of intervals of contamination/pollution index (C/P)
(Sources: Assuncao et al., 2003; Ogunmodede et al., 2016)

Class	**Contamination factor index**
<1	Very slight contamination
0.10-0.25	Slightly contamination
0.26-0.5	Moderate contamination
0.51-0.75	Severe contamination
0.76-1.00	Very severe contamination
1.10-2.0	Slight pollution
2.1-4.0	Moderate pollution
4.1-9.0	Severe pollution
9.1-16.0	Very severe pollution
>16.0	Excessive pollution

Translocation Factor (TF)

The transfer of the heavy metals from soil to Carica papaya tissues in Eneka Dumpsite is presented in table 5. TF is the ratio of the concentration of metal in the aerial portion of the plant to the total concentration in the part in the soil. The result showed that at 10 m away from the dumpsite, the heavy metals occurred in this decreasing order of Fe>Cd>Cu>Pb>Ni; at 20 m, they follow the decreasing order of Fe>Ni>Cd>Pb>Cu; at 50 m, the heavy metals also occurred in the decreasing order of Fe>Ni>Pb>Cu>Cd; while at the control plot (300 m), the TFs of heavy metals occurred in the decreasing order of Ni>Fe>Pb>Cd>Cu. Translocation factors of all the heavy metals in the Carica papaya parts were higher than 1 (table 5). Thus, it may be difficult to translocate metals from the roots to the shoots and as a result, the roots may contain more concentration of the metals.

Table 5. Translocation Factor (TF) of heavy metals from soil to Carica papaya tissues
(Source: Researchers' Analysis, 2019)

Heavy Metals	Distance			
	10 m	20 m	50 m	300 m
Fe	2.47	2.06	2.01	1.81
Pb	1.58	1.51	1.52	1.67
Ni	1.50	1.67	2.00	2.00
Cd	1.71	1.60	1.25	1.50
Cu	1.59	1.43	1.41	1.35

Relationships between heavy metals in Carica papaya tissues and soil

The correlations between heavy metals in soil and Carica papaya tissues were strong and positive except the relationship between Fe soil and Fe fruit; and Cu soil and Cu fruit (table 6). The coefficient of determination (R^2) of the correlations were above 0.90 except for the relationships in Fe soil and Fe fruit (R^2=0.691); Fe soil and Fe leaf (R^2=0.8919); Pb soil and Pb leaf (R^2=0.8734); Ni soil and Ni leaf (R^2=0.8809); and Cu soil and Cu fruit (R^2=0.6979); which were observed not to be significant at $p<0.05$ (table 6). The positive and strong correlations ($\geq$0.90) showed that more than 90% of the heavy metals in the tissues of Carica papaya around Eneka Dumpsite were absorbed from the soil and through the root.

Table 6. Correlations between heavy metals in soil and Carica papaya tissues
(Source: Researchers' Analysis, 2019)

	Fe Soil	Pb Soil	Ni Soil	Cd Soil	Cu Soil
Fe Root	0.976*	0.964*	0.941	0.982*	0.980*
Fe Leaf	0.944	0.976*	0.984*	0.978*	0.959*
Fe Fruit	0.831	0.926	0.993*	0.926	0.884
Pb Root	0.904	0.956*	0.993*	0.974*	0.947
Pb Leaf	0.834	0.935	0.995*	0.912	0.867
Pb Fruit	0.921	0.971*	0.994*	0.968*	0.942
Ni Root	0.969*	0.992*	0.974*	0.960*	0.944
Ni Leaf	0.988*	0.977*	0.939	0.965*	0.962*
Ni Fruit	0.932	0.955*	0.975*	0.991*	0.975*
Cd Root	0.880	0.922	0.976*	0.985*	0.963*
Cd Leaf	0.944	0.985*	0.989*	0.963*	0.940
Cd Fruit	0.889	0.959*	0.999*	0.952*	0.919
Cu Root	0.974*	0.975*	0.957*	0.979*	0.972*
Cu Leaf	0.854	0.957*	0.990*	0.881	0.835
Cu Fruit	0.894	0.973*	0.998*	0.926	0.889

DISCUSSION

Findings reveal that only Cd and Pb were higher in the tissues of Carica papaya than the WHO permissible levels of 0.2 mg/kg and 0.3 mg/kg respectively. The high Cd concentration in

the tissues of Carica papaya in the study area may be attributed to the inadvertent uptake and translocation (Asuncao et al., 2003; Obasi et al., 2013) and may lead to phytotoxicity in plant (Obasi et al., 2013). Cd in soil was higher than the permissible level of DPR (0.8 mg/kg) while it was only the Cd at 10 m away from the dumpsite that was higher than the permissible levels of USEPA (70 mg/kg). The high concentration of Cd in the entire study area is a great concern, though higher around the dumpsite. This can be attributed to the presence of waste like battery, engine oils, metal parts such as radiator which constitute part of the waste deposited in the dumpsite (Odoh et al., 2006).

The high levels of Cd and Pb may be dangerous to human health as there is tendency of injecting the toxic substance into the food chain thereby accumulating easily in the human body. Ang et al., (2003) reported that Pb is known to be toxic even at low concentration especially in young children and that the ingestion of Pb may result to kidney disorder, brain damage, sensory disturbances. High Cd in the human body can also lead to kidney problem, respiratory system malfunctions, bone damage and cancer (Godt et al., 2006). Translocation factors of all the heavy metals in the Carica papaya parts were higher than 1. Thus, it may be difficult to translocate metals from the roots to the shoots and as a result, the roots may contain more concentrations of the metals. Since the translocation factors of heavy metals in this study were greater than one, this indicated that there was high root to shoot translocation of metals in Carica papaya because translocation factors are always based on the root uptake of the heavy metals and not the foliar absorption of atmospheric metal deposits (Awode et al., 2006). This further proves that Carica papaya has the potentials to be used for phyto-extraction of the metals in the environment (Yoon et al., 2006; Cui et al., 2007). The higher contamination factor of Cd in the study area suggests that Cd was a major heavy metal being absorbed by plants especially Carica papaya and this confirms its high presence in the soil. The PLI of heavy metals in the study area is also found to be highest at the distance of 10 m from the dumpsite and reduced with the increase in distance from the dumpsite. This trend indicates that there is occurrence of dilution and dispersion of heavy metal contents through the soil with increasing distance from the source areas (Chakravarty and Patgiri, 2009). The higher values of PLI showed that anthropogenic sources contribute immensely as heavy metal sources in the study area. It was reported that lower values of PLI imply that there was no major input from anthropogenic sources (Chakravarty and Patgiri, 2009. The relationships between the heavy metals in Carica papaya and soil were positive and strong.

The results simply explained that the heavy metals accumulated in the soils are transported to the tissues of Carica papaya through their roots by the process of absorption (Uwah et al., 2012). Thus, the absorption of heavy metals in the tissues of C. papaya was greatly controlled by the content of heavy metals in the soil solution (Tigist et al., 2014).

CONCLUSION

The study has demonstrated that heavy metals especially Pb and Cd were absorbed by the tissues of Carica papaya with most of the heavy metals being absorbed by the root and leaf. The concentrations of heavy metals varied significantly with distance from the dumpsite as their concentrations in the Carica papaya tissues decreased with increasing distance from the dumpsite. The heavy metal concentrations in the tissues of C. papaya and soil in the study area occurred in the decreasing order of Fe>Cu>Pb>Ni>Cd; and Cd had the highest contamination factor despite its lowest presence in the soil samples. Positive and strong correlations existed between the heavy metals in the tissues of C. papaya and heavy metal contents in soil except the correlations between Fe soil and Fe leaf; and Cu soil and Cu fruit. Thus, consuming any tissue or part of Carica papaya grown or surviving close to the dumpsite may lead to accumulation of the heavy metals in the body and can cause human ailments such as kidney disorder, brain damage, reductive system malfunction and disturbance of the respiratory organs. The study therefore recommended that the human consumption of C. papaya tissues especially the root and leaf for medicinal purposes around the dumpsite (≤ 50m away) should be discouraged.

Government and waste disposal agencies should prevent indiscriminate disposal of wastes especially those that may be the sources of heavy metals. In addition, government can intensify efforts to deliberately grow Carica papaya around the dumpsite not for human consumption but to be used for phyto-extraction because of its potentials to absorb heavy metals.

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MULTI-CRITERIA METHOD (WLC) AND GIS MODELING TO ANALYZE SOIL EROSION VULNERABILITY IN CONSTANTINE CITY (ALGERIA)

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Abstract: Land degradation due to soil erosion constitutes a serious threat in the Mediterranean regions, and particularly in Algeria. The objective of this study is to characterized the vulnerability to soil erosion in Constantine city (county seat of the Wilaya of the same name) using a spatial multi-criteria method. The followed approach focused on interaction of several factors (climate, topography, lithology and land cover) Acting erosive process by means of Weighted Linear Combination (WLC) that facilitated the quantification of the global effect of these factors in fine and objective manner. The results show that more than 50% of the city's surface is exposed to high vulnerability, which requires the implementation of soil erosion control measures.

Key words: Soil erosion, Factors, Vulnerability, Weighted Linear Combination WLC

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INTRODUCTION

Soil erosion is one of the biggest problems in the world, especially in Algeria. It is a serious environmental, agricultural and social problem that affects and threatens vast area. Among the most

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remarkable consequences, we note the declining fertility of agricultural soils, water pollution, and aggravation of the mud flows in the urban area, the siltation of dams and desertification of the natural environment (FAO, 1980, p. 135; Toundoh et al., 2020. Soil erosion is a complex process that physically takes place by the movement of soil particles from a given site (Saini et al., 2015, p. 9-21).

To study this phenomenon, first, it is necessary to know and identify the different factors influencing this process. The effects of these factors must then be superimposed and adequately quantified in order to obtain more accurate final results using a multi-criteria analysis method.

Different approaches exist to guide a multi-criteria decision situation. Each approach focuses on certain aspects. Therefore each has its advantages and disadvantages (Chakhar, 2006. p. 300).

This method of analysis makes it possible to combine several criteria of different nature, in order to obtain a cartographic result indicating more or less suitable areas capable of solving the problem (Balzarini et al., 2011, p. 85).

The erosive process is the result of the combination of several dynamic and interactive factors (climate, topography, lithology and land cover). To quantify the global effect of these factors, we made call to Weighted Linear Combination (WLC).

WLC is a compensatory method; it makes it possible to compensate, on the same cell, a low value, induced by one criterion, by a higher value, induced by another criterion. This method seems relatively intuitive and simple to implement, especially for decision makers, not necessarily experts in GIS (Balzarini et al., 2011, p. 85).

Weighted Linear Combination is one of the widely used MCE methods for land suitability analysis. It involves standardization of the suitability maps, assigning the weights of relative importance to the suitability's maps, and then combining the weights and standardized suitability maps to obtain an overall suitability score (Malczewski, 2004; Bouguerra and Bouanani, 2016).

This method of analysis has been applied and integrated under a GIS to map vulnerability to soil erosion in the territory of Constantine city (county seat of the Wilaya of the same name), located in eastern Algeria, 431 km east of the capital Algiers (Algeria).

GIS are tools for data management, processing and analysis (Romocea et al., 2018; Herman et al., 2019) but limited as real decision-making tools, especially when several and/or sometimes contradictory criteria and objectives are involved. Over the past decade, many efforts have been made by GIS software developers to make them evolve. Today, spatial decision-making problems present all the characteristics of multi-criteria problems, which mean that this assessment and treatment are becoming unavoidable (Kedowide Mevo Guezo, 2011, p. 138).

STUDY AREA

Located in eastern Algeria, Constantine city (county seat of the Wilaya of the same name) covers an area of 90.1 km^2, between latitudes 36° 16' and 36° 28' North and between longitudes 6° 31' and 6° 48' East (figure 1)

MATERIALS AND METHODS

In this study, we are based on the integration of spatial multi-criteria analysis into a geographic information system (GIS) to be able to superimpose and quantify the global effect of the different factors contributing to the erosive process. Factors involved in this process fall into four domain: topography, soil, land use and climate (Wischmeier and Smith, 1978, p. 58).

Table 1. Priority and code for each factor

Facteurs	Priorité	Classes	Code
Slope	1	0 – 5 %	0.25
		5 – 15 %	0.5
		15 – 25 %	0.75
		25 % <	1

Rainfall	2	520 – 560 mm	0.25
		560 – 600 mm	0.5
		600 – 640 mm	0.75
		640 – 672 mm	1
Lithology	3	Lithology erosion_resistant	0.25
		Lithology averagely_resistant	0.5
		Vulnerable lithology	0.75
		Highly Vulnerable lithology	1
Landuse	4	Urban area	Zones excluded from the analysis
		Foret	0.25
		agricultural land	0.5
		Bare ground	1

The effect of each factor is quantified and transcribed as a map (figure 1). We have also defined four coded classes for each factor to translate their influence on the phenomenon. The table below summarizes the classes and codes assigned to each factor involved in the analysis.

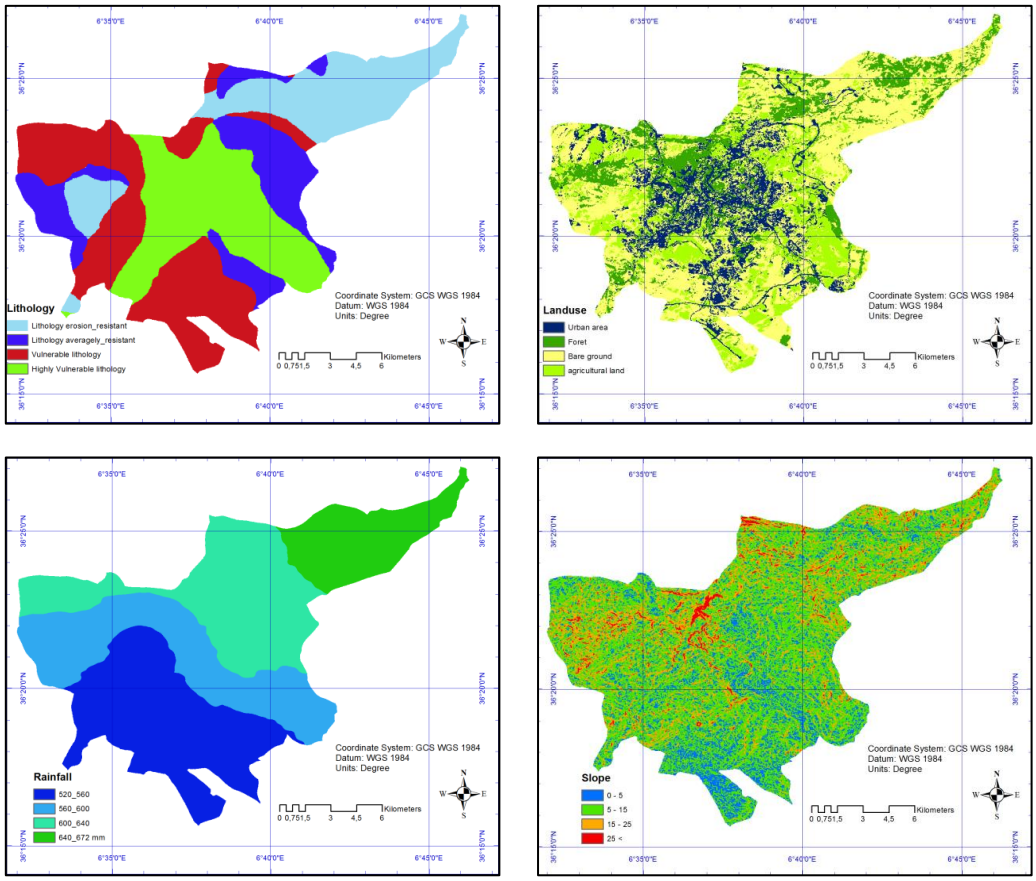


Figure 1. (A) Lithology map (B) Land use map (C) Rainfall map (D) Slope map

Calculation of the weight for each factor:

Denoting the rank position of the j-th attribute by rj, the most important attribute is ranked first (rj = 1), the second most important attribute ranks second (rj = 2), and so on; the least important attribute is assigned a rank of rj = n. Then, the j-th criterion weight can be defined as follows: (Malczewski, 2006. p. 3-65).

$$\mathbf{wj} = \frac{\mathbf{n-r\,j+1}}{\sum_{\mathbf{j=1}}^{\mathbf{n}} \mathbf{n-rk+1}} \quad \text{For: K= 1, 2, 3…….. ….n} \qquad (1)$$

The weights were calculated and inserted into the WLC Tool as a percentage (figure 2). The vulnerability calculation formula is as follows:

The vulnerability = 0.4 slope+ 0.3 Rainfall + 0.2 lithology + 0.1 Landuse

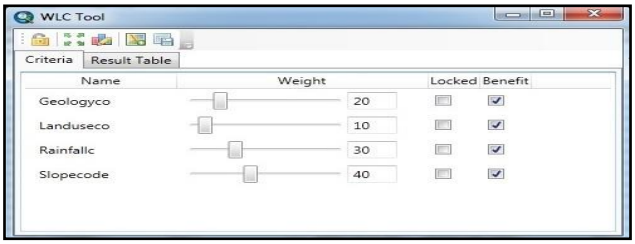


Figure 2. Weight for each factor in %

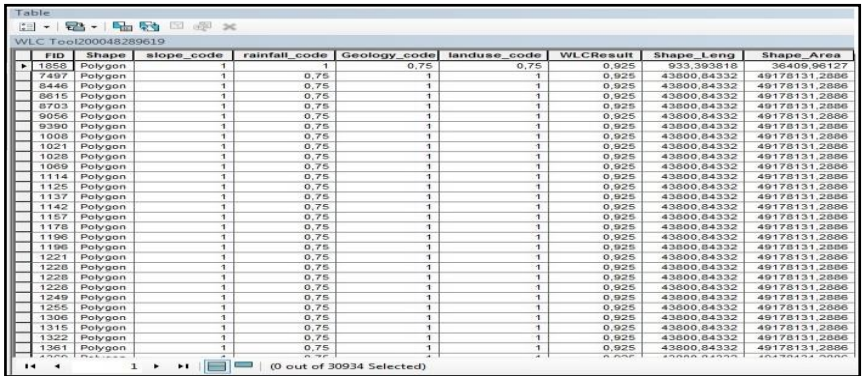
La formule WLC:

WLC is defined and implemented as follows: For a given set of criteria, WLC is defined as a combination procedure that associates a set of criteria weights with the *i*-th decision alternative (the location or polygon). Where the weights satisfy the following properties: $w1, w2, \ldots\ldots, 0 \leq wk \leq 1$ *and* $\sum_{k=1}^{n} \mathrm{wk} = 1$, k = 1,2, 3…….n. The weights are multiplied with the criterion values $ai1, ai2, \ldots\ldots\ldots ain$, i=1,2,…,m as in Equation (2) (Steffan, 2016, p. 18).

$$\mathbf{WLC(Ai)} = \sum_{k=1}^{n} \boldsymbol{Wk.V(aik)} \qquad (2)$$

RESULTS AND DISCUSSION

After determining the priority and weight for each factor, and then integrating into a single information layer using a spatial joint, the global effect can be quantified using the WLC formula under ARC GIS.



Table

WLC Tool200048289619

FID	Shape	slope_code	rainfall_code	Geology_code	landuse_code	WLCResult	Shape_Leng	Shape_Area
1858	Polygon	1	1	0,75	0,75	0,925	933,393818	36409,98127
7497	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
8446	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
8615	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
8703	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
9056	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
9390	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1008	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1021	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1028	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1069	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1114	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1125	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1137	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1142	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1157	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1178	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1196	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1196	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1221	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1228	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1228	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1228	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1249	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1255	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1306	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1315	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1322	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886
1361	Polygon	1	0,75	1	1	0,925	43800,84332	49178131,2886

(0 out of 30934 Selected)

Figure 3. WLC result for each cell

We have represented the erosion vulnerability in Constantine city under four classes according to the factors global effect as follows:

Table 2. Vulnerability classes

Classes of vulnerability	Global factors effect code	Area Km^2
Zero	Urban area	27.4
Low	0.06 – 0.25	2.2
Moderate	0.25 – 0.5	8.6
High	0.5 – 0.75	28.2
Extreme	0.75 <	23.7
Total area of Constantine city		90.1

Statistical analysis of the areas observed shows that more than 50% of the study area is highly vulnerable. This alarming situation requires a range of actions to be implemented to ensure an effective response

The robustness and reliability of the process is also based on the adequacy of the aptitude criteria chosen for each parameter, the weighting adopted, but also the quality of the spatial information that has been exploited (Kedowide Mevo Guezo, 2011, p. 138).

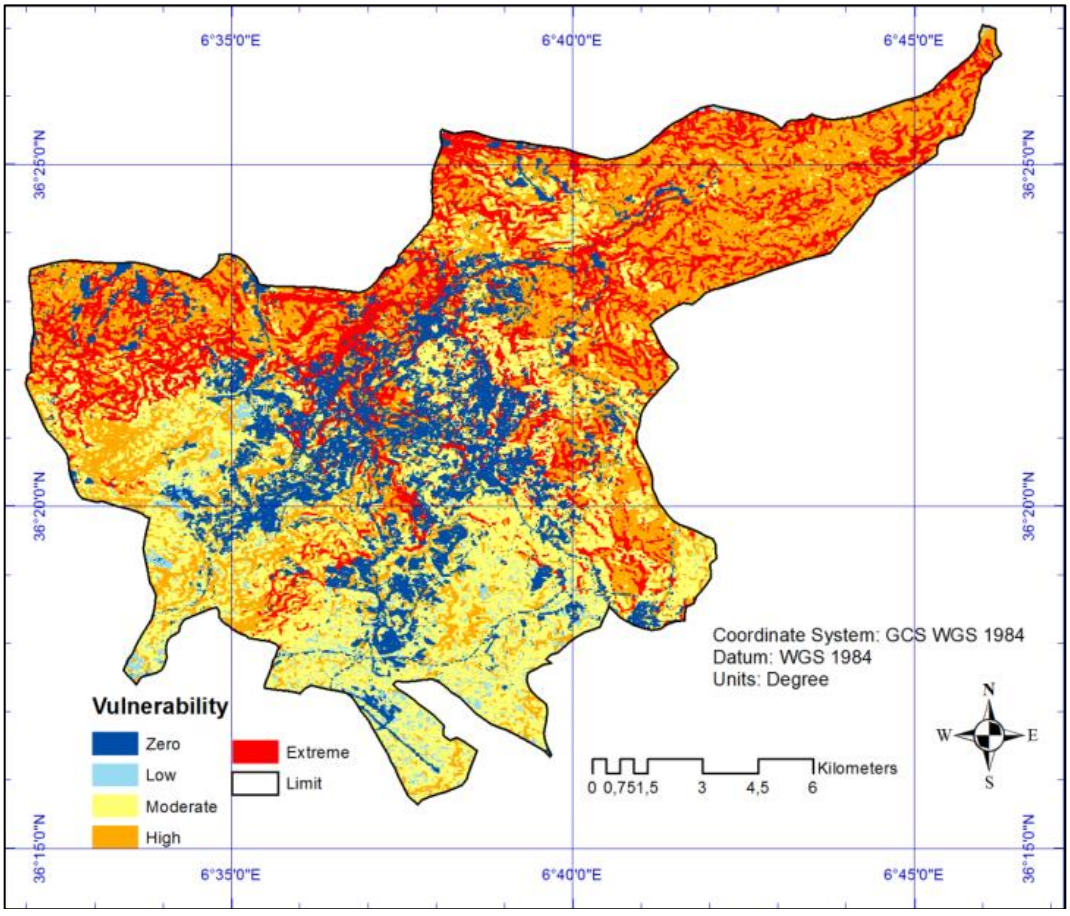


Figure 4. Vulnerability map

CONCLUSION

The erosion vulnerability assessment was made by a multi-criteria analysis Weighted Linear Combination (WLC) that represents reliability according to several authors.

