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CONTENT

REVIEW ARTICLE

TECHNICAL REPORT

DETERMINATION OF DISSECTION INDEX (DI) USING GIS & RS TECHNIQUES: A CASE STUDY ON DRENICA RIVER BASIN

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Abstract

Advances in Remote Sensing (Digital Elevation Models) products and GIS techniques have made the calculation and analysis of morphometric indices much more accurate, effective, and less time- consuming. Dissection index (Di) is a morphometric parameter that indicates the degree of dissection or vertical erosion and the stage of landform development. Calculating morphometric parameters by manual methods is inconvenient because it takes a long time, is subject to mistakes that can be made by humans when extracting these parameters and, consequently leads to wrong conclusions. There is currently no fully automated method to calculate this parameter. The purpose of this paper is to define the procedures for extracting this parameter within a GIS environment using data from high resolution (HR) ALOS-PALSAR (Advanced Land Observing Satellite-Phased Array-Type L-band Synthetic Aperture Radar) Radiometrically Terrain Corrected (RTC) DEM with a spatial resolution of 12.5 m with the help of ArcGIS software. To calculate this parameter, a grid with 1x1 km cells with interpolation points in each cell was constructed. IDW was chosen as the most suitable method for the interpolation of points. Based on the obtained results, the extreme values of Di for the Drenica River basin ranged from 0 – 0.46. 90.54% of the surface belongs to the low and very low values of Di, 9.11% belongs to the average values while only 0.35% belongs to the high values of Di. The high participation of small values of this index for the Drenica River basin indicates that river erosion is very low and the total area is increasing towards the creation of flat surfaces. The relief dissection index can be used for various purposes, such as contributing to a better understanding of the spatial distribution of morphogenetic processes, relief segmentation, and landscape units that serve as the basis for geomorphological mapping work, study the balance between pedogenesis and morphogenesis, and the assessment of environmental vulnerability.

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INTRODUCTION

Determining the quantitative (numerical) morphometric values of morphometric parameters, characteristic forms of relief, hydrography, slope exposure, etc., is today a requirement that is posed in many branches of technique, science, production, and process educational teaching of students. For the calculation of these parameters are used different methods and forms, which depend on the size and features of the territory, the scale of the map, the required accuracy, and the destination (use). Quantitative and measured quantitative values determine the qualitative changes of various physical-geographical phenomena and in some features, also in the transformation of the socio-economic environment. These numerical values measured from the map and reflected in the morphometric, graphic, histogram parameters up to the morphometric maps, can be determined for any territory in general, or for a watershed in particular, where the ways and methods of determination (measurements and calculations) are the same (Talani, 1997).

For the river basin, the morphometric characteristics are of great importance because they hold important information about the formation and development of the basin. Simply put, all geomorphic and hydrological processes happen within the river basin. The catchment area of a river is called the territory from which the river feeds. The surface basin is bounded by the watershed, which passes through the highest quota points between 2 or more neighboring basins.

As a result of geological and geomorphological processes occurring on the earth's surface, landforms have been created (Crevenna et al., 2005). Normally the basic requirement to study the landforms for each area is the analysis of morphometric characteristics. Morphometric parameters represent a significant segment of the natural geographical base of each region. The geomorphological characteristics of a given morphological process, shapes, and relief in general can be given through a variety of quantitative parameters. Defining the morphological characteristics of a given whole through units of measurement determines the size of the forms. The way of researching and assigning these parameters is defined as morphometry.

GIS techniques are now widely used to calculate and analyze various morphometric parameters of river basins, providing a powerful tool for manipulating, and analyzing spatial information. River basins are presented as ideal units of the river landscape and are considered to be suitable for managing natural resources and subsequent planning, as well as for implementing various development plans. In recent decades, the Geographic Information System (GIS) and Digital Elevation Models (DEMs) have become very efficient tools, both in the analysis of river basins and measures for their conservation.

The role of GIS in estimating various terrain parameters and manipulating spatial data related to river basins is very important. The increasing availability

of DEM has led to considerable application in environmental, geomorphological, and hydrological investigations (Moore et al., 1991; Hancock et al., 2006; Liu, 2008). DEM is a digital representation of terrain in three dimensions and through existing GIS tools the terrain can be analyzed and accurate information can be obtained directly.

In recent decades, undoubtedly, in applied geomorphology, extremely great importance has been given to the development of quantitative physiographic methods to describe the evolution and behavior of surface drainage networks (Dobos et al., 2010). Quantitative geomorphological analysis, simply put, involves the presentation of morphological processes, relief, and its forms by applying or using various quantitative (numerical) parameters. The application of such an analysis is of great importance because such data are dimensioned and, besides, can be verified having numerous benefits in practice. The importance of the obtained results is quite large because they are inevitable during the process of determining the protection and improvement of the environment, determining the intensity of erosion, etc. The morphometric aspects stand out in this context for offering a set of quantitative parameters that, in addition to better explaining the processes, serve as a basis for space planning, with landforms as indicators (Ross, 1992; 1994).

Due to its effective functions, such as data management, calculation and analysis, GIS provides strong support to quantitative research. In many areas of geosciences, GIS has been extensively developed and implemented, with a particular emphasis on resource assessment and the environment and their management. Starting from the earliest works that have been carried out on the application of GIS in geomorphology, their focus or main point was on the digital classification of landforms, especially on digital relief models and their advantages (Moore et al., 1991; Dikau et al., 1991). GIS merged with Remote Sensing (RS) data offers the possibility of creating a database for each watershed. This database is very important because it helps to conduct spatial analysis, thus helping decision-makers to formulate appropriate measures for these areas (Thakkar and Dhiman, 2007; Magesh et al., 2010; Mukherjee et al., 2007, 2009).

In the last decades, there were developed GIS technologies that allow quick and effective modeling of many derivations from DEM. The benefit of quantitative analysis of morphometric parameters is extraordinary in the conservation and further development of soils and waters at the catchment level (Kanth and Hassan, 2012). In this context, the use of data obtained from RS associated with GIS has proven to be an important and quite efficient and powerful tool for managing and analyzing river basins [Markose et al., 2014; Oliveira et al., 2010; Rao Tamma et al., 2012].

Changes and variations of terrain shapes (form and size) are taken into account by morphometric parameters. There are a large number of morphometric param-

eters, the purpose of which is to reveal various aspects of the spatial geometry of the landscape. In the present study, an attempt has been made to determine the dissection index (Di) of the Drenica River basin from ALOS-PALSAR RTC DEM using GIS tools. Dissection index (Di) is an important parameter of the drainage basin which shows the scale of dissection or vertical erosion and expounds the step of terrain or landscape development in any given physiographic region or basin (Sarma et al. 2013). This means vertical erosion or the degree of fragmentation and reveals or highlights the stages of landscape development in a watershed or a certain physiographic region. This index gives us data on the degree of formation of relief forms under the influence of fluvial erosion.

For the river basin, morphometric characteristics are of great importance because they hold important information for the formation and development of the basin. Field analysis and modeling require the implementation and development of GIS tools and indicators that would adequately and correctly describe the terrain and its properties. Therefore, the purpose of this paper is to provide a clear and complete overview of the knowledge of the values of Di and the spatial distribution of categories of this parameter, as well as to find the stage of development of the Drenica river basin in the current context. Also, this study, with the methodology developed/brought will help students and experts in scientific fields that correspond to this paper in determining this parameter by helping them solve many problems in their studies. Also, since this paper incorporates the use of GIS, mathematical models, and geomorphological theories, it will radically improve the previous methods of quantitative geomorphic analysis and mapping.