A large area of the city has been identified as a significant vulnerability given the meeting and the significant interactive influence of factors contributing to the erosion process, in particular the slope and Rainfall.

Based on this study, decision makers may have high vulnerability mapping and facilitate the intervention and implement erosion control measures although there are a number of limitations to this approach.

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TRAVEL AND TOURISM INDUSTRY DEVELOPMENT - THE CASE OF KOSOVO

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Abstract: This paper presents a brief theoretical summary related to the development of the travel and tourism industry. The purpose of this paper is to make clear the importance of the development of the travel and tourism industry nowadays, knowing that these industries are developing rapidly. What characterizes this paper is the presentation of the case of Kosovo, which is illustrated with some statistics of tourism development in this country.

Key words: travel, tourism, travel and tourism industry, development

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INTRODUCTION

Our intention in this paper is to make clear the importance of the development of the travel and tourism industry, as part of the life of the population worldwide. Knowing that many people are tired of the daily routine of work, they take trips to get out of this routine and relax. Thus, we can say that travel and tourism are part of our lives.

The development of tourism affects the country's economy. This paper presents the case of tourism development in Kosovo where we will see in more detail that the current situation of the tourism sector in Kosovo in terms of cooperation and exchange of data with international tourism organizations is very unsatisfactory, as Kosovo is not marked nor included in various tourism statistical reports for comparison of countries and regions, tourism trends, etc. Also, statistics show that the number of foreign tourists to visit Kosovo mainly increases from one year to another. Kosovo is very rich in natural beauty and opportunities for the development of

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various types of tourism, but what needs to be done is to use these opportunities for development and the most positive effects.

Tourism is a growing industry all over the world in recent years. In many war affected countries it has been noted that national investors and international investors have engaged themselves in investing more on the tourism industry as well as they are more eagerly waiting to invest more in the near future (Sivesan, 2020).

As one of the main and most dynamic activities in the world economy and the effects it creates, tourism is considered as one of the global economic phenomena. Its role is widely accepted by all governments of countries in the world, as one of the main indicators of economic growth. At the same time, tourism is recognized for its social, political and cultural impacts and environmental impacts. The World Tourism and Travel Council's research clearly speaks to the potential that tourism has for strengthening the global economy and reducing unemployment. In addition to the economic factor that is encouraged by tourism, direct benefits are also realized in the main tourism sectors, such as: hotels, restaurants, transport and retail (Tahiri and Kovaçi, 2017).

Tourism is now recognized as being an economic activity of global significance. Importance of the activity has increased, so too has the attention given to it by governments, organizations in both the public and private sectors, and academics.

The new challenges facing the tourism industry, as well as its specific characteristics and structure, are creating a need for more in-depth knowledge about the factors that affect and shape this industry. The importance of the tourism industry to the economy has been extensively demonstrated (Herman et al., 2017, 2018; Segui-Amortegui et al., 2019).

Tourism is an activity which cuts across conventional sectors in the economy. It requires inputs of an economic, social, cultural and environmental nature. In this sense it is often described as being multi-faceted. The problem in describing tourism as an "industry" is that it does not have the usual formal production function, nor does it have an output which can physically be measured, unlike agriculture (tonnes of wheat) or beverages (litres of whisky). There is no common structure which is representative of the industry in every country. In France and Italy, for example, restaurants and shopping facilities are major attractions for tourists; in Russia they are not. Even the core components of the tourism industry, such as accommodation and transport, can vary between countries. In the UK many tourists use bed and breakfast accommodation in private houses; in Thailand such facilities are not available. In the transport sector, levels of car ownership and developed road networks cause many tourists to use their cars or buses in Western Europe and the USA. In India and Indonesia, most tourists travel by air. It is some of these problems of definition which have caused many writers to refer to the tourist sector rather than the tourist industry. Sometimes the terms are used interchangeably (Lickorish and Jenkins, 1997).

The tourism industry is often cited as an attractive agent of development or redevelopment, generating employment and foreign exchange in a destination (Pender and Sharpley, 2005). The tourism sector, even if it seeks to be socially inclusive and permit access to different resources, has to address an ongoing problem (Page, 2019).

The relationship between tourism and the natural environment is complex (Ilieș et al., 2017; Tătar et al., 2017; Wendt et al., 2019). On the one hand, tourism depends on the world's natural resources, its diverse ecosystems and its rich biodiversity. A quality environment is the natural capital of tourism destinations, with income from tourism providing financial returns from investment in that capital. On the other hand, tourism uses vast quantities of resources and is a generator of emissions and pollution, both of which drive climate change. It is estimated that tourism accounts for 5% of global carbon dioxide (CO_2) emissions - it may contribute even more to global warming if all greenhouse gas (GHG) emissions are counted (UNWTO, 2018).

TRAVEL AND TOURISM INDUSTRY

The simple word travel, defined as "the act of moving" by most dictionaries, has a different definition within the context of the tourism industry. Travel is defined as "the act of moving outside

one's community for business or pleasure but not for commuting or traveling to or from work or school". With respect to travel as an industry, there must also be economic value creation resulting from travel activity. Understanding the fundamental definitions and concepts used within the travel and tourism industry provides an essential framework from which most industry discussions are based. Because of tourism's intangible nature, common definitions of terminology benefit the industry in a number of ways (Gee and Solá-Fayos, 1997).

The notion of tourism is related to travel, but not to all travel, only to those which are motivated by the desire for rest, recreation, with a trip for the purpose of rest, recreation and visits to natural beauty and cultural and historical heritage values (Reçica and Millaku, 2014).

In one definition tourism is described as: the totality of relationships and phenomena arising from the travel and the stay of non-residents, provided that this stay doesn't create a permanent stay and from this stay isn't derived any profitable activity (Koja and Gorica, 2010).

Tourism has grown significantly since the creation of the commercial airline industry and the advent of the jet airplane in the 1950's. By 1992, it had become the largest industry and largest employer in the world. Together with this growth there have emerged a number of extremely critical issues facing the industry in terms of the impacts it has already had on destination areas and its residents, and the future prospects for people and places into the coming decades (Theobald, 2005).

One of the major issues in gauging tourism's total economic impact is the diversity and fragmentation of the industry itself. Theobald suggests that this problem is compounded by the lack of comparable tourism data since there has been no valid or reliable means of gathering comparable statistics. He proposes that the varying definitions of tourism terms internationally, and the complex and amorphous nature of tourism itself have led to difficulty in developing a valid, reliable, and credible information system or database about tourism and its contribution to local, regional, national and global economies. Davidson links the question of whether tourism is really an industry to the misunderstanding, resistance and hostility that often plague proponents of travel and tourism as worthy economic forces in a modern economy. He questions the common practice, especially as suggested in the literature of referring to tourism as an industry. He contends that such a designation may not be correct, and that tourism is not an industry at all. He states that much of the current misunderstanding, resistance and even hostility plaguing proponents of tourism may be due to its mistakenly being called an industry. Three arguments for tourism's designation as an industry are: It needs to gain the respect it now lacks among other competing economic sectors; It needs sound, accurate and meaningful data in order to assess its economic contribution, and; It needs to provide a sense of self-identity to its practitioners (Theobald, 2005).

FORMS AND CATEGORIES OF TRAVEL

Just as there are different types of visitors, there are different forms and categories of travel which take place, varying by traveler, destination, and motive for travel, such as: International vs. domestic travel; Intraregional vs. interregional travel, as well as; Inbound vs. outbound travel.

INTERNATIONAL AND DOMESTIC TOURISM

According to the WTO, international tourism differs from domestic tourism and occurs when the traveler crosses a country's border. Not every international traveler is a visitor, however. The traveler is a visitor only if the trip takes him or her outside the usual environment, e.g., workers who cross borders for employment are not considered visitors. The interest in international tourism has always been strong, primarily for economic reasons, as this form of tourism plays an important role in trade and monetary flows among nations. Domestic tourism has been overshadowed by the interest in international tourism, for it was thought initially to have little or no international impact, and statistics on the subject were felt to be a country's own business. It has become clear, however, that international and domestic tourism do relate to each other. Travelers' choices change depending on circumstances, and domestic tourism can be substituted for international tourism and vice versa under the influence of external factors, such as relative growth in real incomes, price differences

between countries, and international political conditions. Over the past few decades, in many Western countries domestic holidays were largely replaced by outbound holidays, influenced by the rise in living standards and discretionary incomes, while developing countries have seen sharp increases in domestic tourism (Gee and Solá-Fayos, 1997).

REGIONAL TRAVEL

Regions are geographically united subdivisions of a larger area characterized by definitive criteria or frames of reference. Three types of regions are used in tourism research. The first one refers to geographical location. Regions such as "the north" or "the west", are examples of this type. The second type refers to administrative areas, such as "Province X". The third combines criteria referring to location with criteria of a more physical nature. Examples of this type of region are "the lake district" or "the Pacific Basin." Regions of functional type can also be constructed, such as "urban areas" or "coastal areas". The term inter-regional travel refers to travel among various regions, whether in regions found within the same province or state, a country, or various regions throughout the world. Intra-regional, on the other hand, refers directly to travel contained within the same defined region, whether domestic or international such as travel between countries of East Asia (Gee and Solá-Fayos, 1997).

INBOUND AND OUTBOUND TOURISM

There are three forms of tourism at any level, in relation to a given area, e.g., domestic region, country, or group of countries: Domestic tourism, involving residents of the given area traveling (as visitors) only within that area; Inbound tourism, involving non-residents traveling as visitors in the given area; Outbound tourism, involving residents traveling as visitors in an area other than the given area.

If a country is the area of reference, the terms "domestic," "inbound" and "outbound" tourism can be combined in various ways to derive the following categories of tourism: Internal tourism, which comprises domestic and inbound tourism; National tourism, which comprises domestic tourism and outbound tourism; International tourism, which consists of inbound tourism and outbound tourism.

To avoid misunderstanding the terms "inbound", "outbound", "domestic", "internal", "national" and "international tourism" are generally used with a country as the unit of reference. However, it should be recognized that there are political subdivisions which are less than countries and differ from states such as the Commonwealth of Puerto Rico and the Commonwealth of the Northern Mariana Islands, both part of the United States (Gee and Solá-Fayos, 1997).

THE NATURE AND CHARACTERISTICS OF THE TOURISM INDUSTRY

The amorphous nature of the tourism industry has made it difficult to evaluate its impact on the economy relative to other sectors in the economy. Techniques have been developed to facilitate measurement of impact but there is no universally accepted definition of what constitutes the tourism industry. The World Tourism Organization (WTO) has attempted to address this problem in its publication A Standard Industrial Classification of Tourism Activities (SICTA). Most academic writers tend to craft their definitions to suit their specific purposes. The definition given by Burkart and Medlik (1981) is accepted: the phenomenon arising from temporary visits (or stays away from home) outside the normal place of residence for any reason other than furthering an occupation remunerated from within the place visited.

However, there are a number of features associated with tourism which are quite explicit. For example, tourism implies that a person undertakes a journey: the journey may be for less than a day (day tripper/visitor); or it may be a journey within a national boundary, therefore constituting a domestic tourist trip; or it might be a journey which crosses an international boundary, therefore being classified as an international tourism trip. However, it is not only the nature of the journey which constitutes tourism, but is also the purpose of the journey which very broadly should be for

leisure or business. In looking at the development of tourism historically, most attention has been given to the concept of international tourism, i.e. journeys across international boundaries. Although the components of the tourism industry will differ between countries, there are certain subsectors which are clearly identified as being components of tourism activity, such as the accommodation sector which would include not only formal accommodation, hotels, guest houses, etc., but also camping sites, rooms in private houses and bed and breakfast type arrangements. Travel agents and tour operators are recognized as comprising another distinct subsector. Transport - airlines, shipping, rail and car hire, cars and coaches - will also be seen as being important inputs to the tourism sector. In some countries, shopping and production of handicrafts is another associated activity of tourism (Lickorish and Jenkins, 1997).

THE DEVELOPMENT OF THE TOURISM INDUSTRY

Development is an ambiguous term that, although widely applied in many and diverse contexts, defines precise definition. Broadly, however, it is considered to be both the process through which a nation or society moves from one condition towards another (presumably better) condition and also the goal of that process. On other words, it "refers both to the destination of a journey and to the journey itself". Despite this ambiguity, not only has "development" long been considered both a desirable outcome and specific objective of tourism development but also, for many destinations as well as organizations such as the UNWTO, it continues to be seen in this light (Sharpley, 2020).

Over the five decades, tourism has experienced continued growth and deepening diversification to become one of the fastest growing economic sectors in the world. Modern tourism is closely linked to development and encompasses a growing number of new destinations (Baker and Unni, 2018). It is evident that tourism is in a close relationship with many other sectors. This encounters many difficulties as well as some opportunities (Işik et al., 2019).

If we use 1945 as being the year when the development of the major growth in the tourism industry began, we can make some general observations relating to the changes which one can discern in the tourism industry.

Before the 1950s, tourism was very much an industry which was fragmented; hotels, transport operators, travel agents, tour operators all tended to work independently of each other. Hotels were largely in the business of selling bed nights. Airlines and railways were in the business of selling seats. Travel agents of course, were selling travel and holidays but in each case they tended to operate very much as individual businesses. From the mid-1950s onwards, particularly in the UK, the growth of tour operators began to change the nature of the industry from essentially individual business activities to more integrated activities. Hotels, for example, were beginning to see customers as wanting a range of services rather than simply buying accommodation. So hotels began to develop shopping arcades and later to offer secretarial centres to try to increase the spend of guests within the hotel complex. Transport operators, particularly in the airline business, saw the sale of transport services as being integral to a much wider need. Airlines offered insurance and accommodation booking for travellers. By the 1980s many airlines were offering complete travel services including holiday arrangements, medical services, car hire, etc.

What we have seen since the 1950s is the emergence of a holiday and travel industry which is offering more integrated services. This is particularly noticeable with the forward and backward integration of some of the very large tour operators. To some extent this was determined by the nature of demand. In other cases it was a business opportunity to integrate demand and provide a service at a much more competitive price and to maintain and increase market share. By 1990 the structure of the tourism industry, certainly in the UK and Europe, was influenced by the growth of some very large companies. In the USA, American anti-trust laws discouraged, if not prohibited, the development of large integrated companies. The American experience in tour operation has been very different from that within Europe, particularly compared with the UK (Lickorish and Jenkins, 1997).

TOURISM GLOBAL DEVELOPMENT

That tourism is a global phenomenon is not debated. However, the definition and nature of the phenomena collectively known as global tourism are frequently debated and misunderstood. "Global", as a term, is not the major source of confusion. It refers to the fact that visitor flows, tourism advertising, flows of spending by visitors and tourism enterprises, the ownership of tourism enterprises, and the collection and reporting of tourism statistics reach around the world and form a complex web of interconnections and dependencies among tourism businesses and organizations. The confusion stems from the nature of "tourism" itself (Lew et al., 2004).

It is important to recognize that international tourism, although considered an industry, is more accurately a set of industries, including railroads, airlines, automobile rental companies, hotels, restaurants, food and beverage producers, travel agencies, communications firms, museums, souvenir makers and sellers, and various entertainments. Significantly, many of these industries compete internationally, need large capital investments, require development of local infrastructures, and increasingly rely on strategic alliances and centralized coordination (Belk and Costa, 1995).

Tourism, as a curious quest for something that is novel and different, involves spaces and people's social relations to spaces, simply because novelty and difference exist not at home but elsewhere (Wang, 2000).

Globalisation is a concept that is increasingly invoked in the analysis of tourism. With the seemingly limitless spread of tourism, the embracing of virtually any form of activity and the general ubiquity of tourists and tourism, the temptation to reference globalisation in discussions of tourism has been irresistible, often through casual and uncritical statements (Mowforth and Munt, 2016).

Tourism and its development prospects in the world matter too many countries, regions and continents of the globe. From the level and dynamics of international tourism development many countries and regions have changed the landscape physiognomy. From backward and underdeveloped areas have become functional tourist areas, in which there is a genuine tourist offer. International tourism in the world in the past century has reached an extremely high level. The development of international tourism and the progress of its development are related to the political and economic situation in the world and different areas and regions. Tourism as an important economic activity is related to the circumstances created in the world economy. In the fifty years the level of international tourism development has been harmonized with the development of the world economy and the movement of the standard of living (real increase in wages and leisure). However, tourism has grown faster than the world economy and living standards. There is no doubt that in this act and other factors, such as: the rapid development of urbanization and motorization in developing countries has created the need for foreign tourism demand and extensive state and large capital jobs in the developing famous tourist sites with fast developing tourism industry in all fields. The latter is related with the tendency to increase tourism through export opportunities to those countries with favorable natural and other conditions for tourism development (Reçica and Millaku, 2011).

TOURISM INDUSTRY IN KOSOVO

Tourism today is one of the most important and dynamic sectors of the world economy and is considered to be a complex and diverse phenomenon. It is complex as it involves the performance of a large number of activities (e.g. water, rail, road and air transport services to hotels, restaurants, souvenir shops, banks and retail) that are organized and coordinated with each other.

KOSOVO AND INTERNATIONAL ORGANIZATIONS FOR TOURISM AND STATISTICS

An important issue for tourism development in Kosovo is its membership in various international organizations that are directly involved in tourism, or indirectly contribute to the collection and comparison of tourism data. The current situation of the tourism sector in Kosovo in terms of cooperation and exchange of data with international tourism organizations is very unsatisfactory, as Kosovo is neither listed nor included in the various tourism statistical reports for comparison of countries and regions, tourism trends, etc.

Memberships and collaborations with organizations of this nature are very useful and recommended when preparing national tourism strategies and are considered as an extremely important tool in measuring the level of progress in achieving country-specific tourism objectives. Furthermore, the lack of appropriate local, regional and national data on the tourism sector in Kosovo presents a major challenge and makes it difficult for policymakers to develop strategies and set objectives for the sector. When compared to Kosovo, regional countries such as Albania, Macedonia, Montenegro, etc., are already full members or candidates for membership in various international tourism organizations. As noted in various reports on tourism, these countries use and consult closely the reports and findings of international tourism organizations as valuable resources for the development of tourism strategies.

In the table below, there is a list of international organizations related to collecting and comparing tourism data.

Table 1. International organizations that contribute to the collection, analysis and measurement of tourism data
Source: Analysis of the current situation in the tourism sector in Kosovo, 2018

Main international organizations for tourism and statistics	
United Nations World Tourism Organization (UNWTO)	"A United Nations agency responsible for promoting responsible, sustainable and inclusive tourism. It generates market knowledge, promotes competitive and sustainable tourism policies and instruments, and promotes tourism education and training".
World Council on Travel and Tourism (WTTC)	"The WTTC works to raise awareness of Travel & Tourism as one of the largest sectors in the world. The WTTC advocates for partnerships between the public and private sectors, delivering results that match the needs of economies, local and regional authorities, and local communities, with business ones".
Eurostat	"It provides the EU with statistics at European level that allow comparisons between countries and regions".
Travel and Tourism Competitiveness Index (World Economic Forum)	"This index is a measure of the factors that make business development in the travel and tourism industry of individual countries attractive, rather than a measure of the country's attractiveness as a tourist destination".
European Travel Commission (ETC)	"It's a non-profit organization responsible for promoting Europe as a tourist destination in third markets".
United Nations Economic Commission for Europe (UNECE)	"It aims to promote pan-European economic integration and facilitate greater economic integration and cooperation among member countries".
United Nations Educational, Scientific and Cultural Organization (UNESCO)	"It is responsible for coordinating international cooperation in education, science, culture and communication. It strengthens the links between nations and societies, and mobilizes the general public".
United Nations Statistics Division (UNSTATS)	"It is committed to advancing the global statistical system. UNSTATS aims to compile and disseminate global statistical information, develop standards and norms for statistical activities, and support countries' efforts to strengthen their national statistical systems".

STATISTICS FOR TOURISM DEVELOPMENT IN KOSOVO

Despite the lack of institutional support and investment in the tourism sector, the number of international travelers visiting Kosovo has progressively increased from 24,616 in 2008 to 79,234 in 2015. The regions most visited by international guests in Kosovo in 2015 are Pristina (53,057), Peja (12,694) and Prizren (9,779). The data available for this sector is very limited. Tourism is assumed to directly contribute more than 1% to Kosovo's GDP and employs more than 9,000 people (3.5% of total employment), while the world average tourism contribution to GDP is 3.3%. Public investment (human and financial) in this sector is negligible. The ministry responsible for tourism development is the Ministry of Trade and Industry, with a Division of Tourism employing three full-time public officials. Kosovo Investment and Enterprise Support Agency (KIESA) is the public institution responsible for promoting tourism. Both organizations commit very small amounts of money to develop the sector (less than 100,000 euros a year). Unlike the central level, the commitment (product development, promotion and launch of public-private projects) of some municipalities such as Peja, Prizren and Gjakova for tourism development has been significantly higher.

Table 2. Number of foreign visitors and their nights of stay by country of origin in the period 2016-2018
Source: Kosovo Agency of Statistics, Series 3: Economic Statistics, Hotel Statistics Q1 2019

Order No.	Country	2016		2017		2018	
		Visitors	Nights	Visitors	Nights	Visitors	Nights
1	Austria	7,493	11,309	5,719	9.138	5,076	8,809
2	Belgium	2,735	4,209	2,995	5,300	3,156	6,034
3	Bosnia and Herzegovina	2,705	4,071	2,460	4,436	3,360	5,231
4	Great Britain	5,514	9,698	5,034	8,400	6,482	10,113
5	France	3,756	6,027	4,084	7,014	4,496	7,184
6	Germany	14,225	24,425	16,579	28,283	17,178	28,668
7	Greece	1,290	2,624	1,441	4,414	2,593	9,448
8	Netherlands	2,480	4,748	2,666	5,321	3,107	5,564
9	Italy	4,946	7,725	5,023	8,299	6,292	10,253
10	Croatia	5,401	8,775	4,344	7,304	5,926	10,421
11	Montenegro	3,098	4,799	2,889	5,082	3,901	6,843
12	Macedonia	6,155	9,602	6,251	10,504	7,842	12,554
13	Poland	661	1,157	671	1,059	503	891
14	Serbia	6,089	9,173	6,108	9,461	7,475	12,222
15	US	12,238	21,703	10,539	18,796	13,857	21,862
16	Albania	29,509	41,293	28,158	40,263	37,141	53,669
17	Slovenia	6,192	11,771	6,848	13,093	6,690	13,394
18	Spain	325	532	375	636	650	2,059
19	Turkey	12,667	20,928	13,463	21,880	14,848	23,938
20	Switzerland	11,001	18,989	12,494	23,165	13,151	21,741
21	Other	25,506	43,526	24,088	41,549	29,035	50,431
	Total	**163,986**	**267,084**	**162,229**	**264,268**	**192,759**	**321,329**

The table above shows statistics on the number of tourists and their night stays by country of origin in the period 2016-2018. We note that the largest number of tourists come from Albania (37,141 tourists in 2018), Germany (17, 178 tourists in 2018) and Turkey (14,848 tourists in 2018). Mostly the number of tourists has increased from one year to another.

Also the Kosovo Agency of Statistics (KAS) has published the Hotel Statistics in Kosovo in the first quarter of 2019 (Q1 2019). In Q1 2019, part of the survey was 218 hotels that operate in the territory of Kosovo. Most of the hotels are located in the region of Prishtina, Peja, and so on. In Q1 2019 the number of visitors (local and foreign) was 65,265, of which 41.85% were local visitors and 58.15% were foreign visitors, while the number of nights of stay was 104,907, of which 39.70% by local visitors and 60.30% by foreign visitors. The largest number of visitors and their nights of stay is concentrated the region of Prishtina with 28,876 visitors with 48,561 night of stay. The largest number of foreign visitors is concentrated in Prishtina, Prizren and so on. As for foreign visitors, the largest number of them was from Albania, Turkey, Germany, etc.

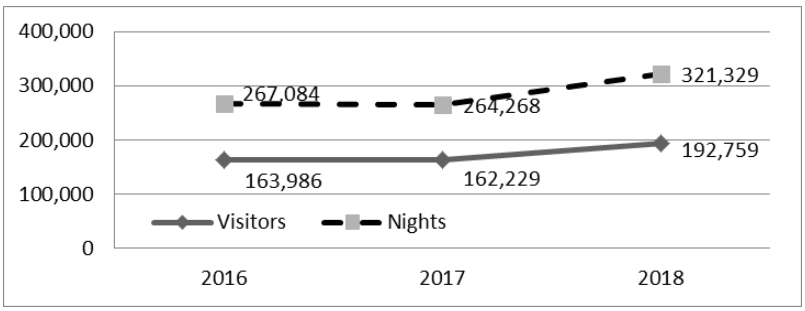

Figure 1. Graphical representation of the number of foreign visitors and their night stays in the period 2016-2018 Compiled by authors based on table data

Figure 1 graphically shows the total number of foreign visitors and their night stays during the period 2016-2018. It is seen that from 2016 to 2017 there is a slight decrease in the number of foreign visitors and their night stays. However, in 2018 the number of foreign visitors and their night stays have increased; the number of visitors from 264,268 in 2017 increased to 321,329 in 2018 and their night stays from 162,229 in 2017 increased to 192,759 in 2018.

CONCLUSIONS

The travel and tourism industry is of particular importance because it contributes to the economic development of countries in general. So, it contributes to GDP growth. Tourism as an industry evolved more rapidly with the creation of the airline industry, which enabled faster transport of tourists from one place to another.

The movement of tourists through tourist destinations in different countries has made tourism develop globally. Nowadays the possibilities for free movement have increased and this has facilitated the global development of tourism. Nowadays both domestic and foreign tourism have a higher level of development as it's easier for tourists in general to visit tourist sites around the world, in those places that tourists prefer.

Regarding Kosovo, we can say that Kosovo has natural beauties, cultural heritage, historical monuments, etc., and all of which affect the way Kosovo is visited by tourists from all over the world. We noticed that the number of tourists visiting Kosovo has increased year after year, which means that the tourist potential in Kosovo is high. To keep up with the growing tourism trend, the government's budget allocated for tourism needs to be increased in order to protect and develop tourist destinations.

Kosovo also needs to become a member of the International Organizations for tourism and statistics so that tourism statistics can be always updated and the access in tourism statistics can be easier.

Concerning the number of foreign tourists, it turned out that the largest number of foreign visitors is concentrated in Prishtina, Prizren and so on. As for foreign visitors, the largest number of them was from Albania, Turkey, Germany, etc.

It should be noted that the number of foreign visitors and their night stays in Kosovo varied from one year to another. Thus, if we compare the years studied, we can say that the number of foreign visitors and their night stays was higher in 2016 compared to 2017. And also in 2018 there was again an increase in the number of foreign visitors and their night stays in Kosovo.

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GEOMATICS CONTRIBUTION TO ROAD NETWORK CHARACTERIZATION CASE STUDY: BATNA CITY

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Abstract: The city of Batna is an important crossroads between coastal cities and the far south. It is also an axis linking East to West across the highlands due to its valuable geographical location and its high demographic increase. As a result, traffic flow problems related mainly to the growing vehicle fleet, as well as the characteristics of the road network and the traffic plan applied, have generated increased needs for motorized travel. It is therefore interesting to establish a diagnosis of the current functioning of the road network in the city of Batna, for more effective management and to help planners anticipate the expected problems. This work will integrate an approach based on the association of the digital database with the use of Geomatics techniques (techniques based on the use of Geographic Information Systems) which can provide a powerful tool for better urban mobility.

Key words: Batna, urban roads, traffic, congestion, load, vehicles

* * * * * *

INTRODUCTION

The transport sector is nowadays one of the essential factors for development. Roads, which facilitate the mobility of goods and people, are therefore one of the important factors for the development of the economy and prosperity in a country. According to the World Bank, there are 76 private vehicles per 1000 inhabitants in Algeria. As a result, it ranks fifth in Africa for the number of vehicles per capita (Benmahmoud, 2013).

It is important to note that the private vehicle has become the most widely used means of urban mobility, and public authorities must therefore "build an urban transport system in the sustainable sense of the term, as long as they develop a participatory approach and innovative communication at the same time" (Boubakour, 2008).

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Over the past twenty years, the Geographical Information System (GIS) has been an area of information and communication technology increasingly used by public authorities in decision-making, particularly in planning and management (Masser and Ottens, 1999; Jankowski, 2009; Stillwell et al., 1999).

Although GIS has been used for more than thirty years, however, it has only recently been used in the field of transport (Shafabakhsh et al., 2017; Sun et al., 2011; Morita et al., 2004; Ueda et al., 1996).

In this context, the present study is based on a series of questions related to the contribution of Geomatics to the management of the road network in the city of Batna.

A database and digital mapping of the road network were set up from a Geomatics perspective. The objective is to demonstrate the usefulness of GIS in road network management to enable coherent management of road mobility, thus facilitating the decision-making process by the concerned services.

STUDY AREA

Batna wilaya is located in the eastern part of Algeria in the Aurès region. The city of Batna is the capital of the wilaya located at the crossroads of Constantine, Biskra and Khenchela roads. Batna is considered as a crossroads that aims to ensure the interconnection of the regional regions of the north and south and at the same time to provide the East-West transition: Khenchela - Biskra (figure 1).

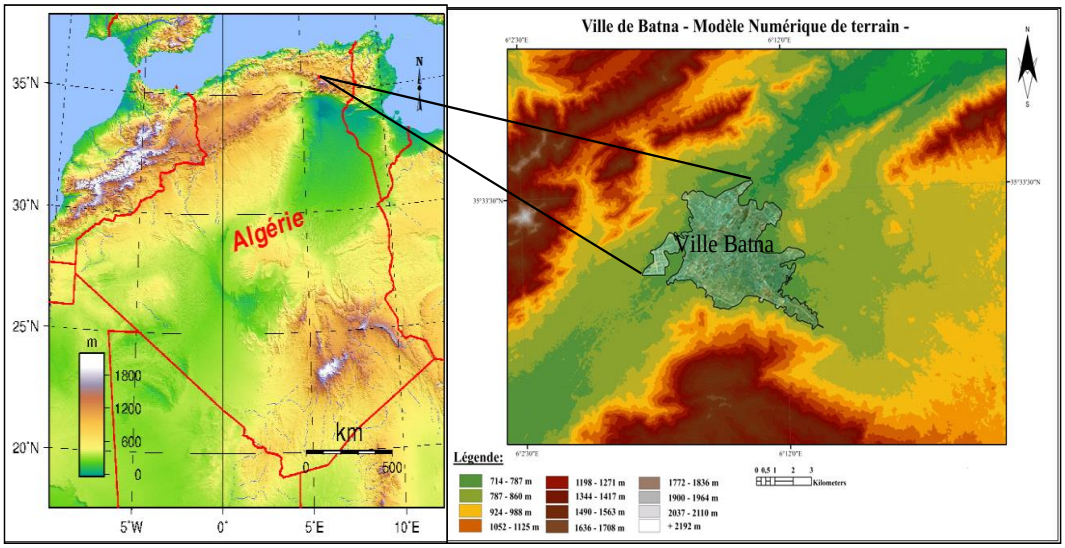

Figure 1. The geographical and administrative situation of Batna city
Source: Merdassi Abdelmoumene

MATERIALS AND METHODS

The methodology used in this work is based on satellite data, topographical data, urban planning instruments and field surveys. These data are then integrated and analyzed in a GIS environment for road traffic restitution and analysis (table 3) using the software: ENVI 4.5 for image processing and ArcGis 10.1 for vector mode GIS.

The survey is based on the information collection for each primary urban road as follows:

- Number of vehicle fleets in the city;
- Present-day traffic conditions;
- Traffic variations during the day (especially during rush hours).

Urban evolution of the city

The change detection approach helps to better assess the socio-spatial changes that occur in a region. To this end, the vectorization and superposition of the various multi-date classifications are an excellent source of information to determine the size and trend of urban dynamics in Batna City (figure 2).

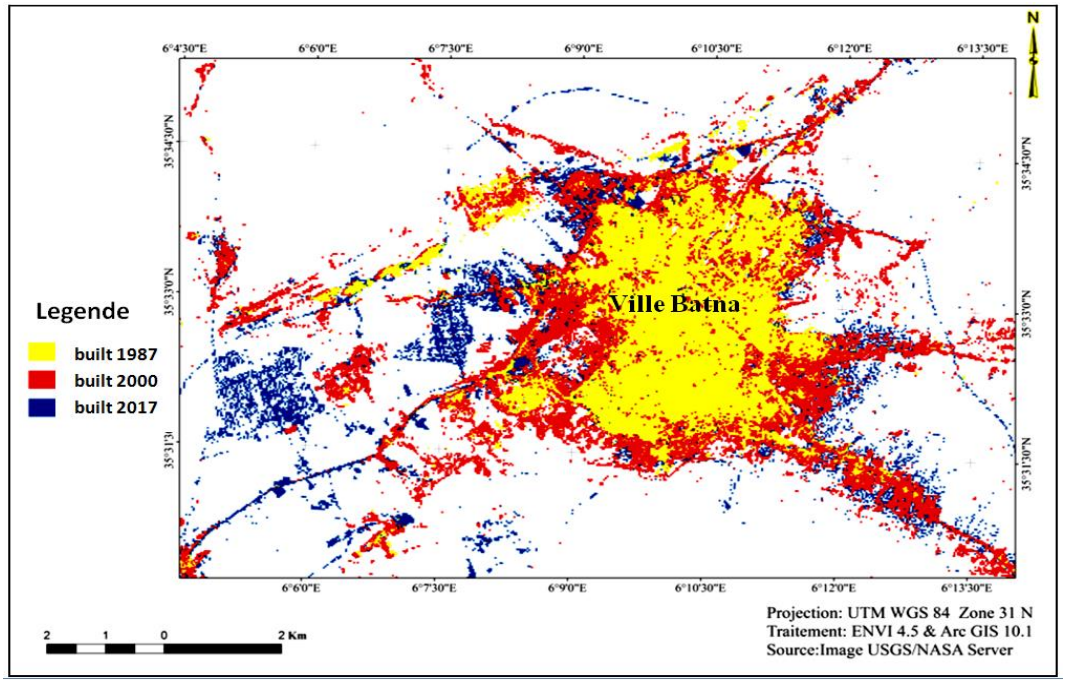

Figure 2. The evolution of the built environment in the Batna city in 1987, 2000 and 2017
Source: (Landsat images)

Table 1. Evolution of land use areas

Land use units	Classification1987		Classification 2000		Classification 2017	
	Surface in hectares	Surface %	Surface in hectares	Surface %	Surface in hectares	Surface %
Urban space	1021,41	12,00	1969,92	23,13	3706,38	43,53
Bare land	2528,64	29,70	1998,18	23,46	1690,92	19,86
Forest	1795,50	21,08	1517,67	17,82	2114,37	24,83
Farm land	3168,90	37.21	3028,68	35,57	1002,78	11,77

The analysis of the classification results (table 1) confirms the progression of the urbanized surface between the two periods. There was a development in the surface of the urban spot of 948.5 hectares or 67.75/year between 1987 and 2000. In the period between 2000 and 2017 this area developed with 1737.5 hectares or 115.75 hectares/year.

Road network components in Batna

The road network in Batna city consists of 3 types of roads (figure 3).

- City bypasses

These roads partially avoid the crossover of Batna city, except that the multiple traffic jams (due to poorly designed junctions, parking and reduced traffic flow at police checkpoints) discourage

motorists from using them. They are supposed to prevent transit traffic from accessing the city and thus avoiding any congestion and safety problems that may arise.

These roads have a dual role: interurban connections and city bypasses.

- South bypass

It bypasses the urban area to the south along the protection ditch, to allow traffic between the two main roads, National No. 3 (RN3) and National No. 31 (RN31), towards Khenchela.

- North bypass

Biskra - Constantine: It borders successively the new urban housing zone II (ZHUN2), the Kechida neighborhood and the Industrial Zone. The development of the city on both sides also gives it an additional role as a collector road.

Urban roads

There are three types of urban roads:

- Primary roads

These roads provide access from the city center to the suburban districts; all these roads are structured by two major axes:

Axis 1: Boulevard KL, Route de Biskra, Avenue de l'Indépendance and Route de Constantine.

Axis 2: Avenue de la République, Rue Boukhlouf Mohamed and Allées Boudiaf Mohamed.

- Secondary roads

They are the second group of roads that connect neighborhoods from the main network.

- Tertiary roads

The tertiary roads provide access within the properties. They have been delayed in terms of planning.

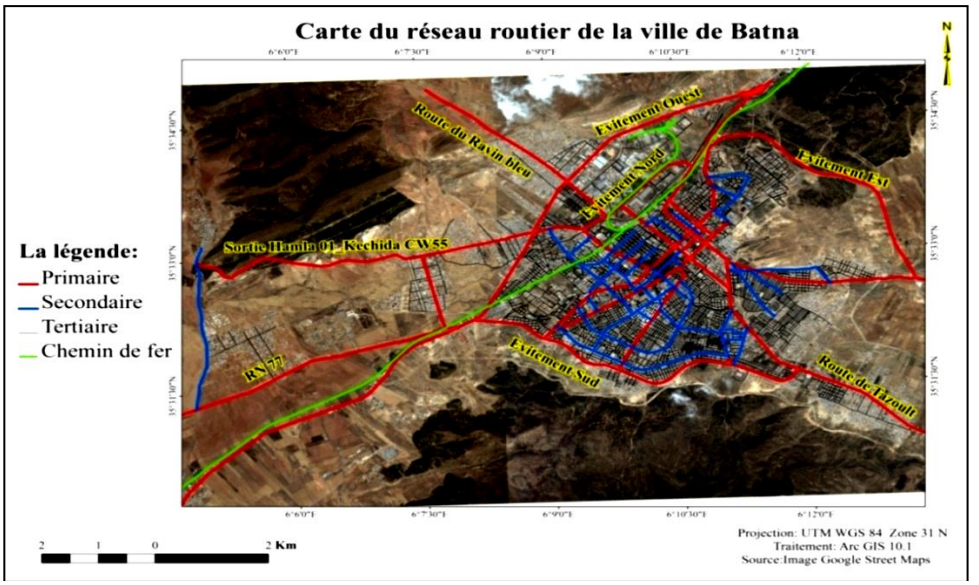

Figure 3. Batna city road network (2017)
Source: Google Maps

Current functioning of the road network

Pendulum movement for the employment sector in Batna

As shown in table 2, there is a real pendulum migration between Batna and the neighbouring cities. In this example, public transport is taken into account since it is often considered as a means of transport for work-related or service purposes.

Table 2. Number of travelers at departure and arrival (Bus transport)
Source: 2016 Urban Community Plan

City	Departures	Arrival
Batna	2038	10701

It is clear that the number of passengers arriving in Batna by public road transport is higher than the number leaving Batna, which confirms the attractiveness of Batna city.

Theoretical and operational capacity of roads

Road capacity at a given point is the maximum number of vehicles that can be passed at that point during a reference time interval, usually corresponding to an hour (Wardrop, 1954) and depending on the existing infrastructure and traffic characteristics.

Capacity on a road route is a different concept defined by Cohen's (2005) quotation: "Capacity on a route is the minimum of capacity at each of its points".

- Theoretical capacity

The theoretical capacity of a road section is the maximum traffic intensity per hour. It is calculated based on the maximum number of passenger cars passing through in 15 minutes, multiplied by the coefficient corresponding to the peak hour. This number is not an absolute maximum; it is based on reasonable respectability. Thus expressed, capacity depends only on the number of lanes, their width and off-road areas and the gradient of the section (PIARC, 2011).

In this case, every 1000 m with a vehicle width of 5 m is equal to 200:

$$\boldsymbol{Tc} = 200 \times \text{road width} \quad (1)$$

- Practical capacity

Practical capacity is defined as the maximum observable traffic intensity on the section, depending on the nature of the traffic predominating at that point (PIARC, 2011).

- Saturation Flow Rate (SFR)

The saturation flow rate of a roadway, whether in the morning or in the evening, is calculated as follows:

$$\boldsymbol{SFR} = \text{load (PPV/h)} \times 100 / \text{theoretical capacity} \quad (2)$$

Where, PPV is the Private Passenger Vehicle unit.

Table 3 summarizes the main characteristics of the road load survey on the main roads of the city.

Table 3. Database component

Sectors and population	Equipment	Urban transport line	Road
Code Sector name Surface area Ranking Percentage Population87 Density 87 Population 98 Density 98 Population 2014 Density 2014	Code Type Name Sector Equipment Surface area	Code Origine Destination Outward length Number of stops Return width Number of stops Busnumber Places available	Code Name Length Width Load HPM LoadHPS Daily capacity Exploitation Condition Theoretical capacity Saturation rate travel time Speed

Using this database, queries can be made to analyze the state of the place. This feature allows highlighting the real issues in the field. The example given in this article concerns the saturation of the current roads. In addition, several requests can be made depending on the factors having a direct impact on traffic, allowing several special analyses to be performed.

RESULTS AND DISCUSSION

Analysis of the practical load of roads

Suburbanization and more generally, any separation of the workplace and the place of residence have led to significant migration (daily movement between the city dweller's home and his place of work, always at the same times). In addition, service and commercial transport generates significant traffic on the city's roads.

The road network in the city of Batna is experiencing significant traffic but has not reached saturation levels yet (figure 5).

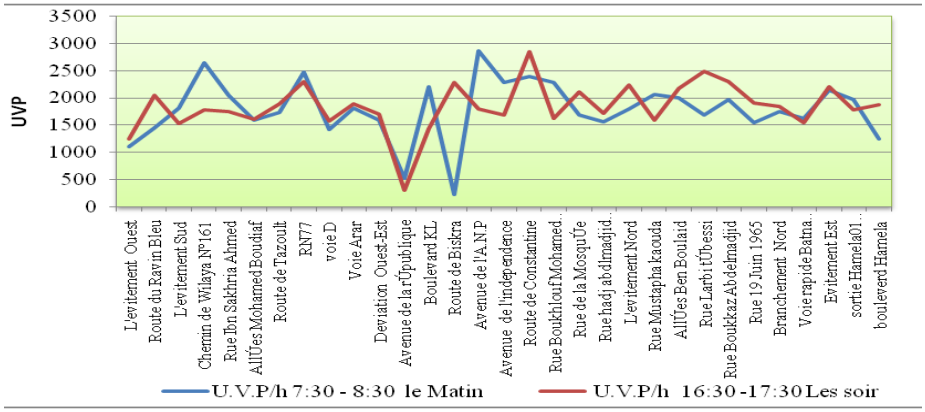

Figure 5. Load of the main axes (morning and evening)

It can be noticed that the highest load at Morning Rush Hour is observed at A.N.P. Avenue (2867 U.V.P/MRH), and the highest load at Evening Rush Hour is observed at Constantine Road (2851 U.V.P/ERH). Roads with a low load are: Biskra road with a load of (220 U.V.P/MRH) in the morning and Avenue de la République with a charge of (298 U.V.P/ERH) in the evening.