The results of the calculation of this parameter (dissection index) will be presented in tabular and on thematic geomorphological maps.

STUDY AREA

The Drenica River basin is located in the central part of the Republic of Kosovo (Fig. 1). The catchment area is 438.47 km². The main river that flows through the basin is Drenica, with an average annual flow of 2.0 m³/sec. The bed of this stream in the vast majority until its discharge in the river Sitnica lies in the basin of the same name, which has deepened and expanded in the thickness of Neogene and Quaternary deposits. The lithological composition of this basin is dominated by flysch rocks, followed by the Paleozoic schists and the Paleolithic to Quaternary igneous rocks, being distinguished by different degrees of hardness and permeability.

In the hypsometric aspect, the basin extends from an altitude of 489 m as the lowest point of the Drenica plain, while in the peripheral parts of the monocline ridges, the altitude exceeds 1,129 m, showing an average hypsometric amplitude (Fig. 2).

From Tab. 1 it can be seen that the hypsometric floor with a height of 489 - 745 m has high participation (66.6%). Such a high percentage indicates high extension/ insertion of the hypsometric field floor within the Drenica plain. At an altitude of over 745.1 meters is located 33.4% of the basin, which make up the edges of the basin, including the lateral slopes bounded by detachment cliffs and the mono-cline ridges of the peripheral boundary mountains.

Fig. 1
Geographic position of the Drenica River basin
Source: Compiled by authors

The Drenica River basin belongs to the Sitnica river system, whose waters flow in the direction of the Black Sea. The main river that flows through the basin is Drenica. Drenica is the left tributary of Sitnica. From north of Petreshtica to Drenas, Drenica is wider and with a smaller slope with all the features of a plain river. Drenica from Drenas to Bardh i Madh, enters a narrow part, taking the appearance of a gorge. In this part of the river, the slope is greater. It originates in Bretenc on Mount Carraleva, flowing towards the central part of the Drenica valley, then takes a turn towards the east and through the transverse gorge of Dobroshec passes into the Kosovo valley and joins Sitnica.

RESEARCH METHODOLOGY

The Drenica River basin was delineated based on the water divide line concept. The next step was the digitalization of the entire river network. This was done based on the 1: 25000 scale topographic maps that we had available. Topographical maps were rectified/referenced geographically and mosaiced and the entire study area was delineated in GIS environment with the help of ArcGIS 10.3 software.
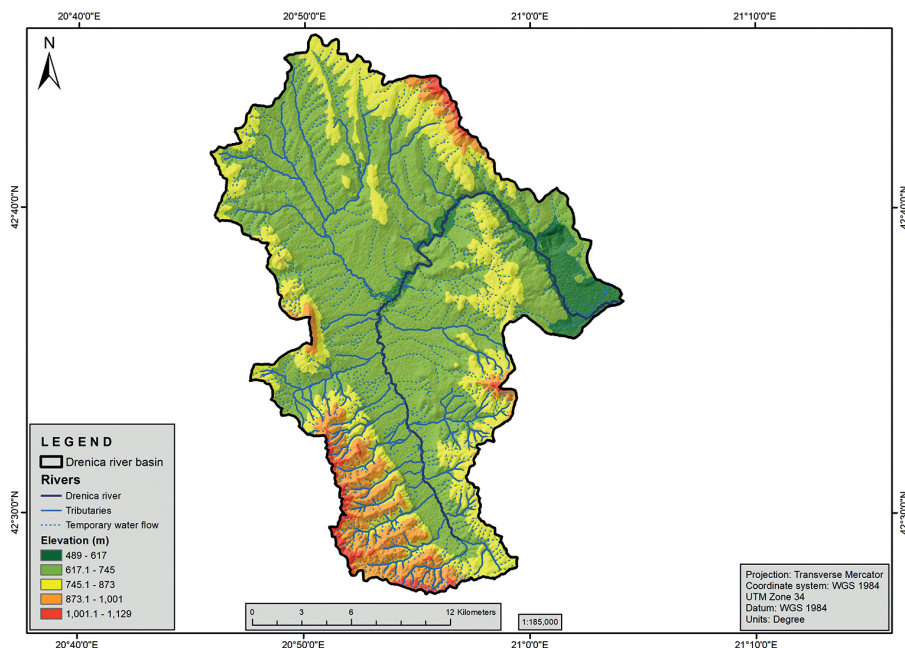
Fig. 2
Hypsometric map of the Drenica River basin
Source: Compiled by authors

Tab. 1   Values of hypsometrical categories of studied area

No	Elevation (m)	Area (km²)	%
1	489 - 617	24.93	5.69
2	617.1 - 745	267.05	60.91
3	745.1 - 873	99.05	22.59
4	873.1 – 1001	38.64	8.81
5	1001.1 - 1129	8.8	2.00
Total		438.47	100%

Source: *Compiled by authors*

Calculating morphometric parameters by manual methods is inconvenient because it takes a long time, is subject to mistakes that can be made by humans when extracting these parameters and, consequently leads to wrong conclusions. Although the relief dissection index has great applicability and importance, so far, there is no fully automated way to extract it based on the 2 morphometric variables proposed by Nir (relative and absolute relief). Thus, this paper presents a methodology that broadly and clearly shows how this parameter (Di) is derived. We did the calculation of the Di using the formula (Nir, 1957):

$$Di = Rh/Ra \qquad (1)$$

where, Di is Dissection index, Rh is Relative relief, and Ra is Absolute relief. The general workflow is shown in Fig. 3.

The HR ALOS-PALSAR RTC DEM from Alaska Satellite Facility is used in this study to determine the dissection index of relief using GIS tools. ALOS-PALSAR was launched in 2006 by the Japan Aerospace and Exploration Agency (JAXA) and
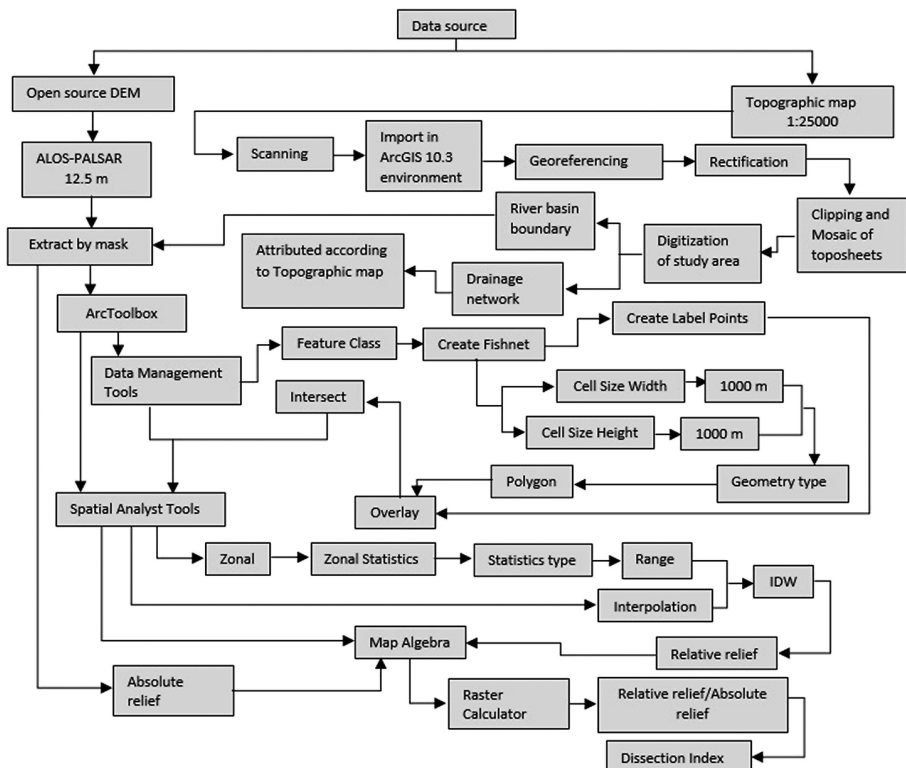
Fig. 3
Flow chart depicting methodology
Source: Compiled by authors

it was operational until May 12, 2011. ALOS was launched in a sun-synchronous orbit and circled around the Earth every 100 minutes, 14 times a day. ALOS-PAL-SAR returned to the original path (repetition cycle) every 46 days. The inter-orbit distance was about 59.7 km at the equator. ALOS-PALSAR has a spatial resolution of 12.5 m at 23.62 cm (1.27 GHz) wavelength with HV polarization and angle of incidence 38.7° (Khal et al., 2020).

Through GIS techniques, 1x1 km areas are formed together with the interpolation points (Figure 4) in which the relative relief is defined. The calculation of relative relief (Ra) was made possible using tools in ArcGIS. More precisely, after the preliminary steps taken, we calculate the Ra using the tool "Zonal Statistics".

After clicking on "Zonal Statistics", a dialog box opens in which we set the necessary parameters. A few different parameters appear in the dialog box, but we only need the "Range" parameter. This parameter calculates the difference between the maximum and minimum quota of each cell separately. After calculating the relative relief, the next step is the interpolation of points. Considering simplicity and accuracy, this study chooses the Inverse Distance Weighted (IDW) method to interpolate these points in order to extract relative relief (Rh). The concept of the IDW method is based on the first law of geography (Tobler's first law) from 1970.
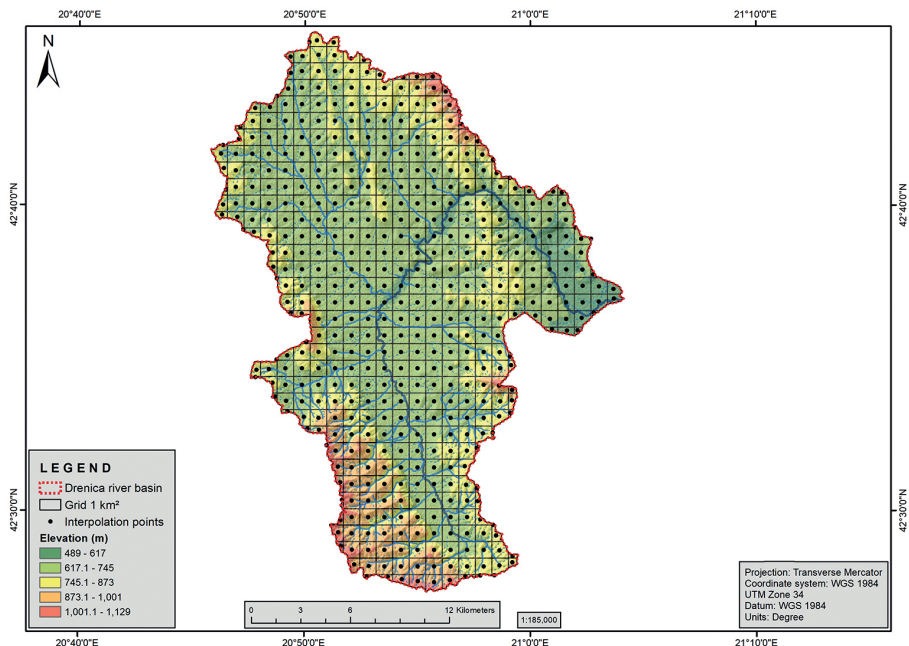
Fig. 4
Grid with interpolation points
Source: Compiled by authors

"It was defined as everything is related to everything else, but near things are more related than distant things" (Johnston et al., 2001; Tobler, 1970).

The interpolation function is as follows (Xie et al., 2011):

$$Z(x) = \frac{\sum_{i=1}^{n} w_i z_i}{\sum_{i=1}^{n} w_i}$$

in which

$$w_i = d_i^{-u}$$

where $Z(x)$ is the predicted value at an interpolated point, whereas z_i is the amount at a known points. n is the total number of known points used in interpolation, d_i is the distance between point i and the prediction point, w_i is the weight assigned to point i. Higher weighting values are assigned to those points which are closer to the interpolated points (Mirzaei, 2016). As the distance increases, the weight decreases and u is the weighting power that impose the amount of weight decrease with respect to the increase in distance (Xie et al., 2011). Undoubtedly, the advantage of the IDW is that it can be easily applied to any number of dimensions and provide reasonable estimates.
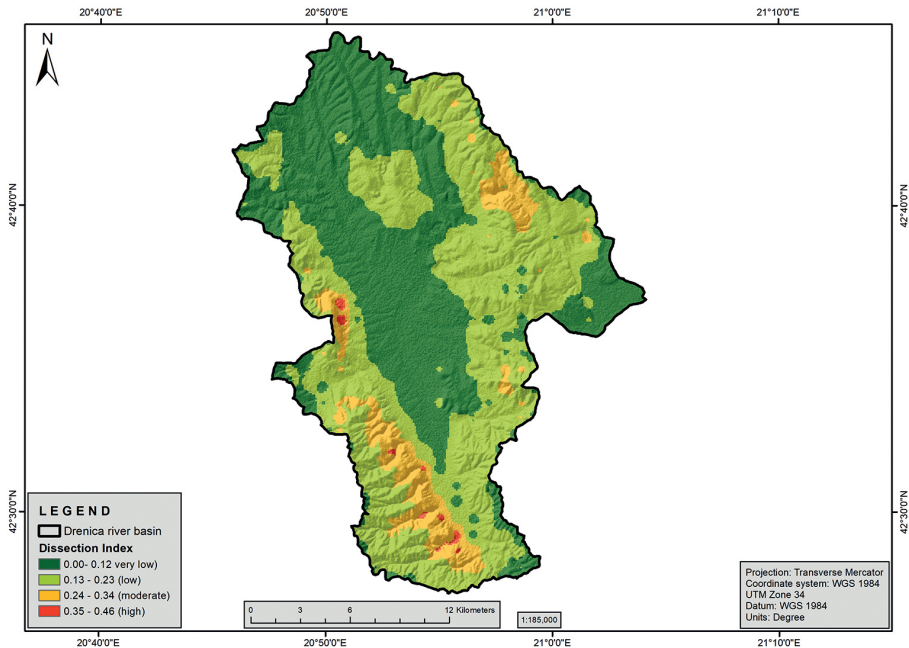
Fig. 5
Dissection index of the Drenica River basin
Source: Compiled by authors

The last step is to extract the dissection index. We do this through the "Raster Calculator" tool. After the dialog box appears, we write the dissection index formula (Ra/Rh). After calculating the Di, we classify the obtained values and compile the dissection index map (Figure 5).

RESULTS AND DISCUSSION

The Dissection index is a very important morphometric parameter of the river basin. This parameter indicates the degree of vertical dissection or erosion and highlights the stage of development of landforms (Sarma et al., 2013). Di values range between "0" and "1. If the value of Di is 0, then this indicates that in the given space where this value is displayed, there is a lack of vertical dissection and, for this reason, the surface is flat. So the complete absence of dissection implies a flat topography. Di value of "1" indicates the presence of vertical cliffs which it might be at the vertical escarpment of hill slope or at a shoreline (Alqahtani and Qaddah, 2019).