Comparison between the theoretical capacity and the practical load of the different primary axes

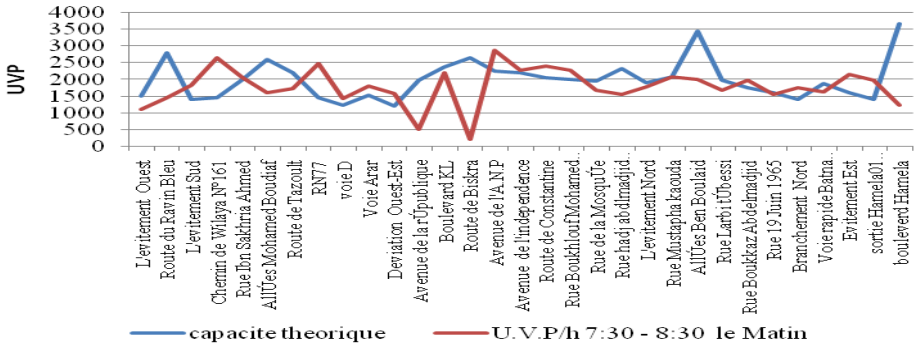

Figure 6. Theoretical and practical load at morning rush hour

The road network in the city of Batna has experienced significant traffic but has not reached saturation levels. This traffic is observed on various routes such as those connecting the city of Batna to the surrounding areas.

Access to the city center is characterized by very high mechanical traffic pressure, which shows a permanent load that is constantly generated on downtown roads on a daily basis. It can also be noticed that during rush hours, there is acongestion on the wilaya road N° 161, RN N°77, avenue de l'A.N.P, as well as the rue de Bouakaz and the east bypass, which explains that the majority of the practical load is caused by the entrances to the city of Batna and is higher than the theoretical load (figure 6).

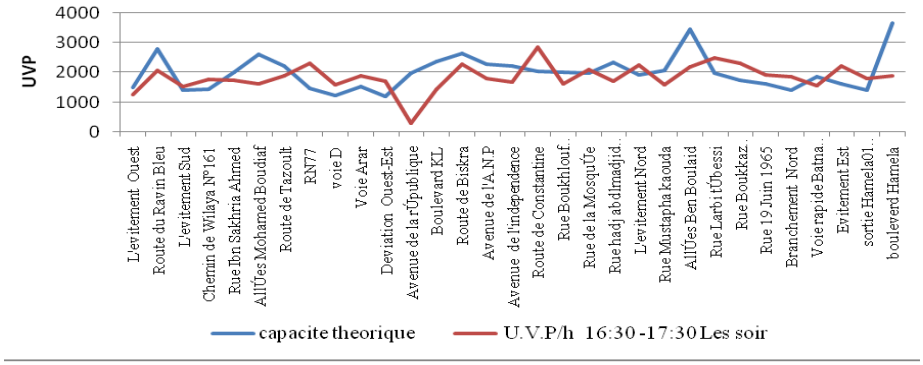

Figure 7. Theoretical and practical load at the evening rush hour

It can be seen that the presence of bus and taxi stations on general traffic lanes disrupts the traffic flow. The inconvenience is caused by traffic on the boulevards and highways with very heavy commercial activity that are parked on both sides.

Analysis of the saturation rate of the primary axes

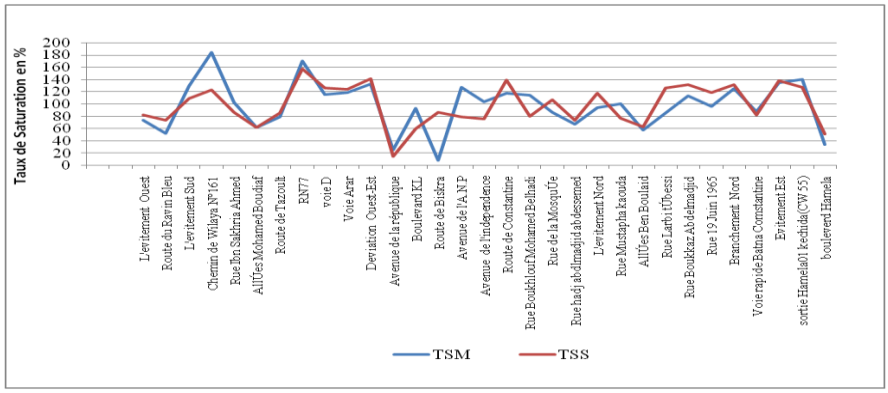

Figure 8. Saturation rate of the main axes (morning and evening)

The city, which currently hosts almost twice its capacity, is in a state of major traffic jams. Some sections have a very high saturation rate, including several axes that have a rate higher than 100% in the morning and evening rush hours.

It is can be noticed that National Road N°3 (CW N°161 in this scale) has a very high saturation rate of 183.75% in the morning and 123.19% in the evening (figure 8).

Transport hubs

The importance of certain facilities or their absence results in significant population movements from one sector to another and from one agglomeration to another.

Traffic black spots are caused by traffic management malfunctions due to factors external to the road network and its management, such as the presence of certain very specific problems on the network that can create waiting lines over several hundred meters. The traffic black spots observed in the city of Batna are summarized in Figure 9.

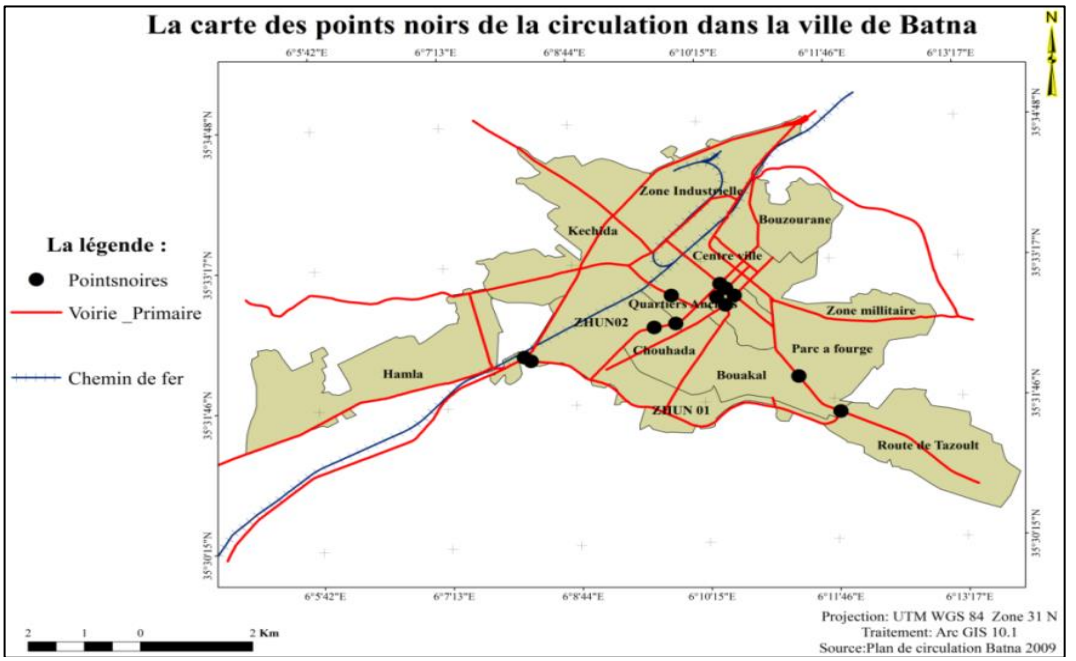

Figure 9. Traffic black spots in the city of Batna

The perimeter of the city of Batna includes places of economic attraction and a series of facilities and structuring activities. Therefore, it has been noticed that the traffic squares are located at the crossroads (roundabouts) as well as the black spots are much more centered in the city center, and this corresponds to the concentration of the various life services, which causes a great accessibility problem and consequently long lines of cars. As a result, it is difficult for many buses to cross these lines.

The two black spots on the M. Boudiaf alleys are the cause of the presence of the CHU (Centre Hospitalier Universitaire - University Hospital).

The saturation of all these intersections is the result, in addition to their presence on high-traffic roads, of the accumulation of certain causes of dysfunction linked to several factors.

A better management of urban roads by geographic information systems (GIS) requires a reliable and enriched database that allows analyzing, managing and interpreting the results obtained from the different requests.

The analyses carried out show that most of the city's road network, and in particular the city center and the first suburbs of urban fabric, are relatively saturated, particularly during rush hour.

This lack of traffic flow is the result of a constant increase in the number of private vehicles combined with undersizing of the primary and secondary roads. There are roads that have a morning and evening saturationrate of > 100%.

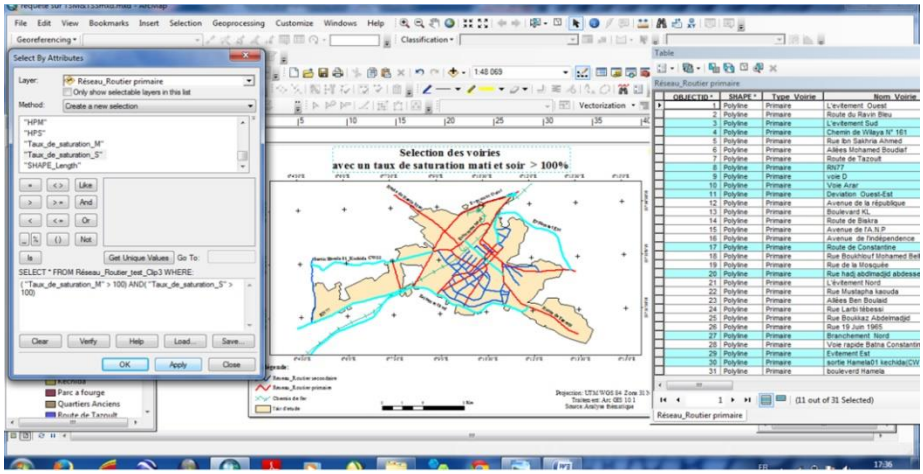

Figure 10. Selection of roads with MSR and ESR> 100%

MSR = Morning Saturation Rate
ESR = Evening Saturation Rate
These axes are characterized by:
- Narrow roadway that causes lateral collisions;
- Number of incoming channels that are too high;
- Does not have traffic lights (Lack of signage);
- Anarchic (informal) parking;
- Conflicts: vehicle/pedestrian, vehicle/vehicle;
- Congestion almost all day long;
- Reduced visibility distance when approaching the intersection;
- High population density and where illegal constructions proliferate;
- Poor road conditions;
- Sidewalks congested by informal transport;
- No pedestrian crossing;
- Inadequate width and number of rows;
- Incoherence of the layout in relation to the typology of the track;
- The heavyweight;
- Poor layout of roundabouts, sidewalks congested by informal transport (Fraud);
- Input radius too large;
- Almost no ground markings for user guidance.

RECOMMENDATIONS

To improve the situation, a series of measures have been proposed for the rehabilitation of roads. The solutions that can be proposed are:
- Installation of traffic lights;
- Widening of the roadway for any axis;
- Regular maintenance of the pavement;
- Improvement of the perception of mini roundabouts;
- Installation of speed limitation road signs;
- Any arrangement to reduce the approach speed (narrowing of the pavement width has crossed;
- Reduce the width of the inlets and outlets;
- Closeness of pedestrian crossings to the intersection area;
- Parking management;
- Presence of bus and taxi stations on the traffic lanes.

CONCLUSION

A better management of urban roads by geographic information systems (GIS) requires a reliable and enriched database that allows analyzing, managing, and interpreting the results obtained from the different requests.

The city of Batna is a medium-sized city that is undergoing a development towards a form of metropolis due to a spreading development. This urban development, driven by both population growth and migration within and between wilayas (departments), has created new travel needs.

Road infrastructure and the transport network have not been able to handle traffic flow, especially during rush hours. This situation of permanent road congestion is a major problem for the social and economic development of the city and raises serious environmental problems.

The use of the database made it possible to highlight saturation levels, fluidity levels and service rates. All these elements make it possible to first target the sectors to be maintained and redeveloped as a priority. In a second step, the study addressed the problem of conflict points by analyzing intersections (crossroads and roundabouts).

As a result the analysis showed a malfunction in traffic that result in daily traffic jams. There is also a lack of prospective visions in terms of urbanization, particularly during the post-colonial period.

Therefore, a traffic plan must be implemented to ensure the adequate traffic flow and to ensure a service for marginalized sectors. Finally, it is important to take into consideration future urban development and the population' most convenient means of transportation.

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ANALYZING THE TOURIST BEHAVIOR OF THE INTERNATIONAL STUDENTS IN WARSAW

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Abstract: This paper is the result of a case study on the foreign students from Warsaw (winter semester 2015-2016), their view on the city and their behavior as tourists. In this case study we applied a questionnaire and analyzed the resulting data in SPSS in order to understand why the students chose Warsaw, if they were involved in tourist activities and if the tourist market from the city and beyond can satisfy their needs. This paper may be useful for policymakers in cities with large numbers of foreign students since it highlights the needs and relation of foreign students regarding tourism.

Key words: international students, educational tourism, tourist behavior, geostatistics, quantitative methods

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INTRODUCTION

Ever-increasing, tourism is becoming more important and our society views the act of travelling as a way of attaining relaxation, finding fulfilment in life and also getting to know one's self better. The youth tourism (Horak and Weber, 2000) and the youth travel market becomes so important from the 1990s that it was discussed into the first WTO's International Conference on Youth Tourism, held in New Delhi, 1991 (Abdel-Ghaffar et al., 1992).

The tourist behavior is analyzed in many research articles from many points of view (Afshardoost and Eshaghi, 2020; Ferreira Silva et al., 2020; Huang et al., 2020; Jiménez-Barreto, 2020; Manosuthi et al., 2020; Tkaczynski et al., 2020; Wang et al., 2020; Xue and Zhang, 2020; Kock and Ringberg, 2019; Kock, Josiassen and Asssaf, 2018; Kumar, 2016; Lin and Kuo, 2016; Pearce, 2016), but students' tourist behavior not, with some exceptions (Tran et al., 2018; Pereira

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López, 2016), which is why we considered this article useful in the context of student mobility is the maximum, at least in European countries. For students, all the above reasons to travel are increased by their energy and many times their desire to acquire knowledge – the knowledge production is also considered a tourist attraction (Travesi, 2017), especially cultural knowledge. Thus, there is a need to understand their behavior, in order to create satisfying travel offers.

Since tourism is already difficult to define (WTO), including students in the category of tourists poses even greater difficulties. However, in certain cases, students (or pupils) do become tourists, hence the concept of educational tourism (García-Rodríguez and Mendoza Jiménez, 2015; Pitman et al., 2011; Pawlowska and Roget, 2009), or international academic tourism (Bento, 2014). Certain interesting cases appear when educational activities (cultural/school exchange programs, field trips) are regarded as tourist activities, this happening because the trip is necessary for the study process. Summarizing, educational tourism means the travel activity of people with the main goal of accumulating knowledge (Pawlak, 2015).

The concentration of foreign students in cities (Michael et al., 2004) is justified by the offer provided by the urban environment: "Towns and cities provide the context (…) where tourism, leisure and entertainment form major service activities. These environments also function as meeting places, major tourist gateways, accommodation and transportation hubs, and as central places to service the needs of visitors" (Hall and Page, 2006, p. 222).

According to WTO, young people travel in order to increase their knowledge about the world, to experience and understand different cultures and, at least 70% of them, in order to study and travel in other countries. Thus, they participate in the tourism process. Other sources tell the same thing (Abdullateef and Biodun, 2014) adding that many times the statistical image is false or difficult to understand. Even so, studies on this have been done (Pawlak, 2015), with results that encourage the goals of this paper such as showing that foreign students travel more than local ones; three types of the most common of those travels being observed: spontaneous travel, organized travels and study abroad (such as Erasmus+).

MATERIALS AND METHODS

This paper aims at understanding the tourist behavior of foreign students in Warsaw, the Capital city of Poland. Accordingly, it will show how students behave when they consider themselves tourists, if they used their time in Warsaw for tourist activities and if they went out of the city for tourism. The data concerning tourism and the total number of students in Warsaw was obtained from the Statistical Yearbook of the city of Warsaw or from the web-page of the Statistics Poland. However, the raw data is not telling anything about the tourist experience of those students. Since this paper aims at offering a view of that experience, this was done by analyzing the questionnaire answers of 50 foreign students, present in Warsaw in the spring of 2016.

For data analysis we used Cluster analysis and ANOVA in SPSS. Cluster Analysis is "an exploratory analysis that tries to identify structures within the data. Cluster analysis is also called segmentation analysis or taxonomy analysis. More specifically, it tries to identify homogenous groups of cases if the grouping is not previously known" (Statistics Solutions, 2018). ANOVA, or Analysis of Variance, "is used for examining the differences in the mean values of the dependent variable associated with the effect of the controlled independent variables, after taking into account the influence of the uncontrolled independent variables" (Statistics Solutions, 2018).

Here, the sample numbered 50 foreign students which answered an online questionnaire (Note 1) disseminated through social media platforms (Facebook) and e-mail. A sample is a collection of measurable objects, individuals or data selected by the study conductor in a random or specific way (Asandului, 2002). The size of this sample is small because it is limited by the lack of access to data regarding the status of foreign students, the questionnaire being applied in the circle of known students. Since the language used for the questionnaire was English, it is visible that the respondents from Ukraine and Belarus are a minority, the great majority of respondents being from the European Union (EU) countries. Concerning the nationality, three of the respondents didn't specify theirs. As

of those who did, only one of them comes from a country at the Equator (Indonesia) hence the others are from the northern hemisphere. It should also be noted that the big proportion of respondents from East-European and Balkan countries is explained by the close trade and political relations between Poland and those countries. Half of the respondents were Erasmus+ students while the others were receiving a scholarship from the Polish government or where exchange students (other programs). More than half (56%) chose to study in Warsaw because they could travel to Poland while 42% because of academic opportunities. From a different point of view, 69% of the respondents studied in Warsaw at the time of the research while the other 40% already finished their studies in the city. As for the length of their study stay, 46% studied in the city for more than one semester, 26% where there for full degree length while just one respondent spent less than one month in the city.

Financially, 42.9% answered that they received parental funding during their stay in Warsaw, as their main income source, 32.7% declared their scholarship as their principal revenue. Regarding gender, 61% where females, the rest were males and one chose not to answer the question regarding sex. Finally, we have to separate the 49 respondents who gave details about their income sources into two groups, 42% which were supported by parents and 32% which benefited from scholarships while the other smaller group were either working or using their savings. Among the respondents, 34.8% had a monthly income varying between €90 and €499, 48.8% had access to incomes varying between €499 and €999 while the other 13.9% had access to sums larger than €1000. Bearing in mind that the living costs in Warsaw are smaller than in western European capitals (from authors own experience, more than €300 suffice for accommodation and food, especially if the students live in university subsidized hotels), we can safely assume that many foreign students are using their surplus income in tourist activities.

RESULTS AND DISCUSSIONS

In order to understand the influence of tourism in a certain area, one of best way to do so is by using the benchmarking technique (Heely, 2011; Hot spots, 2012), which means comparing two or more similar administrative entities from the point of view of important tourist statistical indicators; such as bed-nights, number of tourists and tourism profit. Maybe surprisingly for a city destroyed so many times during its history, the tourism sector of Warsaw is growing year on.

With more than eight million visitors in 2016, the city became the most visited from Poland, even if there is a big competition in the country. In Figure 1 is a comparison that shows how the only real competitor for Warsaw is Krakow, from the point of view of tourism. A useful tourism research was made for another big Polish city, Poznan (Kotus et al., 2015). For a more accurate image of the tourism evolution of Polish cities see a work complete with time series and a beautifully designed synthetic indicator for measuring tourism development of the country's cities, among which Warsaw (Majewska, 2011). As for the whole Europe, the city is trying to become important in a very competitive regional city tourism area, with cities like Wien and Prague that it has to look up to. However, statistically, the city was ranked 43rd on a global level and on the 14th place in the EU on a scale comparing the total number of tourists visiting the cities (Geerts, 2016).

Warsaw is the Capital city and among the most important economic regions of Poland, and one of its major functions is that of an academic center. According to European Commission (European Commission - Study in Europe - Country Profile - Poland, 2015), in 2014 there were 1.46 million students in Poland out of which more than 223000 in Warsaw.

In the same year, overall, there were about 55000 foreign students in the country, of which 16628 in the Capital. Looking at the last years (Figure 2), it can be seen a downfall of the total number of students in Warsaw, probably caused by the general demographic decline of the country and by increasing academic importance of other Polish cities, such as Krakow.

However, an opposite trend is presented by the foreign students in Warsaw, which grew from a share of just 2% in 2010/2011 to over 7% in 2015/2016. Unfortunately, there were no data available as to determine the nationalities of the foreign students from Warsaw but, looking at a national level, it can be seen that the Ukrainians and Belarusians are the dominating groups, partly

explained by the economic and historic ties of the two countries with Poland and by the similarity of their languages with Polish.