From the calculations we made, the Di values were obtained for each grid cell with dimensions of 1km². The values obtained were classified into 4 categories: extremely low (0.0 – 0.12), low (0.13–0.23), moderate (0.24–0.34), and high (0.35 – 0.46), and an isopleth map is prepared for the study of Di's spatial distribution (Figure 5).

The spatial distribution of Di of the Drenica River basin is shown in Fig. 5. Extreme values of this parameter range from 0 – 0.46. In general, this basin is characterized by very low and low values of this index, which together make up about 90.54% (Tab. 1) of the entire surface of this basin.

Tab. 2   Dissection index categories of studied area

Dissection index of relief		Area	Percentage
(Value)	(description)	(km²)	(%)
0.0 – 0.12	Very low	188.5	42.99
0.13 – 0.23	Low	208.51	47.55
0.24 – 0.34	Moderate	39.93	9.11
0.35 – 0.46	High	1.53	0.35
TOTAL		438.47	100

Source: *Compiled by authors*

Such small values of this index indicate a very low fluvial action and that the flat surfaces in this basin are expanding. A lower value of Di implies the old stage of the basin and less degree of dissection. Small values of this index indicate that river erosion is very low and the total area is increasing towards the creation of flat surfaces. In this basin, the average and high values of this index, together, make

up about 9.46% of the total area. Such values are more present in the western and southwestern parts, which, at the same time, represent the peripheral mountains of this basin.

CONCLUSIONS

In recent decades, DEMs have been the object of increasing use and attention to them. This has come as a result of the convenience they offer in calculating the various morphometric parameters. In the present study, an attempt has been made to determine erosion intensity (Di) of the Drenica River basin from ALOS-PALSAR RTC DEM using GIS tools. Working in the ArcGIS program, a database system based on the grid system has been created, which provides an opportunity to overlay geospatial data, extract certain parameters, and analyze them.

GIS techniques have been proved to be an effective tool in computing Di for a given area. The use of digital relief models through GIS has been shown to be a powerful tool for analyzing topographic features because it allows different methods to analyze them with operational advantages and high quality.

Through Di the stages of development of the soil forms of each physiographic region or watershed can be determined. Through such an analysis, geomorphological maps with different scales can be compiled. In our paper, a large-scale map has been compiled, which gives a detailed view of our study area based on 1km^2 cells and interpolation points. Also, given that the database is based on the created grid system, the possibility to overlay data and perform correlative analysis is very wide thus enabling the widespread use and application of geospatial data.

In the Drenica River basin, Di values ranged from 0 to 0.46. The very low and low values of Di occupy the central part of the basin and the lower sectors of the Drenica River. Small values of this index indicate that river erosion is very low and the total area is increasing towards the creation of flat surfaces. Such low values are, of course, related to the soft rocks of this area. From the analysis of the obtained results, it is concluded that the morphological longitudinal profile of the river has been processed, the erosive activity is very low and reduced. Thus, the area is being transformed into a series of soft forms, which are quite low in height, covered with a layer of destroyed soil material, and separated by valleys covered with alluvium. From the analysis made it is clear that such areas lie mainly in the central, northern, and eastern part of the basin (to a large extent) which correspond to low and very low Di values.

While the average and high values extend along the areas where strong rocks are highlighted. Such areas are located mainly in peripheral mountains of this basin.

The value of the results obtained from the determination of the values of the Di in the Drenica River basin is very useful and are inevitable, both in determining the intensity of erosive processes, as well as in the protection and improvement of

the living environment. In addition, the results obtained can be applied to problem solving when drafting spatial plans and planning other economic activities, study the balance between pedogenesis and morphogenesis and the assessment of environmental vulnerability.

REFERENCES

ALQAHTANI, F., QADDAH, A. A. (2019). GIS digital mapping of flood hazard in Jeddah–Makkah region from morphometric analysis. *Arabian Journal of Geosciences*, 12(6), 11. https://doi.org/10.1007/s12517-019-4338-8

CREVENNAA, A. B., RODRIGUEZ, V. T., SORANI, V., FRAME, D. ORTIZ, M. A. (2005). Geomorphometric Analysis for Characterizing Landforms in Morelos State, Mexico. *Geomorphology*, 67(3-4), 407–422. https://doi.org/10.1016/j.geomorph.2004.11.007

DIKAU, R., BRABB, E. E., MARK. M. R. (1991). Landform classification of New Mexico by computer. *U.S. Dept. of the Interior, U.S. Geological Survey*, 1-15. https://doi.org/10.3133/ofr91634

DOBOS, E., DAROUSSIN, J., MONTANARELLA, L. (2010). A quantitative procedure for building physiographic units supporting a global SOTER database. *Hungarian Geographical Bulletin*, 59(2), 181-205.

HANCOCK, G.R., MARTINEZ, C., EVANS, K. G. and MOLIERE, D. R. (2006). A Comparison of SRTM and High-resolution Digital Elevation Models and their Use in Catchment Geomorphology and Hydrology: Australian Examples. *Earth Surface Processes and Landforms*, 31(11), 1394 – 1412. https://doi.org/10.1002/esp.1335

JOHNSTON, K., HOEF, J. M. V., KRIVORUCHKO, K., LUCAS, N. (2001). Using ArcGIS geostatistical analyst. New York: Environmental systems research institute Inc. 50.

KANTH, T. A. and HASSAN, Z. (2012). Morphometric Analysis and Prioritization of Watersheds for Soil and Water Resource Management in Wular Catchment Using Geo-Spatial Tools. *International Journal of Geology, Earth and Environmental Sciences*, 2(1), 30-41.

KHAL, M., ALGOUTI, A., ALGOUTI, A., AKDIM, N., STANKEVICH, A. S., MENENTI, M. (2020). Evaluation of Open Digital Elevation Models: estimation of topographic indices relevant to erosion risk in the Wadi M'Goun watershed, Morocco. *AIMS Geosciences*, 6(2), 236. https://doi.org/10.3934/geosci.2020014

LIU, Y. (2008). An Evaluation on the Data Quality of SRTM DEM at the Alpine and Plateau Area, North-western of China. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, Beijing, 1123 – 1127.

MAGESH, N. S., JITHESHLAL, K. V., CHANDRASEKAR, N., JINI, K. V. (2012). GIS based Morphometric Evaluation of Chimmini and Mupily Watersheds, Parts of Western Ghats, Thrissur District, Kerala, India. *Earth Science Informatics*, 5 (2), 111–121. https://doi.org/10.1007/s12145-012-0101-3

MARKOSE, V. J., DINESH, A. C. and JAYAPPA, K. S. (2014). Quantitative Analysis of Morphometric Parameters of Kali River Basin, Southern India, Using Bearing Azimuth and Drainage (bAd) Calculator and GIS. *Environmental Earth Sciences*, 72(8), 2887-2903, https://doi.org/10.1007/s12665-014-3193-x

MIRZAEI, R., SAKIZADEH, M., (2016). Comparison of interpolation methods for the estimation of groundwater contamination in Andimeshk-Shush Plain, Southwest of Iran. *Environmental Science and Pollution Research*, 23(3), 2758–2769. https://doi.org/10.1007/s11356-015-5507-2

MOORE, I. D., GRAYSON, R. B., LADSON, A. R. (1991). Digital terrain modelling: A review of hydrological, geomorphological, and biological applications. *Hydrological Processes*, 5(1), 3-30. https://doi.org/10.1002/hyp.3360050103

MUKHERJEE, S., SASHTRI, S., GUPTA, M., PANT, M. K., SINGH, C., SINGH, S. K., SRIVASTAVA, P. K., ShARMA, K. K. (2007). Integrated water resource management using remote sensing and geophysical techniques: Aravali quartzite, Delhi, India. *Journal of Environmental Hydrology*, 15 (4), 1-10.