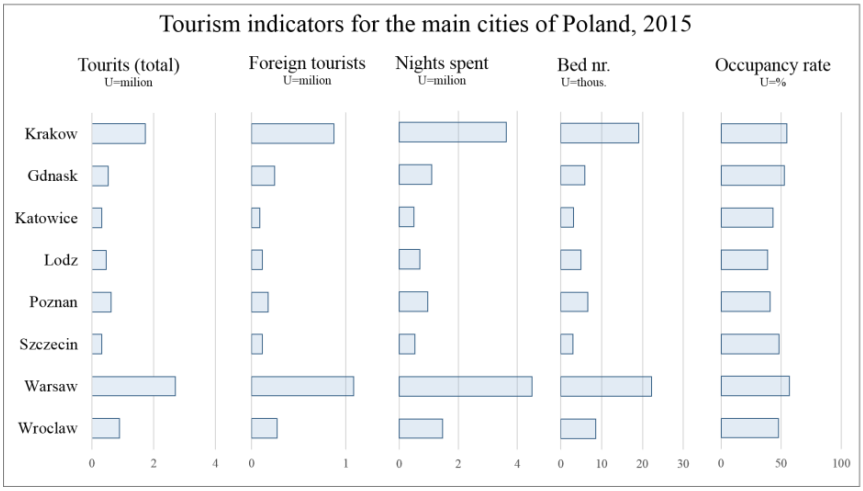

Figure 1. Comparison of tourism indicators between Warsaw and the next seven most important Polish cities
(Data source: BDL, 2015)

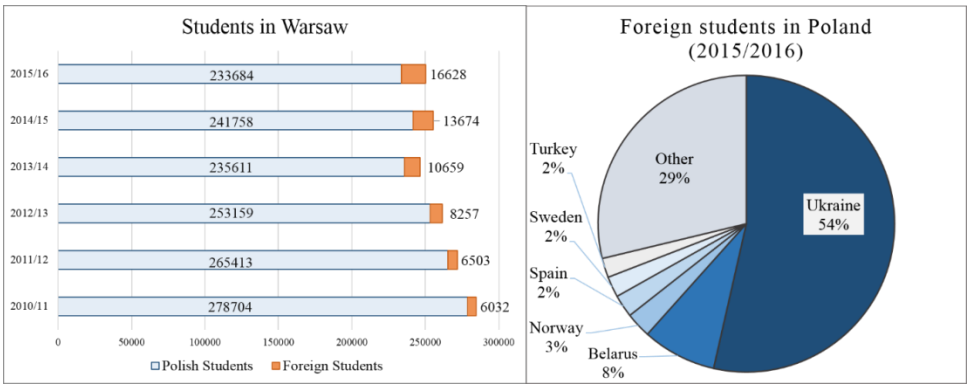

Figure 2. The situation of local and foreign students in Warsaw
(Data source: http://studyinpoland.pl/, Statistical Yearbook of Warsaw)

The real identity of Warsaw differs from the one shown through the main tourist info site (Warsawtour.pl) (Lange, 2012). He insists on the modern and cultural side of the city as opposed to the unclear image promoted by the site. A different approach shows that all the information sources are contributing to the creation of the city's image while the tour-operators are the ones focusing on culture (Dudek-Mankowska, 2009). The foreign students in Warsaw associated the city with communism and winter before their stay while, during or after their stay, that image improved to one of a green city, full of culture, nightlife but still dominated by the communist Palace of Culture. In order to determine the above-mentioned aspects, the questionnaire begun with inquiries regarding which features they associated the city with prior to arrival (they were able to choose between the following options which were offered based on literature and the city image communicated by official marketing means: Winter, Summer, Second World War (II WW), Communism/Sad Urban Landscape, Old Town, Night Life/Bars, Sky Scrapers, Palace of Culture and Science, Jewish Warsaw/Ghetto, Green areas, Chopin, Museums). Most of them associated the city with Winter

(82%) and II WW, Communism, Old Town and Chopin (all having been selected by about 50 to 60% of the respondents). However, when asked at the end of the questionnaire if they associate the city with the same features as they did prior to their arrival, their feedback was different, a very big share of the respondents (80% or more) now associated the city with: The Palace of Science and Culture, Chopin, Green areas, Night Life, Sky Scrapers and II WW. Out of them, the most prominent symbol was the Palace of Science and Culture, due to its central position, dominating the city's CBD. The symbol that saw the most significant growth was represented by Sky Scrapers whiles the Communism and related fell drastically. Green Spaces, museums and Chopin are all symbols that grew in importance for students. All these show the developing efforts of Warsaw in order for the city to have a friendlier image and also the interests and activities of the foreign students.

Tackling the most important matters, 56% of the respondents chose Warsaw for studying because of travel possibilities while 72% considered themselves also tourists and not only students (Table 1) during their stay in the capital of Poland. Also, the longer the stay, the less those students identified themselves as tourists (after one semester). Since so many of the respondents regarded themselves as tourists, this is the most important feature that gives this research a positive tone, hence its aim to discover the student's tourists needs and behavior.

Table 1. Correlation table between the length of studies and perception as tourists
(Data source: own data)

			Did you consider yourself a tourist?	
			2=No	1=Yes
Length of stay	Between one month and a semester	Count	4	19
		% within length of stay	17.4%	82.6%
	For an entire degree	Count	3	10
		% within length of stay	23.1%	76.9%
	Less than one month	Count	1	0
		% within length of stay	100.0%	0.0%
	More than one semester	Count	6	7
		% within length of stay	46.2%	53.8%
Total		Count	14	36
		% within length of stay	28.0%	72.0%

Regardless of the duration of their stay, 72% of the foreign students considered themselves tourists. However, looking at this perception from different time categories about 80% students spending between one month and one semester in Warsaw (and those enjoying full degree studies in the city) considered themselves tourists, while among the ones that spent more than one semester but less than a full degree time in the city only half of them had a self-perception as tourist. We can assume that the time spent in a foreign city, does not highly influence student's perception as being also a tourist or not; however this idea must be tested on a bigger statistical population.

Even if the language was a barrier for some of the respondents, the majority had a good interaction with the local people and a good opinion about the town, 90% would return as tourists, while half just for work. Thus, 77% of the students enjoyed traveling around the city and the nightlife, 65% were attracted by cultural tourism while most of the female respondents enjoyed shopping in the city. Taking all these into account it becomes no wonder that so many of the students considered themselves tourists while in Warsaw.

When analyzing the relationship between the total income of the students and their view on the affordability of Warsaw (Figure 3) we cannot identify any visible correlation and thus we can conclude that the perception on affordability is a purely subjective one. On the other hand, when asked, the foreign students had ideas as to how the city can serve them better, from a tourist point of view. Those were: organizing more concerts, English should be more widely spoken (many students would like the Polish people to be friendlier with using the English language), more cycling paths and a friendlier attitude of locals towards foreigners (this, however, has to do with the language barrier since very few of the poles born before the 1990s speak English).

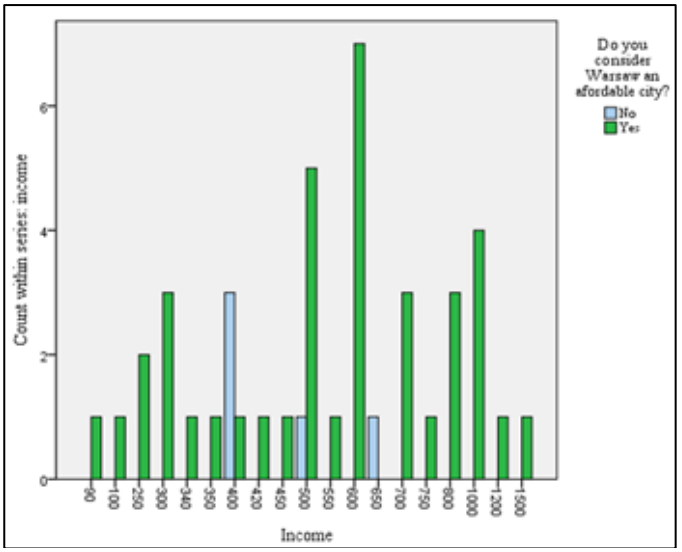

Figure 3. Correlation between incomes and affordability of Warsaw city
(Data source: own data)

Even if at the start of their stay in Warsaw, the foreign students didn't perceive the city as it wanted to be perceived which is: modern, friendly, smart and full of history (Lange, 2012; Dudek-Mankowska, 2009); during their stay and after, the foreign students saw the city as it is marketed or very close to that but, still marked by the communist scars which are to found especially in the architecture. Summing up, the image of the city is a positive one, with only one important thing to improve, which is the locals' attitude towards the English language

Students are a very mobile social group (Abdullateef and Biodun, 2014), and the foreign students from Warsaw do not differ. Over 90% of the respondents used Warsaw as a starting point for traveling to other parts of the country while 78% travelled from the city to other parts of Europe.

As the below representation shows (Figure 4), the most visited destinations where those closer to Warsaw, especially in the V4 group. However, it can be seen long distance travels also, the most probable reason for their occurrence being family visits. On the other hand, a connection between the length of stay in Warsaw and the distance students travelled was spotted, with the longer stays translating into journeys on longer distances.

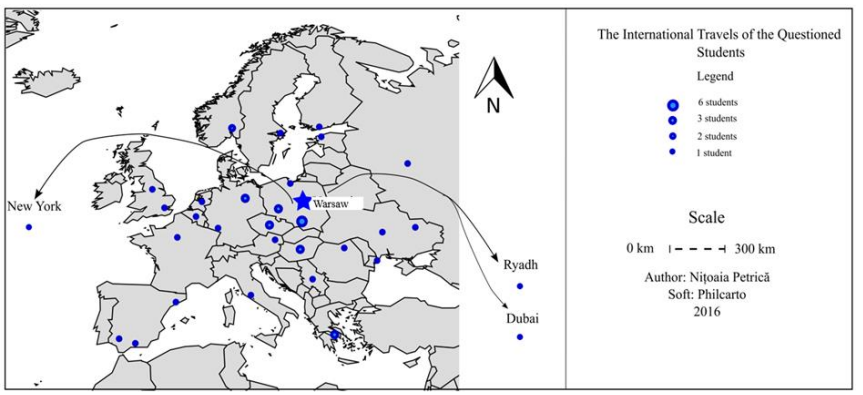

Figure 4. Cities where the foreign students travelled to, starting from Warsaw
(Data source: own data)

Regarding financial aspects of the their stay in Warsaw, 92% of the questioned ones declared that they spent money on tourist activities, which is somewhat not surprising since 72% of them considered themselves tourist. Out of the respondents, 70% appreciated how much they spent monthly on tourist's activities. These can be further divided into three categories: more than half of them spent less than 150 € monthly on tourism, 25% spent between 140 and 300 € on tourism while the rest spent more (with two very high sums appearing: 900€ and 2000€, though this might be as a result of misunderstanding the question). All these numbers must be completed by the fact that 88% of the respondents regard Warsaw as an accessible city, from a financial point of view. We can thus safely assume that the foreign students visiting Warsaw have a lot of disposable income which they can use for tourist's activities, especially since living in the city is not a great financial burden for the most.

ANOVA

longest trip (distance)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	45027210.210	22	2046691.373	.820	.669
Within Groups	29941813.333	12	2495151.111		
Total	74969023.543	34			

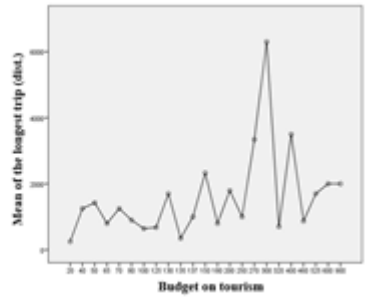

Figure 5. ANOVA test and correlation matrix
(Data source: own data)

By utilizing the ANOVA test (Baloglu, 1997), we intended to show if the students' incomes are somehow influencing their tourist behavior (Figure 5). Four different tests were done but the budget for tourism didn't influence the tourist decisions of students (as to how much time they spend on tourism or the distance they travelled). The distribution of incomes compared with the affordability of the city for students could not be correlated so their incomes did not pose a great stress on their experience. The results are explained by the fact that the students as a group, are travelling proportionally more than other human groups, in spite of their incomes, while also not spending a lot at the destination (Pawlak, 2015).

A profile of the respondents was created through the Cluster Analysis, in which their relation to the tourist offers accessed in Warsaw was analyzed. The indicators used were the following (derived from questionnaire questions): tourist offers were easily accessible, tourist offers for students, longest trip in distance, and longest trip in days and income. The analysis was made with SPSS using the Two Step Cluster option.

Since the first two indicators were categorical, they were the most important while the last three which, though not being so important for the final resulting cluster, serve well for the purpose of understanding the final result.

Group description:

1. 45.5% is a middle way group which had access to tourist offers, had medium incomes and enjoyed a medium travel time.

2. 21.2% is the least numerous group, made out of students which had no problem finding tourists offers targeting them, with high incomes and long journeys.

3. 33.3% is a group made out of students which travel above the average while not having access to student targeted tourist offers.

We can thus appreciate that the foreign students from Warsaw travelled regardless of incomes or targeted tourism offer, travelled and enjoyed their time in Warsaw, as tourists. However, those who had access to offers designed for students generally travelled more and used those offers.

CONCLUSION

The foreign students that chose Warsaw in 2016 view themselves as tourists and their behavior is in accordance with that view. Both in the city and outside it, they did take the chance to discover the most they could during their study time, regardless of their incomes or time spent there. Though they do have access to some tourist offers designed for them it is clear that the city should do more to satisfy their demand for tourist activities. Given the existing Erasmus mobility program and other academic programs, local policies must profit from this opportunity and be oriented also to the satisfaction of this segment of tourists.

Despite the obvious limitations of this research (the lack of access to some data, the sample research is not statistically significant), we believe that other studies, improved, including larger ones, can be carried out on this model, the more so as the tourist behavior of the students it has not been analyzed in other research works.

Notes

(1) - Link to the on-line questionnaire: https://drive.google.com/open?id=1vhPVyhBgD09So4ZVYvBiBIIEnPZCqYeL.

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FLOOD RISK, TYPOLOGY, SEVERITY AND MANAGEMENT

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Abstract: Flooding has now become a major and critical concern in most parts of the world. It is defined as frequent natural phenomena that cause significant and often irreversible human and material damages. The increase in the number of catastrophic floods is first and foremost the consequence of climate change as well as land use that is not in line with environmental reality (construction on floodplain areas, inconsistent development of river beds. This paper represents generalities and definitions which allow an explanation of some fundamental concepts related to flood risk and its management.

Key words: damage, flooding, management, risks,

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INTRODUCTION

Natural disasters have always posed serious problems because they affect a large number of people. Floods are among the most significant natural disasters affecting the world (Herman, 2009). Our societies have always been confronted with floods; rivers are both a wealth and a threat to the residents (Bravard and Petit, 1997, p. 213). This duality has long been seen as globally beneficial, but today it seems that this balance has been broken (Kreis, 2004, p. 2).

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Based on information (IDD: International Disaster Database) from the Centre for Research on the Epidemiology of Disasters (CRED, 2007), floods have been at the forefront of natural disaster in the world over the past two decades. Climate change introduces a new variable in the search for sustainable flood risk management (Gralepois and Guevara, 2015, p. 1-20). Taking into account a non-stationary of climatic conditions involves adaptation of flood risk reduction strategies.

Risk is defined as the mathematical expectation of damage to the environment during a reference period in a given region and for a particular hazard (ONU, 1992, p. 98). In a less simplistic way, risk depends on hazard and vulnerability.

Flood risk management is based on prevention, forecasting, protection and crisis management. The evolutions of knowledge and technologies have led to more accurate methods for flood management (Herman, 2010)

METODOLOGY

This work presents generalities and definitions which allow an explanation of some fundamental concepts related to flood risk and its management. We started with the definition of flood as a combination of hazard and vulnerability. We proceeded to its typology and severity. Finally, we explained its management and its modelling.

THE RISK OF FLOODING

Natural disasters are divided into six disaster groups: biological, geophysical, meteorological, hydrological, climatological, and extraterrestrial. Floods are in the hydrological group (Yang, 2020, 1-20). Floods encountered around the world are diverse and evolving both in their nature and impact on society (Binns, 2020, p.1-3).

The bibliography offers many definitions of flooding, but they all converge on the following summary: Flooding is a fast or slow, total or partial submersion of an area usually out of water. This submersion can be natural or artificial. Flooding in a broad sense includes river overflows, the rise of water tables, flooding due to failure of protective structures, runoff from heavy thunderstorms and floods resulting from the conjunction of high tides.

The surface water flow is manifesting by stream flooding or outside any organized hydrographic network by the phenomenon of runoff. At the extreme, these phenomena can lead to flooding, flooding by overflow of streams in the first case and flooding by runoff in the second one (Fouchier, 2010, p. 27).

A flood is defined by different criteria such as its genesis, duration, frequency, volume and peak flow (or maximum flow). There is interdependence between the frequency (probability of occurrence) and the magnitude (severity) of this risk, and the floods with rare frequencies are the most severe and catastrophic.

The flood concept is usually defined by different criteria, such as its genesis, duration, frequency, volume and the peak low (or maximum flow). It is also known that there is a clear interdependence between the frequency (probability of occurrence) and the magnitude (severity) of the risk. In another hand, the floods with rare frequencies are the most severe and catastrophic ones.

The centennial or millennium designation characterizes an average probability of occurrence of the flood each year, but does not provide information on the duration between two events. The project flood is a given recurrence flood (depending on the environment and technological requirements) used to calculate dimensions of the hydraulic works and the resistance of the civil works.

Risk: Hazard and vulnerability

Risk is defined as the combination between hazard and vulnerability. It is thus the combination of the probability of hazard occurrence and the consequences that can result on vulnerable elements in a given environment (Morin, 2008, p. 60). Losses can be estimated in terms of human lives, destruction of infrastructure in financial terms and environmental disorder.

Risk = hazard X vulnerability

Hazard is a phenomenon, physical manifestation or activity that could result in loss of life or injury, damage to property, social and economic disruption or environmental degradation (Morin, 2008, p. 60). It is an uncontrollable physical phenomenon of occurrence with random intensities (Lacina, 2012, p. 217). It is defined by a probability that takes into account the occurrence and intensity of the phenomenon with being a function of time and space. A hazard can only cause damage if there are socio-economic and environmental issues exposed to it.

Vulnerability is a propensity to damage or failure of different exposed elements (property, people, activities, functions, systems) of a given territory and society (Leone and Vinet, 2006, p. 9-25). It is the sensitivity of populations and activities located in an area exposed to a hazard.

The main direct damage caused by flood hazards is damage to people, buildings, socio-economic activities and the environment. Therefore, risk is necessarily the result of the intersection of two intimately related factors: hazard and vulnerability.

The risk is related to a natural or anthropogenic hazard whose foreseeable effects involves a large number of people, cause significant damages and exceed the response capacities of the directly concerned authorities (Ifen, 2002, p. 4).

For example, flooding does not constitute a risk in an uninhabited area, as no vulnerable element is theoretically present in terms of civil security (Tanguy, 2012, p. 40). If, in another hand, it affects a densely populated area, where important infrastructure is established, the risk will be present and may be important (Cutter et al., 2003, p. 242-261).

Flood risk definition can be considered from hydrological perspectives and geographical points of view. In the first case, emphasis is placed on floodplain areas, identified by hydrological estimates and hydraulic models, where river floods are likely to occur. In the second case, the combination of geographic conditions, environmental and socio-economic factors is used to determine areas with a high probability of damage (Luong, 2012, p. 325).

Typology of the floods

Flooding encompasses several types of events. The classical typology consists in distinguishing them according to their origin (natural or anthropogenic) and their speed (slow or fast).

Flooding associated with slow plain flooding occurs when rivers leave their minor beds for a long period of time, from a few days to a few weeks, due to heavy rainfall, either due to a rise in their alluvial water table. The kinetics of these floods, which concern large watersheds (more than 1000 km²), often make it possible to anticipate them correctly (Fouchier, 2010, p. 27).

Furthermore, torrential floods are characterized by the suddenness of their appearance and their evolution (a few hours) with a rapid response to precipitation. They are caused by intense rainfall over watersheds ranging from tens to hundreds km².

The severity of the flooding

Humans live in the world with natural hazards that would seem more and more frequent and intense. In recent years, floods remain the first risk-taking phenomenon of natural origin in the world. They can be a major risk with extremely harmful human and material consequences. They can cause very heavy and irreversible material, human and environmental damage.

Water-related disasters lead the development process to regress for decades. Floods can be one of the factors limiting the development capacity of human society, especially in poor and developing countries where alert capacity and experience of risk management are still limited.

According to the CRED (the Centre for Research on the Epidemiology of Disasters) report, there is an average of 37 catastrophic floods per year worldwide between 1900 and 2013. They account for 34% of global disasters between 1990 and 2007. Each year, floods affect an average of nearly 31 million people and cause more than 60,000 deaths. The number of people affected by disasters has increased considerably, reaching nearly 200 million in 2007 from 135 million in 2006.

Of this total, the vast majority (164 million) were affected by flooding. Between 2000 and 2006, an average of 95 million people was affected each year by this hazard.

The consequences are constantly increasing and becoming more and more fatal and increasing with years

The development of rivers that have long been undertaken locally without considering their downstream impact. The removal of flood expansion fields by dams has led to increase flooding in the downstream rivers. To avoid the replication of these errors, development projects must be considered at all watershed area (Kreis, 2004, p. 5).

FLOOD RISK MANAGEMENT

Flood control is not a new concern, and rivers have long been the focus of work to limit overflows in order to conserve human activities. The hydrological risk represented by floods is the result of the coexistence of this hydrological hazard and societies, which are mostly located near to rivers. Flood risk management is based on crisis prevention, forecasting, protection and management.

Prevention is an aspect of flood management outside of a crisis context. Counter to prevention, forecasting and crisis management correspond to actions in a state of emergency.

The forecast is intended to anticipate the occurrence of a flood and its consequences. Crisis management brings together all the means used to protect, inform and rescue (Hostache, 2006, p. 14).

To manage floods, there is now a greater emphasis on prevention (institutional and legal measures) more than protection (technical measure), which was for a long time dominant and still present (Beucher and Rode, 2009).

The reduction of hydrological risk requires both control of the hazard and mitigation of vulnerability. To protect populations, strategies are often the predetermination of rare floods, referring to the statistical assessment of flows associated with different return periods whose purpose is to implement Flood Risk Protection Plans to regulate urbanization and development in flood-prone areas and anticipate these events and shelter people before and during the flood.

Prevention aims to manage and reduce the risk (hazard and vulnerability) of flooding. On one hand, it includes informing people about the vulnerability to flooding and the steps to follow in the event of a crisis, on the other hand the establishment of protection means and the succor organization (Hostache, 2006, p. 17). It allows choosing a level of protection corresponding to the maximum degree of hazard. This prevention involves structural improvements (dikes, retention basins and dams) and non-structural ones (land use regulations, urban planning constraints). Preventive knowledge of risk can therefore help to lead the political choices of the territory and the protection of socio-economic issues through development (Fouchier, 2010, p. 27).

The forecast aims to anticipate the flood occurrence and its consequences in order to alert the population and put in place more effective succor. Contrary to prevention, forecasting is strongly influenced by time and it is interested to actual or in-formation flooding (Hostache, 2006, p. 17).

Crisis management brings together all the actions that come together during a flood to rescue and protect people and properties.

Hazards that exceed the level of protection determined represent the residual risk (Borrows, 2006, p. 1). This may include, for example, the flood that exceeds the project flood that was used to design a protection structure. The control of this residual risk is then based on monitoring and forecasting systems, alert and crisis management (Fouchier, 2010, p. 27).

FLOOD RISK MODELLING

This modelling aims to quantitatively measure the risk at any appropriate division of the territory.

Hydrological modelling

Hydrology encompasses all the processes which lead to the determination of flows in a river, associated with their probability of occurrence. There are two approaches in the hydrology: the deterministic approach and the statistical approach.

The deterministic approach considers all factors that may influence the watershed response and introduces them into a model for flow estimation.

The statistical approach allows the estimation of flows, of a given probability, from statistical laws that have been adjusted from series of measured flow data (Blin, 2001, p. 8-9).

Hydraulic modelling

A flood is a very complex natural phenomenon, whose analysis requires efficient and elaborate tools, for example hydraulic models. The main purpose of hydraulic models is to simulate hypothetical or real floods numerically, which makes it possible to characterize the hazards in space and time (water levels, flow rates, times of submersion, etc.).

Hydraulics refers to applications, calculations and treatments which allow water levels to be obtained from flow rates calculated at the scale of watercourse section.

Therefore, hydrology is the discipline which allows getting the flows and their return periods. Hydraulics is the discipline that makes it possible to obtain the water levels and the speeds corresponding to these flows.

Geographic information systems (GIS)

GIS are spatial analysis tools based on the overlay of qualitative and quantitative data, all geo-referenced in the same projection system (Grivel, 2008, p. 517). GIS manipulates geographic information that refers to geodesy, global positioning (GPS), remote sensing and spatial reference databases related to environmental characteristics. A geographic information system has become an essential tool in flood diagnosis. It offers unprecedented flood extension mapping and being a valuable source of information in the preparation of Flood Risk Prevention Plans.

CONCLUSION

Flooding is one of the main natural hazards in the world; this unpredictable and recurring phenomenon is aggravated by intense human activities and a poorly organized space. The damage occurs when land cover in a flood-prone area is not suitable for flooding. For this reason, flooding in sparsely populated areas or in areas where urbanization is particularly well adapted to flooding results in little damage.

In the end, effective flood risk management must be based on three essential concepts: prevention, forecasting, protection and crisis management.

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THE TOURIST AND TECHNICAL INFRASTRUCTURE SURVEY WITHIN THE ORADEA RURAL LEISURE METROPOLITAN BELT

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Abstract: The current study is meant to be a contribution to the promotion and development of an important geographical area for the municipality of Oradea, namely the rural proximity area that is part of the Oradea Metropolitan Area (OMA). The magnitude of the tourism phenomenon, as a sustainable resource could contribute to a functional reconsideration of this space that can bring about an overall territorial development, based on economic competitiveness, sustainable development, social cohesion or the development of new technologies. In this sense, it is not possible to conceive the development of an area

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from a tourist viewpoint without the existence of a suitable infrastructure (tourist, technical, transport), because it can influence, depending on the endowment degree and updated technology, the volume and structure of the tourist traffic. Thus, the main infrastructure components were identified, quantified and analyzed, each TAU being granted a certain score according to the evaluation methodology, based on which a certain hierarchy and highlighting of the main dysfunctions could be achieved. In conclusion, it was found that the existing tourist and technical infrastructure is satisfactory, but disproportionately distributed, a situation somewhat accountable due of the existence of the two spas, Băile Felix and Băile 1 Mai.

Key words: tourist infrastructure, technical infrastructure, Oradea Metropolitan Area (OMA), metropolitan rural area

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INTRODUCTION

The tourist infrastructure as a component part of the general infrastructure, which, moreover, the former supports and integrates, has an overwhelming importance for a certain territory, contributing to the creation of necessary conditions for the organization of tourist services.

Starting from the importance of the tourist and technical infrastructure for a certain territory, in our case the territorial administrative units (TAU) that make up the rural area of Oradea Metropolitan Area (OMA), in this research we identified and quantified the main components of the two categories of infrastructure in order to contribute to the development of the tourist phenomenon, thus increasing the attractiveness of the rural area from the metropolitan perimeter.

Another important aim that we followed was to analyze each infrastructure-related component, at a TAU level, in order to observe the degree of their endowment, so that later a hierarchy and a highlighting of the main dysfunctions could be acomplished.

Given the economic administrative and tourist importance, this metropolitan area has been and still represents an important basis of scientific research. The tourist valences were highlighted by many researches of authors such: Dincă, 2008; Ilieș and Josan, 2009; Baias et al., 2010; Stașac and Bucur, 2010; Ilieș et al., 2011; Dincă et al., 2012; Bucur, 2012; Ilieș et al., 2013; Herman and Tătar, 2015; Dincă et al., 2017; Tătar et al., 2018; Linc et al., 2019; Herman et al., 2020; etc.

The tourist infrastructure and technical facilities has an impact on tourist development in the environs of cities, factors which were analyzed for the current study of the rural OMA. The former relates to the accommodation, restoration, cure and entertainment facilities and the technical support to transportation and communication accessibility. Among them the accommodation industry stood out in terms of statistics. Nowadays accommodation industry features a wide range of diversity and specialization (Weaver and Lawton, 2014), most predominant tourist stayovers still being in hotels followed by motels, ecolodges, timesharing, resort hotels, extended apartment hotels, villas, guesthouses, campsites; a sector which draws attention for the tourism analysts as it most often drives the largest tourist expenditure during the trip. The contemporary accommodation infrastructure adds value to the experience by providing ancillary services and products, besides that of shelter (Page, 2019). In the case of the analyzed territory of the rural OMA, resort hotels, followed by motels and guesthouses hold the largest share due to the two spas located on the rural areas of the metropolitan area, amounting to 93,3%, showing that an old tourist consumption practically still dominates the entire rural metropolitan area, despite the huge natural (Tătar et al., 2018) and man-made tourist potential of the entire metropolitan area. As in the case of Fuschi and Evangelista's (2017) rural tourism case study, the tourist infrastructure-related results indicate that despite the great opportunity for tourism and local development, the rural area of the OMA suffers from low accommodation networking and an unbalanced accommodation facilities' distribution. It is estimated that the most of growth will take

place in cities and their environs (Halcrow Group Ldt., 2008), with a need for relaxation in the rural surrounding metropolitan areas which will function as recreational belts around cities. As this rural urbanization occurs fast-paced, it needs to be done sustainably and healthily, backed-up by pro-active policies so as to reduce inequalities among its composing communes and spread tourist flows equally throughout the entire rural area of the metropolitan belt. Rural development should bring about an expanding employment in in the suburban areas (Sykora and Ourednicek, 2007), also in the tourism sector. The tourism rural metropolitan development is possible due to a clustering of technical infrastructure facilities that lie at of the basis of most economic and social activities. The technical infrastructure in the rural OMA was surveyed for road, air, water accessibility, water sewage and Internet connection. For instance, the internet technology has proved to be a particularly good tool for consumers to communicate about social topics such as holidays and travel (Page, 2019). The results for this analysis showed a rather reduced score, the average for the entire rural OMA being of 11 points out of 30 allocated points, the average score being much negatively influenced by a very low score of the two newly entered communes (3 points) in the metropolitan area versus the other communes which most range above 10 points, indicating gaps in technical coverage. With a good transport and communication accessibility travel and holidaymaking speeds up, thus "linking transport, spatial structures and social effects" (Geurs et al., 2012, p. 7).

METHODOLOGY

In order to achieve this scientific research, we relied on the Methodology for assessing the tourist potential in the basic administrative-territorial units. According to it, the diagnosis of the tourist and technical infrastructure was made taking into account the following components:

- specific tourist infrastructure (i.e. tourist accommodation units; treatment facilities; conference rooms, exhibition centers, etc.; ski slopes and skiing cable facilities; entertainment facilities).
- technical infrastructure (accessibility to major transportation; sewage facilities; telecommunication coverage).

For each component specific to the two infrastructure categories existing at the level of each TAU which makes up the rural space of the OMA scoring points were granted according to the evaluation methodology. Thus, each commune accumulated a certain score depending on the concentration degree of the components specific to the tourist and technical infrastructure. Based on this score, it was possible to make a ranking of the TAUs highlighing which one is better equipped versus the other.

Furtheron, in order to achieve our goal, we did desktop reference documetation, based on the national and international literature. Field trips were also made to locate and quantify the main units that make up the tourist and technical infrastructure. For the analysis and interpretation of data obtained both from various statistical sources and from the field, the method of analysis and synthesis was applied and by the help of ArcGis Online we elaborated maps with the tourism and technical infrastructure outspread in the territory within the 11 metropolitan TAUs.

The elements of the tourist infrastructure can be found in an ArcGIS Online document, developed by the authors of this article, an application that allows the sharing of content with other people, both Romanian and other languages. The access to the information from the ArcGIS Online document can be made via the following link: https://dgtatamd.maps.arcgis.com/apps/webappviewer/index.html?id=e05528e7d74a47ad999b4698fc8e64ed.

RESULTS AND DEBATES

Oradea Metropolitan Area - the characteristics of the tourist infrastructure

The prosperity, the high economic and enhanced socio-cultural standard of the metropolitan area is also the result of its underlying activities in the field of tourism which, in turn, could not develop satisfactorily unless an adequate and diverse tourist infrastructure exists.

In the OMA, two tourist spas from Sînmartin commune draw our attention, namely Băile Felix[1] and Băile 1 Mai[2] spas, their appearance and development being related to the presence of thermal waters and in their planning of the urbanization phenomenon trend is easily identified.

Regarding the *tourist accommodation units* (represented by hotels, motels, guesthouses, agritourism guesthouses, classified between 1-5 stars/flowers) from the OMA, there is an unequal spread, most of them being located in the two spas (Figure 1).

Sînmartin commune, through the presence of the two balneoclimatic spas, has a reputed tourist function. According to data from the Ministry of Tourism (updated in 06.11.2020)[3], it holds 237 (93.3%) of the total 254 accommodation units of the rural OMA (Figure 2) and concentrates 8656 (94.7%) places for accommodation from a total of 9136 (Figure 3). Thus, the accommodation basis is very diversified, including 22 hotels, a 5 stars hotel with 262 beds accomodation acapacity, four 4 stars hotels (890 beds), twelve three stars' hotels (2102 beds) and five 2 stars hotels (1854 beds).

As can be seen, the 3 and 2 star hotels dominate, concentrating almost 80% of the accommodation hotel capacity. In fact, the entire accommodation basis in the rural metropolitan area is characterized by the dominance of 2 and 3 stars units (hotels, guesthouses, etc.) (Figure 4) in terms of comfort ranking categories (Figure 5). The other accommodation units in Sânmartin commune consist of motels, tourist and agrotourism guesthpuses, tourist villas, private villas with rooms for rent, etc. They amount to a total of 215 units, offering 3548 accommodation beds.

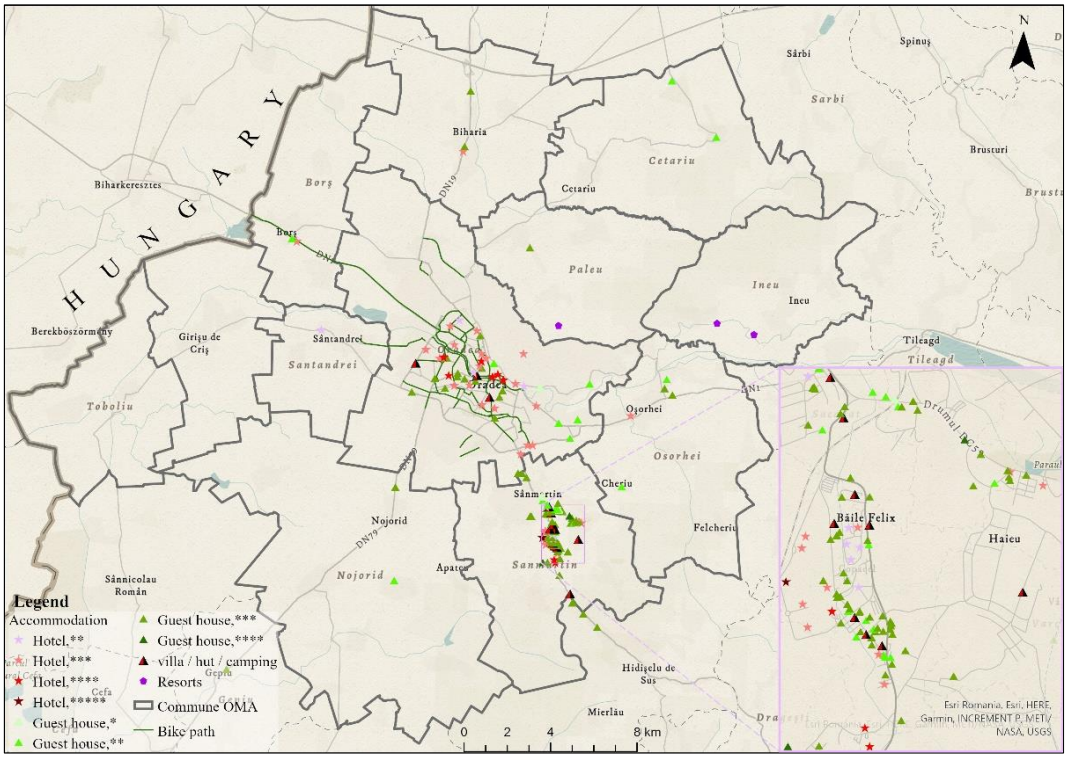

Figure 1. The OMA accommodation units typology

In the rest of the communes, the accommodation basis is much below the level of the two resorts, both in the number of accommodation units (17) and their category: one 3-star hotel with

[1] The greatest permanent spa of Romania
[2] Local-interest spa
[3] http://turism.gov.ro/web/autorizare-turism/

146 beds (Borş commune), the others being motels or classified guesthpouses with 2-3 stars/flowers, but with few accommodation beds (1 unit with 16 beds in Borş locality, 5 units with 86 beds in Oşorhei commune, two units with 72 beds in Biharia commune, one unit with 52 beds in Sîntandrei commune, two units with 61 beds in Ineu commune, three units with 30 beds in Nojorid commune, one unit with 11 beds in Cetariu commune, one unit with 6 beds in Paleu commune, 0 units in Girişu de Criş and Toboliu communes).

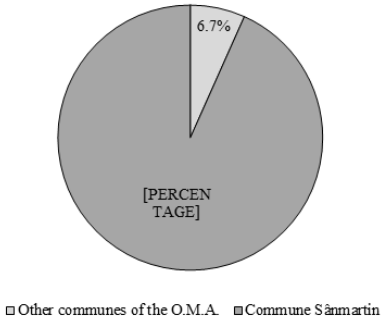

Figure 2. Weigth of accommodation units in Sînmartin and the other ommunes of the OMA (November, 2020)

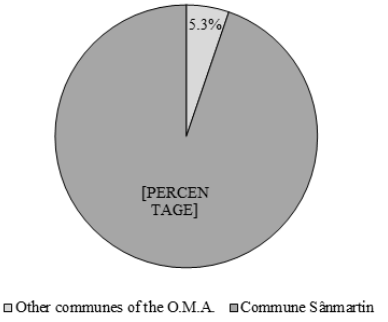

Figure 3. Weight of beds in Sînmartin and the other ommunes of the OMA (November, 2020)

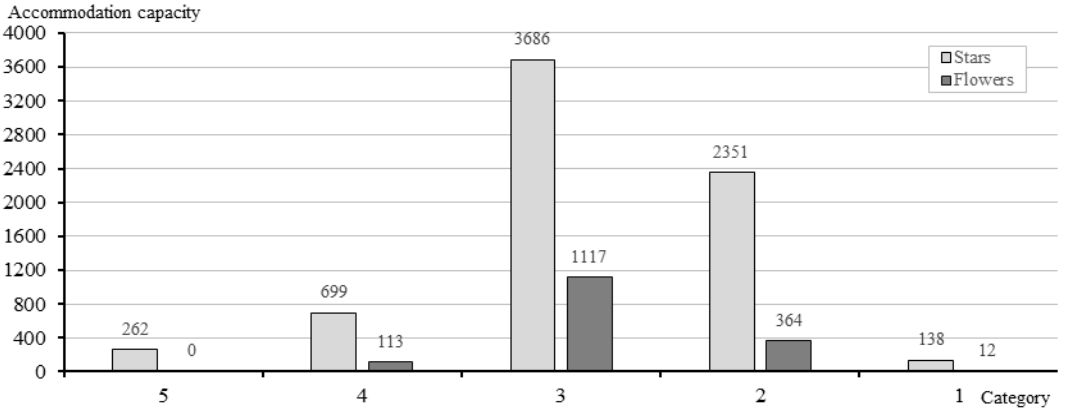

Figure 4. Accommodation capacity in OMA on comfort ranking (June, 2019)
(Source: http://turism.gov.ro/web/autorizare-turism/)

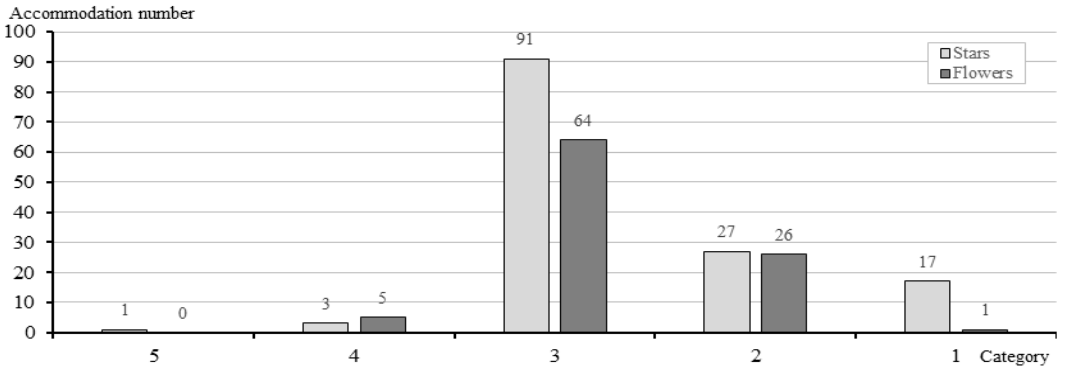

Figure 5. The rural OMA accommodation units ranking on comfor categories (June, 2019)
(Source: http://turism.gov.ro/web/autorizare-turism/)

On the other hand, in the rural OMA we can find the category of tourist complexes/ensembles formed by accommodation units, restaurants, terraces, leisure lakes, located on the banks of man-made lake reservoirs (Fishermen's Inn from Paleu, Magnolia from Biharia, Camelot from Husasău de Criş, King's Land from Ineu, Dodo from Sîntandrei).

Figure 6. The tourist complex Hanul Pescarilor/Fishermen's Inn of Paleu

On the bank of the Şişterea lake The fishing pond nets of Santău Mic[4]

Figure 7. Reservoirs with complex functions

Spa treatment equipments and entertainment facilities are also concentrated in the 1 Mai and Băile Felix spas. Here you will find a wide range of facilities and means for health and treatment, especially in the two medical recovery hospitals (for adults in Băile Felix spa, for children in the 1 Mai spa), but hotels also have their own treatment wellness and spa basis. To these numerous outdoor / indoor pools add up (at the hotels International, Mureş, Crişana, Termal, Nufărul, Ceres), swimming pools (Apollo-Felix, Padis, Venus, the wave pool) and aquaparks (Aqua President, Felixarium, Perla).

In the other localities from the OMA, it is not possible to talk about this category of tourist infrastructure (in the village of Livada of the Nojorid commune there is a swimming pool that works with thermal water, but it is currently closed).

Nonetheless in some villages we can find small lake accumulations with complex functions (Tătar et al., 2018) and gravel ponds in the meadow of Crisul Repede river that have some

[4] https://www.gavella.ro/index.php?idmenu=4

facilities for fishing (cash and release), as well as picnic areas. To these two small fish farms are added (in the communes of Sîntandrei and Borș).

Another interesting entertainment element that is very suitable for ecotourism is represented by 5 herds of horses (three in Sânmartin, one in Paleu and one in Ineu communes).

Furthermore within the King's Land tourist complex of Ineu there is an aerodrome for light aircraft, gliders, motor gliders and a golf course. Within this tourist complex leisure and fun activities can be complemented by a series of cycling demonstrations and events (http://kingslandineu.com/). The slopes with different difficulty levels are accessible for both beginners and the most experienced.

Hangar for light aircraft in Ineu

Golf course of Ineu

A few horses from the herd of Ineu

Cycling race at Kingsland Country Club[5]

Figure 8. Entertainment opportunities in King's Land (Ineu commune)

The *restoration facilities* (restaurants, pizzerias, terraces) are well represented in the spas of Sînmartin commune, but we also find them in other locations of OMA, either in next to accommodation units or as independent units (in the villages of Biharia, Oşorhei, Cheresig).

By the help of European funds, the development of tourist information and promotion centers in the communes of Cetariu and Sînmartin (Băile Felix) was planned.

Accessibility to any tourist attraction in rural OMA is facilitated by a network of communication routes such as national / European roads (E-60 Borș-Oradea-Oșorhei-Cluj-Napoca; DN 76 Oradea-Sânmartin-Deva, DN 79 Oradea-Nojorid-Arad; DN 19 Oradea-Biharia -Satu

[5] http://kingslandineu.com

Mare), county and communal roads, with an average density of 1.27 km/km^2. With few exceptions (there are several unpaved roads), they have a good asphalt cover. The fastest way is by car, but there is also public transport with the help of regular bus or minibus lines of some private companies that connect Oradea with each commune in the metropolitan area. The bike paths, represented with green on the map (Figure 9) feature disparate sectors all converging toward Oradea city, a future planning should also connect all these bike lanes into a cicular belt to connect all the metropolitan communes.

In the commune of Nojord, 4 km from the city of Oradea, there is the Oradea International Airport (charter flights), and in the Oradea railway station there are train connections from all over the country and from abroad (Austria, Hungary).

Still in the category of transport services, we find rent-a-car services (in Oradea), internet access and banking systems (several banks have ATMs in the commune centers). For example, Banca Transilvania has ATMs in the localities: Sânmartin, Băile Felix, Cordău, Oșorhei (Fughiu), Biharia, Cauaceu, BRD in the localities: Băile Felix, Borș (Sântion), CEC Bank in Băile Felix.