MUKHERJEE, S., SHASHTRI, S., SINGH, C., SRIVASTAVA, P. K., GUPTA, M. (2009). Effect of canal on land use/land cover using remote sensing and GIS, *Journal of the Indian Society of Remote Sensing*, 37 (3), 527–537, https://doi.org/10.1007/s12524-009-0042-6

NIR, D. (1957). The Ratio of Relative and Absolute Altitude of Mt. Carmel. *Geographical Review*, 47(4), 564-569.

OLIVEIRA, P. T. S., SOBRINHO, T. A., STEFFEN, J. L., RODRIGUES, D. B. B. (2010). Caracterização morfométrica de bacias hidrográficas através de dados SRTM. Revista Brasileira de Engenharia Agrícola e Ambiental, 14(8), 819-825. http://dx.doi.org/10.1590/S1415-43662010000800005

RAO TAMMA, G., RAO GURUNADHA, S. V. V. S., RATNAKAR, D., RAO MALLIKHARJUNA, S. T., RAO RAJA, B. M. (2012). Remote Sensing and GIS Based Comparative Morphometric Study of Two Sub-Watershed of Different Physiographic Conditions, West Godavari District, A.P. *Journal Geological Society of India*, 79(4), 383-390. http://dx.doi.org/10.1007/s12594-012-0059-2

ROSS, J. L. S. (1992). O registro cartográfi co dos fatos geomórfi cos e a questão da taxonomia do relevo. *Revista do Departamento de Geografia*, 6 (1), 17-30. https://doi.org/10.7154/RDG.1992.0006.0002

ROSS, J. L. S. (1994). Análise empírica da fragilidade dos ambientes naturais antropizados. *Revista do departamento de geografia*, 8 (1), 63-74. https://doi.org/10.7154/RDG.1994.0008.0006

SARMA, P. K., SARMAH, K., CHETRI, P. K., SARKAR, A. (2013). Geospatial study on morphometric characterization of Umtrew River basin of Meghalaya, India. Int J Water Resour Environ Eng 5 (8), 489–498. https://doi.org/10.5897/IJWREE2012.0367

TALANI, R. (1997). Laboratory manual for cartography and topography, Shkodër, *Camaj-Pipa*, 62 (In Albanian).

THAKKAR, A. K., DHIMAN, S. D. (2007). Morphometric analysis and prioritization of miniwatersheds in Mohr watershed, Gujarat using remote sensing and GIS techniques. *Journal of the Indian Society of Remote Sensing*, 35(4), 313–321. https://doi.org/10.1007/BF02990787

TOBLER, W. R. (1970). A computer movie simulating urban growth in the Detroit region. *Economic Geography*, 46(1). https://doi.org/10.2307/143141

XIE, Y., CHEN, T-B., LEI, M., YANG, J., GUO, Q-J., SONG, B., ZHOU, X-Y. (2011). Spatial distribution of soil heavy metal pollution estimated by different interpolation methods: accuracy and uncertainty analysis. *Chemosphere*, 82 (3), 469. https://doi.org/10.1016/j.chemosphere.2010.09.053

A NEW ELEMENT OF TOURISM IN NORTH-EASTERN PART OF HUNGARY – STEPS TO ATTRACT JEWISH PILGRIMS TO TOKAJ-HEGYALJA REGION

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Abstract

Religious tourism can be considered as one of the defining sectors of tourism, which is playing an increasingly important role in today's economic and social life. Memories of the Jewish religion, one of the dominant religions on Earth, can be found on several continents and have attracted an increasing number of tourists as tourist attractions in recent decades. In the spirit of the above, the aim of our study is to present the situation of Jewish tourism in one of the specific regions of Hungary, in the Tokaj-Hegyalja region, which is still known today mainly through other tourist attractions (e.g. wine tourism). To summarize the results, it can be said that there are very significant architectural features of Jewish tourism in the region (e.g. synagogues, tombs), and these have recently attracted an increasing number of visitors to the region. At the same time, local actors (municipalities, economic enterprises) have only a limited recognition of the opportunities offered by tourism (for example, the majority of investments financed by the European Union, state and foreign sources), the exploitation of which requires further steps and much more conscious intervention.

Key words

Jewish tourism, heritage products, wonder rabbi, Tokaj-Hegyalja region.

INTRODUCTION

Religion has played an important role in people's lives for a long time, and as a result, it is not surprising that travels related to religion, as a form of tourism (e.g. visiting oracles and shrines) has existed since the Antiquity, and in fact, they were among the first forms of tourism ever. From a geographical point of view, Judaism occupies a very special position among the major religions of the world: during the 1st and 2nd centuries AD, its believers were forced to flee from their core area in Palestine, and after a long migration, religious communities were established and important religious structures were built in the countries of Europe, Africa and North

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America. World War II triggered a new migration, and as a result, Israel can now be considered as the most important centre of the religion. At the same time, the traditions and buildings of the past centuries can be found in many countries of the world and especially in Europe, and they are important destination for tourists following Judaism. In the spirit of the above, the aim of this paper is to present the connection of the Tokaj-Hegyalja region (Fig. 1), located in Borsod-Abaúj-Zemplén county, in the north-eastern part of Hungary, and answer the following questions:

- what is the relationship between Jewish tourism and local actors (e.g. munici-palities): how well was the importance of Jewish tourism recognized and from what source were the most important investments financed?
- what are the most important characteristics of Jewish tourists visiting the region
- what are the most important effects of Jewish tourism in the region

The importance of the topic is indicated by the fact that while the region is primarily known for its wines (Bujdosó et al., 2019), it is also one of the main centres of Hasidic pilgrimages not only in Hungary but also around the world.
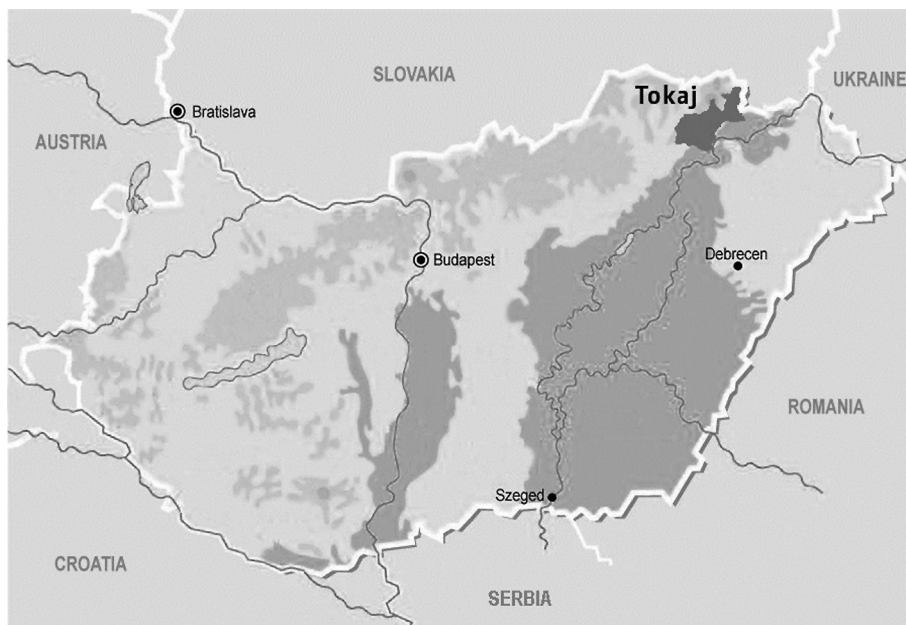
Fig. 1
Location of Tokaj-Hegyalja region in Hungary
Source: own work

The paper fundamentally consists of three larger units. After a review of the literature of religious tourism, it will outline the history of Judaism in the region and the special position of Tokaj-Hegyalja. The third major unit deals with the steps taken to welcome Jewish tourism in the region, and it also analyses its socio-economic impacts.

Even though, as a result of the COVID-19 pandemic, just like all other branches of tourism, religious tourism in the region also declined significantly in 2020, from the point of view of the future, it is still important to draw some conclusions based on the experience gained so far.

THEORETICAL FRAMEWORK

Travelling for religious reasons, or religious tourism, has a very notable history (Chakrabarty and Sadhukhan, 2020). Places and objects endowed with various supernatural powers attracted significant masses already in the prehistoric era (e.g. Stonehedge), but the first boom of religious tourism occurred in the Antiquity (Rinschede, 1992; Olsen and Timothy, 2006). In the Middle Ages, the holy places of Christianity, Judaism and the Islam attracted a large number of pilgrims (initially to the Holy Land and Rome, later also to Santiago de Compostela and after the appearance of the cult of relics to places like Aachen, Assisi, Cologne, etc.). During the Baroque period, in the era of the Counter-Reformation, there was a revival of pilgrimages and more frequent visits to religious sites, which was followed by a significant decline during the Enlightenment period. At the same time, the 19th and 20th centuries brought a new boom, which also continued over the last decade: the UNWTO estimates that nearly one-third of the 1.4 billion people involved in international tourism in 2018 travelled for religious purposes.

In terms of the definition of religious tourism, there are basically two approaches (e.g. Griffin and Raj, 2017; Hvizdová, 2018; Sulyok and Mártonné-Máthé, 2014; Varga, 2011). According to the narrower interpretation, religious tourism involves trips linked to practicing a religion, and those participating in it wish to exercise, live, or strengthen their faith. By contrast, more recently, increasing attention has been given to a broader approach to religious tourism, according to which religious tourism also includes the cases where the intention of travellers is to visit religious buildings or events as cultural attractions.

We can distinguish between various types of religious tourism. Some of the researchers (e.g. Rinchede, 1992) have focused on the duration of the trip, distinguishing between short-term and long-term religious tourism. The former aims to visit a local or regional religious centre, attend a religious festival or conference, or visit a church. In the latter case, the visit to religious centres may take several days or weeks, and the journey is not limited to religious sites of national or international importance, but also includes other national or international religious centres.

The other approach (e.g. McGettigan, 2003; McKelvie, 2005) focuses on the force of attraction serving as the basis of religious tourism, and distinguishes between three types, which are also interconnected to a certain level. The best-known among these, also having the longest history, are pilgrimages undertaken for the most part by believers (pl. Collins-Kreiner, 2010; Čábyová, 2016; Kim et al., 2020; Krogmann et al., 2017; Nompumelelo, 2020; Pasternák and Tomas, 2018; Tőzsér, 2020), during which the visit to the holy place may be based on the intention of finding spiritual peace or replenishment, fulfilling a requirement of a given religion (e.g. islam) (Arjana, 2017; Luz, 2020), or the belief in healing as a result of the pilgrimage (Goldingay et al., 2014; Talbot, 2002). The second type consists of attending various religious events (e.g. a service by a prominent ecclesiastical personality, International Eucharistic Congress of Catholic Church), in which it is also mainly followers of a faith that are mostly involved (e.g. Cerutti and Piva, 2015; Sánchez et al., 2017). Finally, visiting major sites of worship (e.g. churches, cathedrals, shrines) not primarily for religious purposes, but rather for their architectural and cultural historical values is related to the broader definition of religious tourism, the which the proportion of visitors not motivated by religious reasons is also significant (Buchrieser, 2019; Irimiás and Michalkó, 2013; Kozma, 2014; Navajas-Romero et al., 2020).

For various reasons, tourism related to the Judaism occupies a special place within religious tourism. Firstly, we should consider the history of Jews: after their migration/exodus from their ancient land in Palestine in the 1st and 2nd centuries AD, they settled in various countries in Europe and Africa (their presence was particularly strong in the Eastern part of Europe from the 17th century), and created a variety of religious buildings (synagogues, cemeteries, bath houses). However, as a result of the events of the 20th century (the Holocaust and the subsequent large-scale immigration to Israel), these buildings have often lost their function and deteriorated. Secondly, in some Jewish communities, there is a very strong attachment to the past, as a result of which, from the 1960s and 70s, the intention of rediscovering former places of habitation and preserving the memories there has been on the increase. Thirdly, Jewish communities have a larger proportion of higher income layers, and therefore the financial conditions for travelling as well as for repairing for these deteriorating buildings also in place.

As a result of the above, three destination areas of tourism related to Judaism can be fundamentally separated (Collins-Kreiner and Luz, 2017). Firstly, religious monuments in Israel represent very significant attraction (e.g. Collins-Kreiner, 2010; Ioannides and Ioannides, 2006; Luz and Collins-Kreiner, 2015), which, for a long time, had only served as motivation for people of the Jewish faith to travel, for whom it provides an opportunity to discover their past and traditions. However, in recent decades, there has been a tendency that the architectural works concerned

have also motivated a large number of travellers to Israel who are not believers of Jewish faith. The second main target area consists of the former concentration camps (e.g. Auschwitz) that were the main scenes of the extermination of Jews during World War II, and today function as memorial sites and museums, calling attention to this shameful historical act (Griffiths, 2019; Thurnell-Read, 2009).

Thirdly, a significant number of tourists are also attracted to areas that have been important places of habitation for Jews in the past. In the 20th century, as a result of the events previously outlined, the number of Jews living there has significantly decreased, but various mementoes of their lives – albeit often in a deteriorated state – have remained. Of course, buildings (e.g. synagogues) in larger cities have the biggest force of attraction (Corsale and Vuytsyk, 2018; Fenyvesi et al., 2020; Gaižutytė-Filipavičienė, 2020; Ioannides and Ioannides, 2002; Krakover, 2013; Krakover, 2017; Zammit, 2020), in the case of which we can distinguish between two main target groups with respect to tourism. One of these groups are people of Jewish religion who visit the given settlement partly because it played a role in the lives of their families (e.g. their parents or grandparents lived there) and partly for religious reasons (the intention to find spiritual peace or strength there). In recent decades, however, due to the growing importance of heritage tourism, the use of the buildings concerned as monuments and attractions has received more emphasis, and in this sense, the aim is to also attract tourists less interested in religion *per se*, which is often achieved by way of various cultural events organized there.

In addition to the larger towns, the increasing popularity of Jewish monuments in smaller settlements has also been observed in recent times (Marchenko, 2018; Makowiecka et al., 2015; Švedova, 2018). At the same time, in such cases, the renovations were primarily financed by various Jewish organisations, and the majority of the visitors are also people of the Jewish faith.