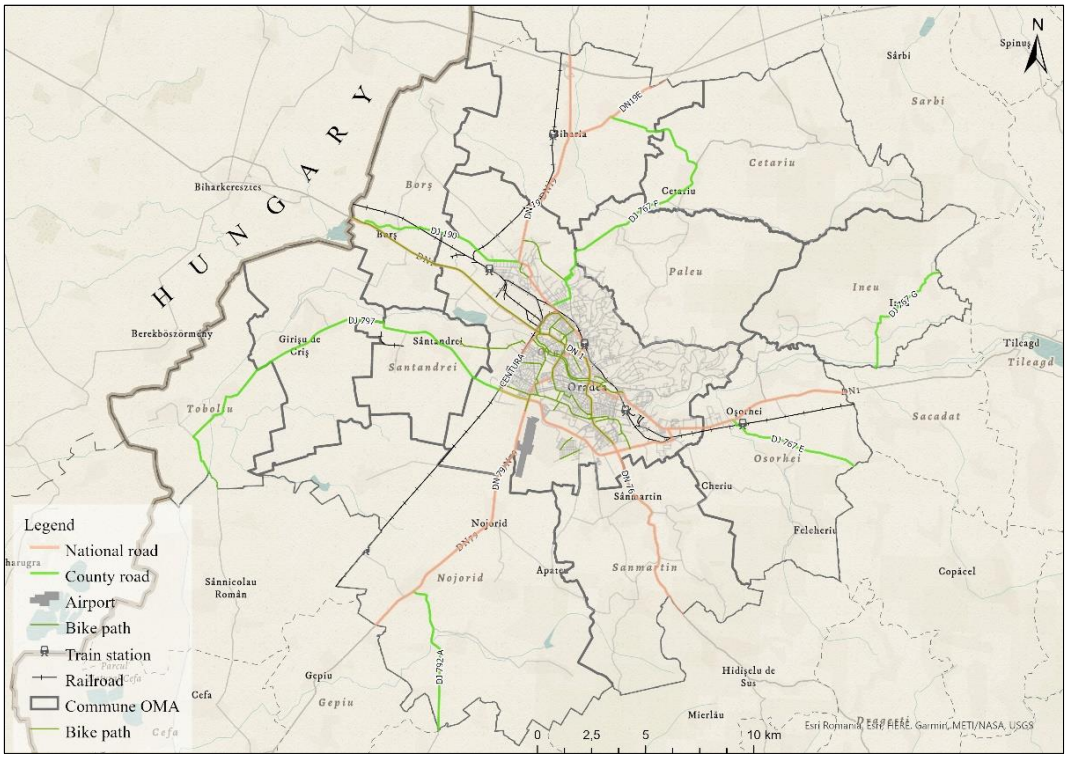

Figure 9. The accessibility transportation network to the tourist attractions of the OMA

Survey of the specific tourist and technical infrastructure

According to the *Methodology for assessing the tourist potential in the basic administrative-territorial units* (TAUs) for the Specific tourist infrastructure, out of 100 points, 20 were allocated to it and distributed as follows: tourist reception structures with accommodation functions 7 points; treatment facilities, 5 points; conference rooms; exhibition centers 6 points; ski slopes; cable transport facilities 1 point; other leisure facilities 1 point.

On the OMA territory the the score distribution is the following (Table 1):

As can be seen in Table 1 and illustrated in Figure 10, the highest score related to the tourist infrastructure is achieved by the presence of accommodation units, the maximum score

going to Sânmartin commune, to which the two spas brought a special contribution. The other TAUs, due to reduced accommodation facilities, received minimum scores. Unfortunately, the rest of the components that make up the tourist infrastructure (treatment facilities, conference rooms, cable transport facilities, etc.), with the exception of Sânmartin TAU, are almost non-existent. Therefore, the specific tourism infrastructure in the OMA features an obvious disproportion, its greatest concentration and diversification being present in the Sânmartin TAU which concentrates 60% (18 points) of the score calculated at the level of this indicator for the entire rural OMA (30 points). The remaining 40% of the score is divided between the other 10 communes, returning an average of 1.2 points/commune, given that two communes (Girișu de Criș and Toboliu) do not have such facilities.

Table 1. The specific tourist infrastructure of the OMA

Name of commune	**Accommodation units** (max 7 points) (hotels - 5 points; (agri)guesthouses – 1point; 1point - other types of units)	**Treatment facilities** (max 5 points)	**Conference rooms, exhibts centres** (max 6 points)	**Ski slopes, cable transportation** (max 1 point)	**Other entertainment facilities** (pool, aquapark, equestrian centre, leisure water-based activities, fishing) (max 1point)	**Total commune**
Biharia	1	-	-	-	1	2
Borș	2	-	-	-	-	2
Cetariu	1	-	-	-	-	1
Girișu de Criș	-	-	-	-	-	-
Ineu	1	-	-	-	1	2
Nojorid	1	-	-	-	-	1
Oșorhei	1	-	-	-	-	1
Paleu	1	-	-	-	1	2
Sînmartin	7	5	5	-	1	18
Sîntandrei	1			-	-	1
Toboliu	-	-	-	-	-	-
Total rural OMA	**16**	**5**	**5**	**-**	**4**	**30**
Rural average of OMA	**1.45**	**0.45**	**0.45**	**0**	**0.37**	**2.72**

Table 2. Technical infrastructure in OMA

Name of commune	**Access to port** (max 1 point)	**Access to national/ international airport** (max 5 points)	**Access to European road** (max 5 points)	**Access to national road/railway** (max 5 points)	**Water, Sewage and stormwater network** (max 5 points)	**Natural gas supply** (max 4 points)	**GSM coverage/landline** (max 5 points)	**Total commune**
Biharia	-	-	5	2.5	5	2	3	17.5
Borș	-	-	5	2.5	5	4	3	19.5
Cetariu	-	-	-	-	2.5	-	3	5.5
Girișu de Criș	-	-	-	-	-	-	3	3
Ineu	-	-	-	-	2.5	-	3	5.5
Nojorid	-	5	5	2.5	3.5	-	3	19
Oșorhei	-	-	5	5	2.5	-	3	15.5
Paleu	-	-	-	-	5	-	3	8
Sînmartin	-	-	5	2.5	5	-	3	15.5
Sîntandrei	-	-	-	-	2.5	4	3	9.5
Toboliu	-	-	-	-	-	-	3	3
OMA total rural	**-**	**5**	**25**	**15**	**33.5**	**10**	**33**	**121.5**
OMA rural average	**-**	**0.45**	**2.3**	**1.3**	**3.05**	**0.9**	**3**	**11**

For the criterion *Technical infrastructure*, out of a total of 100 points, 30 were allocated, distributed as follows: direct access to major transport infrastructure (16 points), provision of public communal management services – *urban infrastructure* (9 points) and availability of

electronic communications services – telecommunications infrastructure (5 points). In the analysis of the major transport infrastructure, the TAU's access to the port was taken into account (max. 1 point), the access to the international / national airport - max. 5 points, access to European road (E) - max. 5 points, access to national road / railway - max 5 points. For the urban infrastructure out of the 9 granted points, a maximum of 5 points are offered to TAUs that have a water supply, sewage and stormwater networks and a maximum of 4 points for gas supply, as well as the telecommunications coverage has a maximum of 5 points (Table 2).

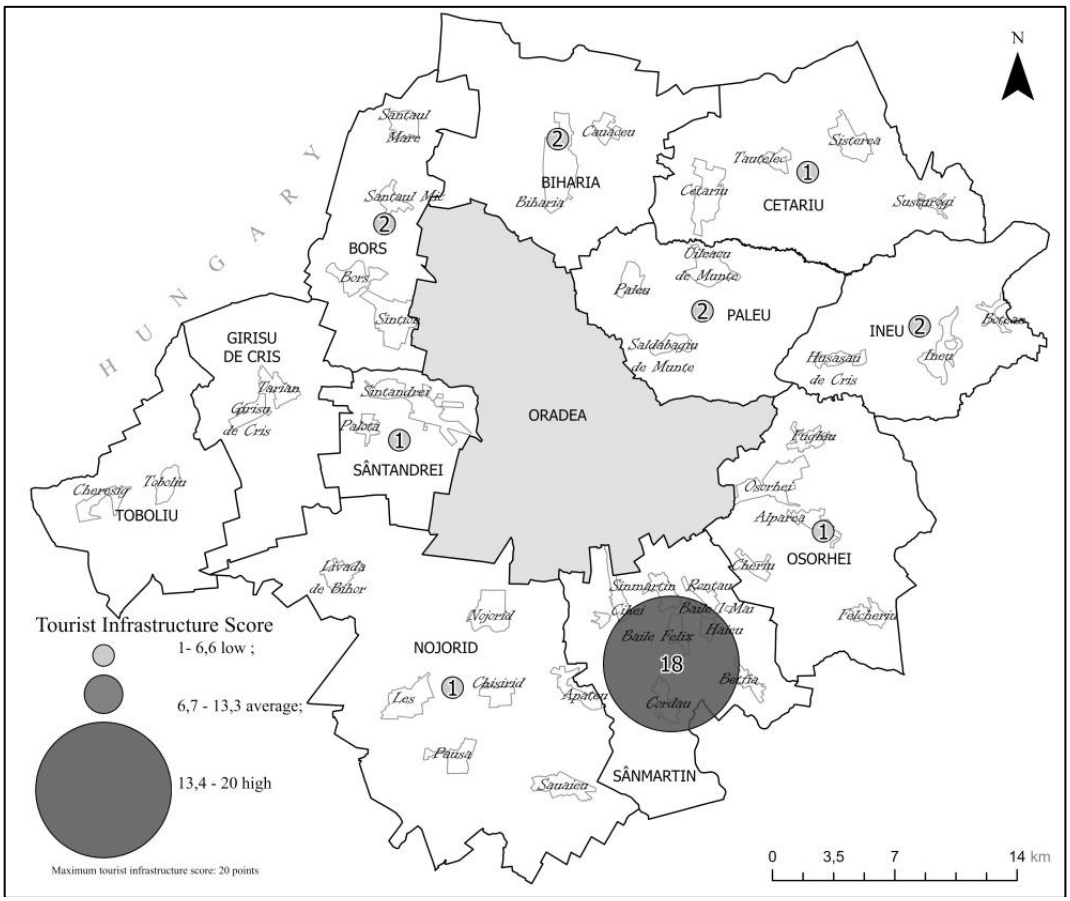

Figure 10. Specific tourism infrastructure score

Following the analysis of the technical infrastructure in the OMA, based on the mentioned indicators it can be seen that the telecommunications network and especially the mobile one with GSM coverage is present in all TAUs pertaining to the metropolitan area, thus increasing the degree of endowment and comfort.

What differentiates the localities of the metropolitan area is the different degree to which some of them have or do not have access to the various networks of roads or to the municipal infrastructure. From this point of view, the Borș TAU stands out, which, benefiting from an advantageous position, has both transport infrastructure (being crossed by the national/European road DN1/E 60), and the municipal one, respectively the water and natural gas supply. The Nojorid TAU.stands out through the transport infrastructure with access to the national/European road DN 79/E 671, but also through the proximity to the (inter) national airport in Oradea. The Biharia TAU has a technical infrastructure very similar to Borș commune, but the difference is

made by the partial natural gas supply (for now, only at the level of the commune center). Furthermore, with identical scores, the communes of Sâmnartin and Oșorhei stand out, which, unlike the previous TAUs, lack the methane gas supply network.

CONCLUSIONS

The existing tourist and technical infrastructure at the level of the rural space within the OMA shows obvious disproportions at the level of each TAU. These gaps are somewhat accountable, given that two of the famous spas of national and local interest in Romania have developed here (Băile Felix and Băile 1 Mai spas), which makes Sânmartin TAU to stand out from the rest of the metropolitan communes, at least in terms of tourist infrastructure concentration.

We did not find the same thing at the level of technical infrastructure, as it is more equitably concentrated at the level of the TAU. First of all, the water supply and sewerage infrastructure stand out, followed by the communications infrastructure that obtained the most points (33.5, respectively 33), these being present in almost every commune.

Other components that stand out depending on the accumulated score are represented by the access to a European road (25 points), to the national road (15 points) and to the gas supply (10 points). Access to the european/national road is easy only for 5 communes (Biharia, Borș, Nojorid, Oșorhei with railway access - and Sânmartin), and the endowments with methane gas, although long awaited in the metropolitan countryside, are still expected. Only three communes have this advantage: Borș, Sântandrei and in Biharia only the commune center is supplied with methane gas.

On the opposite end, there are two communes (Girișu de Criș and Toboliu) where the tourist and technical infrastructure is poorly represented, perhaps due to the fact that they joined the metropolitan area later (in 2007), Toboliu commune resulting from the detachment of Toboliu villages and Cheresig from Girișu de Criș commune. Perhaps the peripheral position was a disadvantage, but certainly the development strategies of these communes will focus on the two categories of infrastructure.

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CLUJ-NAPOCA – PREMISES OF A POTENTIALLY OVERCROWDED TOURIST DESTINATION

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Abstract: Nowadays, several international tourist destinations are dealing with overtourism, which means a series of malfunctions concerning activity segregation (often, located in historical centres), discomfort for the local community and even for tourists, due to extended visiting hours, etc. In the same context, in a number of cities, local authorities came up with coping strategies regarding the management of tourist flow during travelling seasons and measures to avoid overcrowding on tourist attraction areas. We started our research with the purpose of validating the hypothesis according to which the city of Cluj-Napoca is confronting an intense travelling phenomenon and its consequences upon the citizens. In order to achieve this goal, a double social inquiry was considered, aiming at, on one hand, tourist perception of overtourism in the city of Cluj-Napoca (50 validated questionnaires), and citizen opinion in what regards tourist behaviour in Cluj-Napoca (166 validated questionnaires), on the other hand. The results of the research pointed out the following: a high interest in Cluj-Napoca tourist attractions, especially the ones located downtown; a tendency towards overtourism in the month of August, due to summer events, as well as overcrowded areas throughout the historical centre; the role of local administration in promoting the city of Cluj-Napoca as a travel destination; an everyday better image of the city as a destination for worldwide tourists etc.

Key words: tourist destination, social inquiry, cultural tourism, Romania, Cluj-Napoca

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INTRODUCTION

In several cases, tourist destinations have been models of economic revival (Erschbamer et al., 2018). Hence, they become the key-element in tourism development, which, due to its well promoted potential through different branding techniques, lead to the development of certain

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identities and personalities in a pretty competitive environment, at national and international levels (Baloglu and Kozak, 2011). Tourist destinations distinguish from one another by their brand, image, value, quality, heritage etc. (Baloglu and Kozak, 2011; Herman et al., 2020a,b). Among the advantages that tourist destinations present in the context of local development, one can count: development of business environment, coming-up of medical services, development of educational environment, more expanded and modern urban areas, as well as communication and transport system. Moreover, according to Mutuku C. (2013), in time, around tourist destinations various products and tourist services have been created, whose consumption can be found under the same destination brand. Tourists perceive tourist destinations as unique entities that offer elements (accessibility, attractions, travel packages etc.) and basic experiences by means of which destinations differentiate themselves (Mutuku, 2013).

Many of the hotspot tourist destinations confront the phenomenon of overtourism (Erschbamer et al., 2018), as well as certain management aspects regarding tourist numbers. Some of these destinations have started to draw up plans in order to avoid overcrowding or limit the number of visitors (Pilato et al., 2018; Bourliataux-Lajoinie et al., 2019). The available literature on overtourism points out the consequences, and more specifically, the measures taken to limit tourist flow, decrease the phenomenon of tourismophobia (Bourliataux-Lajoinie et al., 2019; Paris, 2017; Petkar, 2017; Pilato et al., 2018; Khanali and Yazdi, 2017) or the creation of tourist educational policies (Bourliataux-Lajoinie et al., 2019). The notion of overtourism refers to certain overcrowded locations, which generates discomfort not only for tourists, but also for locals (Taiminen, 2018; Anuar et al., 2019; Egresi, 2018; Goodwin, 2017). Among the causes leading to this phenomenon we can name the freedom of mobility that leads to a constant flow of tourist masses (mass tourism) on a number of destinations (France, Spain, China etc.), the popularity of a tourist destination, the accessibility given by the freedom of travelling, the prices and the quality of tourist services (Erschbamer et al., 2018). The negative effects on tourist destinations may vary from one destination to another, but, considering Barcelona, as one of the hotspot destinations for mass tourism - „Spain counts with 77 million visitors in 2017" (Taiminen, 2018; Kottasova, 2017), we speak of aesthetic and functional changes of the city, through new accomodation structures being set up, new aesthetics of public squares, all due to the massive internationalisation of the city environment and atmosphere, lack of social cohesion, local attitude towards tourists (Ballester, 2016).

Overtourism is an effect produced by urban cultural tourism, a type of tourism dating back in ancient times, when it was known under other forms. Urban areas (urban jams/cities) represent travel locations in which 50% of the population is urbanized (Cave and Jolliffe, 2012). Some of the causes leading to this type of tourism were the cultural and economic development of urban centres and the presence of architectural styles in buildings. In an urban environment, tourism is dependent on the presence of cultural attractions, on spare time spent to relax, exchange of values, ideas and cultural experiences (Bogdan, 2019). The cities were proved to be polarizing nuclei of attraction (Puşcaş, 2015; Herman et al., 2020c). According to Bogdan E. (2019), urban tourism may be of help in saving and conserving cultural heritage, by means of the local-visitor interaction.

From the legislative point of view, there are no EU integrated directives meant to contribute better management of mass tourism or constant flow of tourists (European Parliament, 2015). Tourism is a sector of economic activity which contributes over 10% to the EU GDP, and it is also a job-generator (over 12%).

Some of the European countries have created their own systems of fighting mass tourism, which is the main factor leading to overtourism. In Spain, Barcelona has been confronting for years this overtourism phenomenon; under such circumstances, a management plan was drawn up, entailing better management and tax on new accomodation structures, declaring tourist-purchased properties illegal, cooperation with local authorities to fight illegal residence (Goodwin, 2017). In The Netherlands, Amsterdam may be considered as another example of a city touristically developed which is confronting overtourism, but a few years ago the Dutch authorities launched a programme called City in Balance which implies keeping a balance between visitors and residents,

on the idea that „visitors are welcome, but locals are the priority". Moreover, traffic restrictions were imposed in the city central areas, homogeneity of accomodation structures is aimed at, and a series of campaigns sustaining responsible tourism are being organised (Hospers, 2019). Other European destinations which started to fight this phenomenon: in Prague, the presence of vehicles in the central historical area is forbidden; in Denmark, the purchasing of residences by foreigners, all along the coast, is forbidden, and in Copenhagen the opening of new bars and restaurants is also forbidden (Goodwin, 2017). The Cultural Entreprise for Management of Equipment and Cultural Animation was founded in Lisbon (EGEAC), financed through collecting entrance tickets at Sao Jorge Castle (Marques and Richards, 2019).

The United Nations World Tourism Organization (UNWTO) comes up with generally valid solutions to fight overtourism, such as: strategies to diversify the existing tourist and travel supplies, extended areas of tourist attractions, a reduced travelling season and management strategies for tourist areas (Egresi, 2018; Coldwell, 2017).

The phenomenon of rejection and antipathy towards tourists, felt by locals, is called tourismophobia and is very common in overcrowded popular destinations (Egresi, 2018). It was mentioned for the first time in the media around Barcelona, and the notion was used to describe the rejection of tourist masses by residents (Krugzek, 2019; Milano, 2017; Martin et al., 2018). The phenomenon entails verbal and physical threats towards tourists, and also towards accomodation structures, as prices went up and local lifestyle has changed (Egresi, 2018). Even local authorities feel, sometimes, that they have no arms to fight this situation (Milano et al., 2018); consequently, there should always be a balance between locals and tourists, and the process of gentrification by restoring the suburbs and poor peripheral areas may be a solution to this (Egresi, 2018; Nițulescu, 2006).

Most tourists are attracted by those destinations with a balanced price-offer ratio. Low-cost companies promoted heavily certain destinations, new types of accomodation came up (Airbnb), located in the city centres, which soon turned out to be overcrowded (Paris, Londra, Barcelona) (Egresi, 2018). Another aspect caused by mass tourism in some destinations is the loss of local identity (Egresi, 2018). At the same time, a good example of tourismophobia is Palma de Mallorca, where, in the past, the Aborigine population would welcome tourists happily, but nowadays they feel fear towards them. They see tourists as being responsible for their overcrowded city, price increase and alteration of lifestyle (Ballester P., 2016).

The purpose of this research is to draw attention on the phenomenon of overtourism, its causes and effects on the most popular tourist destinations, as well as management strategies and measures of fight against it. Particularly, we started with the hypothesis of validating the premise according to which the city of Cluj-Napoca is an ever-developing tourist destination confronting certain premises of an individualized overtourism phenomenon.

METHODOLOGY

Research area

The city of Cluj-Napoca is one of the most important urban centres in Romania and one of the most popular tourist destinations in Transylvania. Apart from being an old city, Cluj-Napoca is also a prominent cultural nucleus, a great academic and business centre (Popescu and Grigoraș, 2018), with a series of anthropic and natural tourist attractions (Cosma, 2006), such as St. Michael Church, The „Babeș Bolyai" University main building, Matei Corvin House, The Botanical Gardens or The Ethnographic Museum (Figure 1).

Moreover, Cluj-Napoca is a hotspot destination due to its cultural events (Popescu and Grigoraș, 2018), as it holds a pretty rich and stable calendar of events (Cosma, 2006) and international festivals, which contributed to the increase of its popularity as a travel destination. Cultural events are the most dinamic elements that contribute a greater flow of tourists (Cosma, 2006). In 2015, the city was granted the title of European Youth Capital, and in 2017 that of European Sports Capital. In 2017, more than 1.100 events and over 3.500 activities were organised, which attracted over 21% of the tourists (Popescu and Grigoraș, 2018). Each year, the city hosts

popular festivals: Untold, Jazz in the Park, Transylvania International Film Festival (TIFF), Street Food Festival, Cluj-Napoca Music Autumn Festival etc.