DATA AND METHODS

In the course of the research project, a variety of methods have been used. The secondary research consisted of studying the relevant international and Hungarian literature (in the framework of which, the most important features of Jewish tourism, as well as the historical role of Jews in the region were explored), and we also analysed the various documents related to the development of the region from the point of view of Jewish tourism. One of the foundations of the primary research was a questionnaire-based survey among Jewish tourists in 2018 and 2019 (the survey took place in three settlements of outstanding importance for Jewish tourism, Mád, Sátoraljaújhely and Bodrogkeresztúr, and covered a total of 345 Jewish tourists, who visited the religious monuments), in the course which we examined the general characteristics of the travels, as well as the tourism services used dur-

ing those travels. In addition, a prominence investigation was conducted with the participation of Slomó Köves, the executive rabbi of EMIH Unified Hungarian Jewish Congregation (EMIH), Mariann Frank, the organizer of "Footsteps of the Wonder Rabbis", the mayors of Bodrogkeresztúr, Olaszliszka, és Sátoraljaújhely, as well as Kálmánovits Miklós the president of Tokaj Orthodox Community. Besides, we relied on the data provided by the Central Statistical Office of Hungary and the website „palyazat.gov.hu", which publishes the results of the European Union tenders.

RESULTS AND DISCUSSION

The History of the Jewry of Tokaj-Hegyalja

From the 18th century onward, Jews arrived in several waves in Tokaj-Hegyalja from Bohemia, Moravia, Silesia and Galicia. Some of the Jews arriving in the area were poor, impecunious people, peddlers who travelled to the settlements and sold various goods. The wealthier merchants commissioned peddlers to sell their goods. In the 18th century, in terms of business activities, distilling pálinka (Hungarian fruit spirit) and brewing beer, as well as activities related to viniculture and viticulture also played an important role among Jewish enterprises (Csorba, 2017).

The increase in the Jewish population (by the middle of the 19th century, the number of Jews had reached 15,000 people) was accompanied by the appearance of buildings related to Judaism. Cemeteries were established first, and later, when there were at least 3 or 4 families on a settlement, a ritual bathhouse (mikveh) was also built. In places with ten or more families, they typically built houses of worship (súl), and later also synagogues. By the second half of the 1800s, in the case settlements with a large proportion of Jews, it was also a natural next step that they also built, in addition to the synagogues and houses of prayer, primary schools and yeshivas (educational institutions after primary schools), which played not only educational but also cultural roles.

The roots of the Hasidic movement, which is of outstanding importance from the point of view of today's Jewish tourism in the region also emerged in 18th century. Hasidism originated in Eastern Europe, and the term Hasid comes from the Hebrew word *chesed* meaning "practising love". The leaders of the new Jewish movement were called tzadiks or rebbes. The meaning of the word tzadik is *"righteous one"*, and it was used for men that the Jewish communities considered their spiritual and moral leaders. According to historical records, there were four rabbis in Tokaj-Hegyalja, who faithfully proclaimed and followed the teachings, and they were also buried on the settlements of the region after their death (Bodrogkeresztúr - Reb Sájele, Olaszliszka - Friedmann Cvi Hersele, Sátoraljaújhely - Teitelbaum Mózes, Mád - Winkler Mordháj). Their activities were very highly valued by the public, and they became religious leaders referred to as "wonder rabbis". Thanks to their teachings and assistance, they gained great respect, and not only Jews

but also the Christian residents asked for their help. According to Hasidic teaching, a wonder rabbi has a direct connection with the Eternal One, as a result of which Hasidic Jews believe that wonder rabbis can help – even long after their death, in response to a prayer or a request left there on a piece of paper – so that they can make the right decisions.

The horrors of World War II, however, also affected the Jews of Tokaj-Hegyalja, and the Jewish population inhabitants either fled or were taken away. The majority of the Jews in the area immigrated to Canada, the United States or Israel (Zelenák, 1990). The return of Jews who formerly lived on the settlements started in the 1970s. They came to Tokaj-Hegyalja with the aim of visiting their old contacts and former homes, and before 1989, an average of 4,000 Jewish religious tourists arrived in the area (Gleszer, 2006).

Role of the Jewish tourism in regional and local policy

In recent decades, several strategies and programmes have been developed that strive to outline the possibilities of development of Tokaj-Hegyalja and its wider region, as well as the possible breakout points. Looking at the relevant documents from the point of view of Jewish tourism, it can be concluded that for a long time "higher-level" materials did not address this issue at all: the documents titled "Northern Hungary Region Tourism Development Strategy 2007-2013" (accepted in 2006), "Northern Hungary Operational Programme 2007-2013" (accepted in 2007), "Regional Development Concept of Borsod-Abaúj-Zemplén County" (accepted in 1999), "Situation Assessment and Development Concept for the period 2011-2013"(accepted in 2011), or "Regional Development Concept of Borsod-Abaúj-Zemplén county 2014-2020" (accepted in 2014) did not mention Jewish tourism either in the parts assessing the existing situation or in the chapters on development strategy. In all likelihood, what is in the background of the above situation is that the writers of these documents considered wine tourism, active tourism and other branches of cultural tourism (e.g. visit of fortresses and castles) as having such forces of attraction that could significantly contribute to bringing tourists to the region.

In the case of small regions situated between county and settlement levels, a slightly more favourable situation can be observed: two of the development concepts of the four regions comprising Tokaj-Hegyalja in the 2000s include attractions related to the Jewish heritage (Tokaj small region: Tarcal és Tokaj – synagogue and Jewish cemetery, Szerencs small region: Mád: synagogue); however, tourism related to Jewish values is not mentioned among the development priorities related to tourism at all. (The renovation of the synagogue in Tokaj is the sole exception, but even here it is only referred to as a cultural venue.) The situation is also similar in the application of the Tokaj wine region for the title of UNESCO World

Heritage Site, in which the synagogues and other religious buildings in Tarcal and Mád are listed among the assets of the region.

An important element from the point of view of settlements is that in recent times only the towns had to develop an independent development concept (2007-2013: Integrated Urban Development Concept, 2014-2020: Integrated Settlement Development Concept). An analysis of the documents of the three towns of the region (Sátoraljaújhely, Tokaj, Sárospatak) reveals that a minimal role of Jewish tourism appears in case of Tokaj and Sárospatak: even though these documents mention the Jewish cemetery and synagogue in Tokaj and the ritual bathhouse in Sárospatak, the strategy parts of these documents do not address this topic any further. This is probably due to the fact that the two settlements concerned fundamentally focused on other areas related to tourism development. The only exception is Sátoraljaújhely, where the possibility of exploiting tourism linked to the tomb of the wonder rabbi already appears in the strategy prepared in 2015.

In the spirit of the above, it is hardly surprising that for a long time the local governments of the region devoted very little attention and financial resources to the renovation of the architectural monuments related to the Jews (their modest financial opportunities of the settlements also played a role in this), which means a greater reliance on the donations of the descendants and other grants from outside. The first major investment was the renovation of the synagogue in Mád (which took place between 2000 and 2004, resulting in this facility functioning as a cultural centre), the costs of which were mainly provided by the Hungarian state and the Jewish Heritage programme of the World Monuments Fund (the restoration received a Europa Nostra award). The municipality also took part in the renovation of the synagogue in Tokaj (the project was completed in 2006, with 90% of the cost of about HUF 400 million provided by the European Union and the rest of the funding by the local government); at the same time, the resulting facility is not linked to the Jewish religion, but operates as a cultural and conference centre. In Bodrogkeresztúr, the descendants of the wonder rabbi bought and renovated the birthplace of their ancestor, which became one of the centres of Jewish tourism.

In addition to further developments, the project titled "Journey to the Jewish heritage of Northern Hungary" (ÉMOP-2.1.1/B-12-2012-0031), realized between 2014 and 2016 under the leadership of EMIH, aimed at placing the elements of the Jewish heritage into a system, which received a grant of HUF 460 million from the European Union. As part of this project, the building of the former rabbi's house and yeshiva in Mád was transformed into a museum and a pilgrims' accommodation (due to the growing demands, the latter is expected to be enlarged in the coming years), and a memorial was also created in Olaszliszka by rebuilding one of the walls of the demolished synagogue after excavations of the ruins of the building there (Fig. 2).