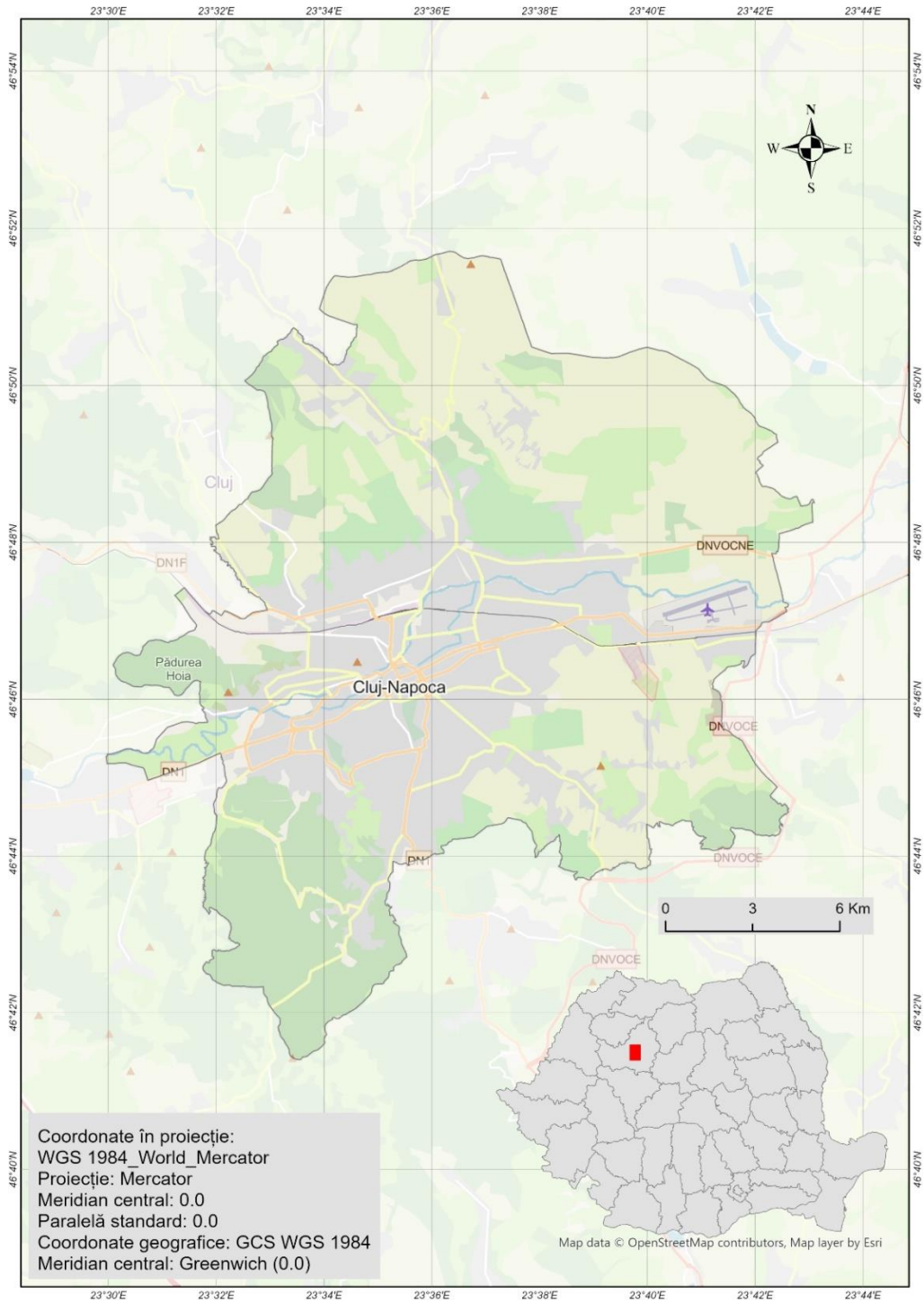

Figure 1. Placement of research area

Methods used

Apart from the fact that the available literature on overtourism has been consulted, the method of social inquiry has also been used, by means of a double set of questionnaires meant to shed light on the perception of locals, and also on that of tourists towards Cluj-Napoca as a travel destination. The questionnaires were undertaken in December 2019 - March 2020. They consisted of two sets of items: one for locals (166 validated questionnaires), and the other one for tourists (50 validated questionnaires). The role of the questionnaires was that of collecting answers associated to the tourism phenomenon to be researched (Cosma, 2006; Anuar et al., 2019).

In the case of the first set, addressed to tourists, the conclusion was that all respondents were foreigners, mainly from Germany and Israel, without Romanian citizenship (Figure 2.1-2.6.).

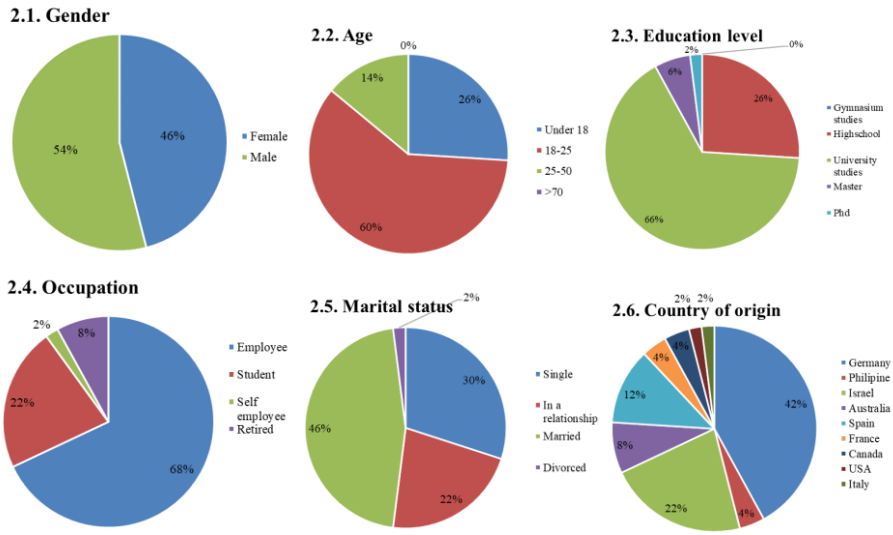

Figure 2. Social-demographic characteristics of respondents (tourists)

As for the second set, addressed to locals, the respondents were mainly students, aged 18-25, mainly females (Figure 3.1-3.5).

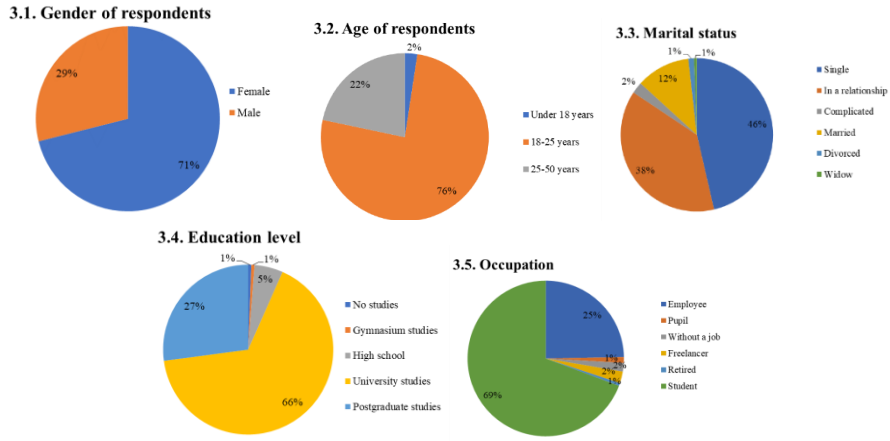

Figure 3. Social-demographic characteristics of respondents (locals)

RESULTS

Cluj-Napoca – tourist destination

Cluj-Napoca belongs to the category of the most visited tourist destinations in Romania, and its contributing multicultural component is more than visible (Cosma and Negrusa, 2008). The city offers a variety of tourist attractions (Figure 4) (Ministry of Culture, 2015), consisting of: a series of anthropic tourist attractions, such as buildings and institutions, historical buildings belonging to different historical periods, churches, palaces, public squares; a whole variety of cultural, sports and artistic events: Transylvania International Film Festival (TIFF), Cluj Anniversary Days, Hungarian Cultural Anniversary, Untold, Jazz in the Park, Book Fest etc.; an attractive natural space consisting of green areas (the banks of Someş river, Hoia Baciu Forest, Făget Forest, „Alexandru Borza" Botanical Gardens, „Simion Bărnuţiu" Central Park).

Although the city of Cluj-Napoca does not boast tourist attractions and monuments classified by the UNESCO, it defines itself as an appealing destination at European level (Bolog et al., 2014-2020).

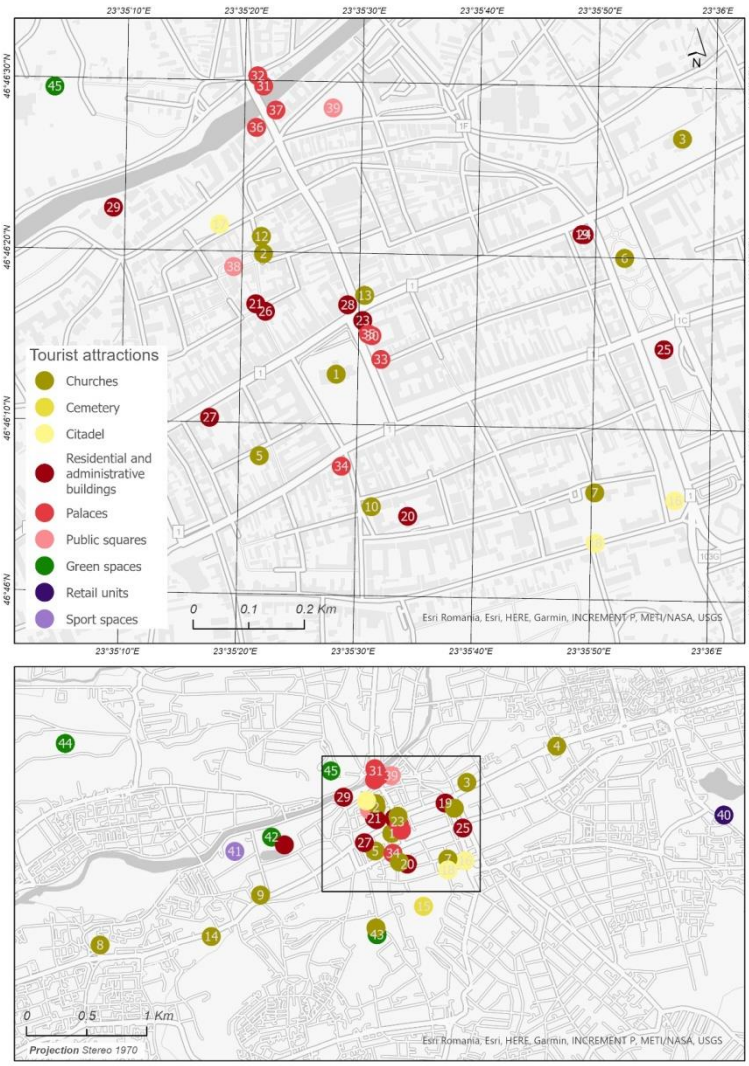

Figure 4. Main tourist attractions in Cluj-Napoca

1 - St. Michael Church, 2 – The Franciscan Church, 3 – The Hungarian Calvinist Church, 4 – St.Peter Roman-Catholic Church, 5 – The Romanian Greek-Catholic „Christ's Resurrection" Church, 6 – The Orthodox Metropolitan Cathedral, 7 - The Hungarian Calvinist Matia Church , 8 – The Roman-Catholic Calvaria Church, 9 – The Hungarian Calvinist Church, 10 – St. Trinity Roman-Catholic Church, 11 - St. Trinity Romanian Orthodox Church, 12 – The Franciscan Monastery, 13 – The Evangelical Church and parish house, 14 – The Jesuit Monastery, 15 – Central Cemetery, 16 – Tailors' Tower, 17 – The antique and medieval city, 18 - Fragment of the second medieval enclosure, 19 - Cluj-Napoca City Hall, 20 – The Babeș-Bolyai University main building, 21 - Matei Corvin House, 22 – The Casino in Central Park, 23 - Melody Hotel, 24 – The Local Councill, 25 – The Romanian National Theatre, 26 - The „Sapientia" University, 27 – The Ethnographic Museum of Transylvania, „Reduta" building, 28 – Museum of Pharmacy, 29 – The Hungarian Theatre, 30 – The Art Museum, 31 – Elian Palace, 32 – Berde Palace, 33 – Palaces of the Roman-Catholic Status, 34 - „Continental" Hotel, 35 - Banffy Palace, 36 – Szeki Palace, 37 – Babos Palace, 38 – Museum Square, 39 - Urban complex of Mihai Viteazul Square, 40 - Iulius Mall, 41 - Cluj Arena, 42 – Central Park, 43 – Botanical Gardens, 44 - Hoia-Baciu Forest, 45 – The Citadel

Tourist perception of Cluj-Napoca as a tourist destination

No less than 50 questionnaires were handed out directly to several foreign tourists, during four months (December 2019, January-March 2020), in order to find out their vision about Cluj-Napoca as a tourist destination. There were 18 items, which revealed the following aspects:

- most respondents, 90% of them, think that Cluj-Napoca is a tourist destination, eligible due to prices (including transport) and accessibility. 10% think that the city cannot be considered as a travel destination yet.

- over 90% of the respondents haven't visited the city before, and only 4 of them have already visited the city once;

- most tourists recommend Cluj-Napoca as a tourist destination to friends and colleagues, aspect also seen in the ever-growing image of the city;

- the sources of information mentioned by the respondents regarding the choice of a destination were social media (TripAdvisor), tourist guides, friends/colleagues; the city of Cluj-Napoca is a tourist destination quite visible online. According to TripAdvisor (2020), in Cluj-Napoca there are 295 accomodation units, 54 spaces for rent, 449 food service units (restaurants, bars, coffee shops). Among the activities one can undertake here, there are: tours (51), meeting points and landscapes (41), evening activities (40), activities outside the city (39), interactive activities (30), shopping (25), green areas and parks (14), SPA&wellness (14), museums (10), means of transport (10), lectures/courses&workshops (6), tours on boat, water sports (5), shows and concerts (4), casinos and gambling houses (4), travel resources (3) and day trips (1).

- 36 respondents consider the city of Cluj-Napoca is a top tourist destination, similar to other European urban centres, whereas 14 do not agree; moreover, 33 persons think there are premises for the city to become a top tourist destination, whereas the rest of the answers highlight certain impairments that still exist, such as destination visibility;

- tourist respondents (48 persons) chose air transport and only 2 of them considered railway option;

- respondents spent 2-4 days in Cluj-Napoca, the main arguments for chosing the destination were to relax, to discover new places, culture, business or visit friends;

- from the tourist point of view, on a scale from 1 to 5, ratings on the internet vary between 4 and 5, in terms of importance, which highlights the fact that tourist perception is influenced by the experience of other tourists, expressed by means of travel platforms (see the Airbnb experience). 37 respondents prefer meals in food service units other than accomodation structures, whereas 10 would eat within their accomodation units, and the rest of them at friends' places.

Local perception of tourists in the city of Cluj-Napoca

Among locals, a number of 166 questionnaires were undertaken online (by means of Google Forms) and also directly, with the purpose of catching a better insight on the overtourism phenomenon in Cluj-Napoca. The 20 items used helped us find out the strengths of the city from the perspective of its tourist potential and the use of it. The main elements revealed were the following:

- a significant percentage of respondents (41%) have been living in Cluj-Napoca for at least 2 years, most of them in Mănăștur neighbourhood, but also in the city central area (given the fact that student dorms are located in the central area of the city) (Figure 5.1.);

- 69% of the locals think that Cluj-Napoca holds a well exploited tourist potential, and 21% consider it is not enough (Figure 5.2.);

- 54% of the locals say that there are times when the city is overcrowded with tourists (Figure 5.3.), especially in the summer (28%), in the months of July and August (22%); the most overcrowded areas are, also in the opinion of local respondents, the historical centre of the city (25%) and the central park (19%);

- some locals consider that the city became a tourist destination at the end of an interval of 1-4 years (47%), whereas others (45%) think that it was no sooner than 4-10 years, and this is why they would recommend it as a tourist destination to family members and friends;

- according to local opinion, Cluj-Napoca is chosen as a tourist destination due to its cultural events (24%) sports events (14%), tourist attractions (17%), but also due to its being a renowned academic centre (15%);

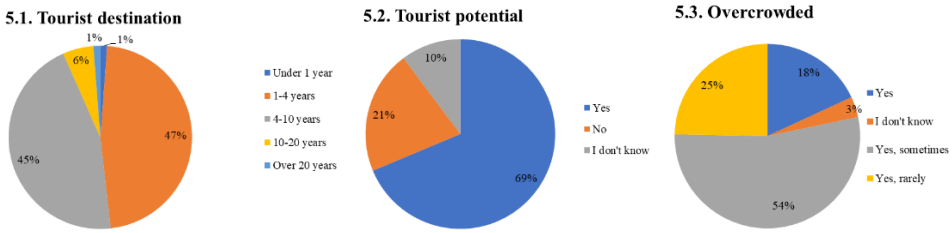

Figure 5. Tourist characteristics of Cluj-Napoca according to local respondents

- the local actors responsible for the promotion of the city as a tourist destination are the City Hall (32%) and Cluj-Napoca Cultural Centre (20%) (Figure 6.1.);

- respondents made an ascending order of the benefits brought to the local community as a consequence of tourism development in Cluj-Napoca (Figure 6.2.), i.e., the appearance of new accomodation platforms (20%), the increase in the number of tourist services (17%), the increase of accomodation units (15%), development of the transport system (12%), image and advertising intake (11%), as well as associated events (10%); as for weaknesses/drawbacks, traffic (30%) and price increase were mentioned (24%) (Figure 6.3.);

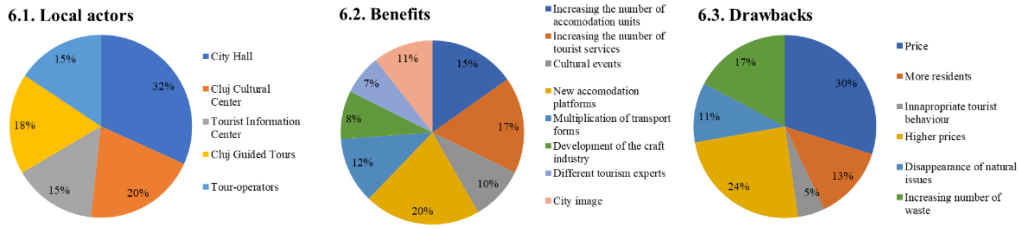

Figure 6. Local actors responsible for the promotion of Cluj-Napoca as a tourist destination, benefits and drawbacks identified by local respondents

- 73% of the locals wish that the city of Cluj-Napoca became a tourist destination, but 53% do not know about strategies and measures meant to prevent the effects of overtourism (Figure 7.2.);

- 42% of the respondents agree upon the introduction of fares on certain tourist attractions, whereas 38% do not welcome such an initiative (Figure 7.1.);

- according to local opinions, the most significant measures to be taken in order to avoid overcrowding during intense visiting seasons in Cluj-Napoca (Figure 7.3.), should be the following: traffic restrictions (20%), prior reservation (18%), travel industry pricing policy (16%), tourist number database (15%), as well as new tourist products and alternative deals (13%).

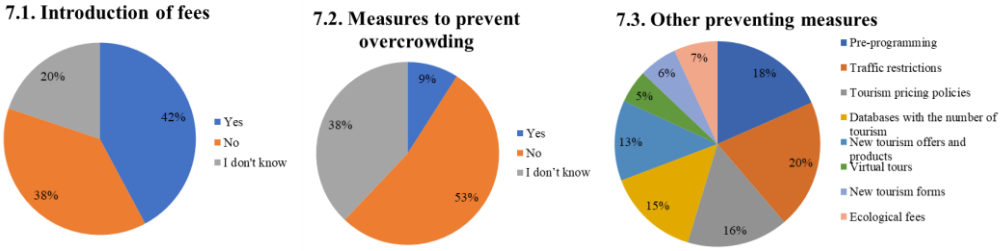

Figure 7. Overtourism preventing measures in the city of Cluj-Napoca

Management strategies for Cluj-Napoca as a tourist destination

Based on the answers given by respondents, personal observations and the current policies of Cluj-Napoca municipality, we hereby suggest that the following management strategies should be considered for the benefit of the city as a tourist destination:

- the organising of Untold festival in some other location, in a less populated area, to avoid noise pollution that causes discomfort both to the community and the environment built nearby;
- a more efficient promotion at international level by means of the media channels, in order to lure tourists all year long;
- regulations set up for every tourist attraction regarding the number of tourists allowed to do the visit, related to programme and prior reservation;
- visiting fares set up for every tourist attraction, which would increase local income and contribute more efficiently to the restoration of historical and cultural heritage;
- promotion of tourist attractions located in peripheral neighbourhoods of the city and nearby, in order to extend tourist visiting areas;
- promotion of attractions located in areas with little tourist activity, in order to extend tourist visiting areas, diversify possibilities and avoid tourism overcrowding.

CONCLUSIONS

Cluj-Napoca is one of the most visited cities in Romania, boasting a remarkable tourist potential which is yet to be discovered and exploited. Although at present the overtourism phenomenon cannot be considered in its case, based on the inquiry undertaken, the city has been dealing, in recent years, with an early stage of tourism overcrowding in the summertime; one of the causes is given by the various cultural and artistic events (international and local festivals), which attract a great flow of tourists, a component that might just as well represent a benefit regarding the economic development of the city, of the tourism industry and city visibility. On the other hand, when it comes to infrastructure, the city is not sufficiently prepared yet to welcome and support a great number of tourists, which could lead to overcrowding.

Cluj-Napoca is seen as a European tourist destination both by most tourists and locals, as well. This is an economic benefit given by the tourism industry to the local economic environment, but, in time, it can also be seen as a problem by residents, should it lead to an overcrowded city.

Consequently, a certain percentage of the city's population thinks preventing measures should be considered, such as: visiting fares applied to the most popular tourist attractions, procedures and strategies meant to avoid traffic jams, as well as strategies designed to support price trend related to the development of sustainable tourism.

The same answers reveal a certain reluctance generated by the potential increase of tariffs and fares, due to an eventual ever-growing competitiveness of the city with other European tourist cities.

In the last decade, the city of Cluj-Napoca has become very visible, both at national and international level, and the ones responsible for this developing process are, according to respondents, Cluj-Napoca City Hall and Cluj-Napoca Cultural Centre; the two institutions are deeply concerned with the promotion of local heritage and attraction of investments meant to contribute to the city development within the tourism industry.

Moreover, the present study may open new development directions, such as identifying new solutions to prevent the overtourism phenomenon or the feasibility analysis of the existing measures and strategies designed to optimise tourist areas.

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