On the other hand, a thematic route called "Footsteps of the Wonder Rabbis", including 10 settlements (Mád – Tarcal – Tokaj – Bodrogkeresztúr – Olaszliszka – Sárospatak – Sátoraljaújhely – Erdőbénye – Abaújszántó - Tállya), was also created, and access to the Jewish heritage on these settlements is provided in various ways (websites, guided tours). With the aim of addressing the accommodation problem described later, a project was completed in 2020 in Sátoraljaújhely, as part of the project titled "The Path of Jewish Heritage in Easter Hungary – A Presentation of Orthodox Jewish Monuments in Sátoraljaújhely" (GINOP-7.1.4-16-2016-00002), in the framework of which the building of a former educational institution was transformed into pilgrims' accommodation and a museum.

Fig. 2
The Holocaust memorial wall on the site of the former synagogue in the village of Olaszliszka
Source: own photo

Tourism related to Jewish heritage in Tokaj-Hegyalja

As a result of the developments in Tokaj-Hegyalja presented above, a Jewish tourism offering consisting of several elements has been created recently (Fig. 3). Among the most widely available elements of the Jewish heritage are the cemeteries, which can be found in nearly two-thirds of the 27 settlements in the region. Thanks to the hard work done in the recent period, often by volunteers, the cemeteries of 11 settlements (Abaújszántó, Szerencs, Mád, Tállya, Tarcal, Tokaj, Bodrogkeresztúr, Olaszliszka, Sárospatak, Sátoraljaújhely, Erdőbénye) have already been partially mapped (a cadastral database of the graves, complete with GPS data, has been created and made also available online, thereby helping Jewish tourists arriving in search of the grades of their ancestors), and continuous efforts are also made to maintain the condition of these cemeteries; however, in the absence of custodial works, the condition of cemeteries on six settlements (Bekecs, Legyesbénye, Bodrogkisfalud, Rudabányácska, Szegi, Vámosújfalu, Tolcsva) is deteriorated, they are hard to access and walk around in.
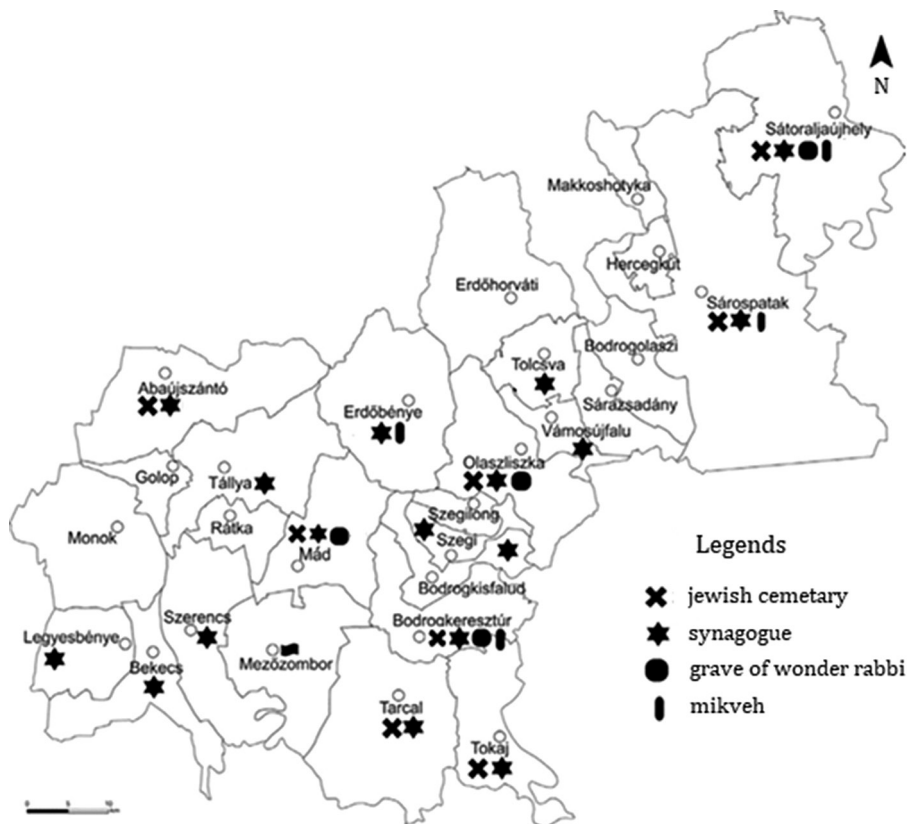
Fig. 3
Existing Jewish architectural monuments in Tokaj-Hegyalja
Source: own work

Among the cemeteries, as destinations of Jewish tourism, an outstanding role is played by those that also contain the tombs of some of the wonder rabbis (Bodrogkeresztúr – Reb Sájele, Olaszliszka – Friedmann Cvi Hersele, Sátoraljaújhely – Teitelbaum Mózes, Mád – Winkler Mordháj). The renovation of these were started in 2007, largely with the financial support of the descendants, in the framework of which modern electronic security systems were installed, and air-conditioned *ohelim* were built over the tombs.

For the wider public, the most spectacular Jewish architectural monuments are synagogues. Several synagogues were built in settlements with larger Jewish populations during the 18th and 19th centuries (Tab. 1), but during the post-World War II period a large number of them became deteriorated, and some were also demolished. By examining the current situation, we can conclude that the smaller part of the remaining synagogues fulfil cultural functions after their renovations,

Tab. 1   Jewish architectural monuments located in Tokaj-Hegyalja and their current use

Jewish architectural monuments	settlement	current use
synagogue	Tokaj	renovated, cultural and congress centre
synagogue	Tarcal	renovated, cultural function (exhibition centre)
synagogue	Mád	renovated, cultural function (cultural centre)
synagogue	Abaújszántó	economic function (storage)
synagogue	Sárospatak	economic function (shop)
synagogue	Tállya	demolished
synagogue	Tolcsva	demolished
synagogue	Sátoraljaújhely	demolished economic function (shop)
synagogue	Olaszliszka	demolished (memorial wall)
synagogue	Bodrogkeresztúr	administrative function (office of Aggteleki National Park)
primary school	Tolcsva	educational function (primary school)
primary school	Sátoraljaújhely	economic function (economic development foundation office)
yeshiva	Mád	accommodation
rabbi house	Mád	accommodation
mikveh	Bodrogkeresztúr	renovated, tourist attraction
mikveh	Erdőbénye	renovated, tourist attraction
mikveh	Sátoraljaújhely	renovated, tourist attraction
mikveh	Sárospatak	economic function (shop)

Source: *own collection*

while the majority of them are used for other purposes, with the original religious function not observable in any of these cases. Due to the lack of children who would attend them, the former Jewish primary schools are used for completely different purposes these days, while the majority of *mikvehs* (bath houses) function as tourist attractions. In terms of architectural monuments, the village of Mád plays the most important role among the settlements of the region: the block consisting of the former synagogue, the Rabbi's House and the yeshiva (school providing higher education) have been completely renovated thanks to a European Union grant, and it also serves as the starting and the end point of the thematic tour titled "Footsteps of the Wonder Rabbis".

The attractions associated with the Jewish religion also include programmes that are targeted at non-Jewish people as well. The event called *The Jewish Days of Mád* is a three-day series of events with popular music concerts and religious

ceremonies, where participants also have an opportunity to visit the built and renovated Jewish sites. During the *Kosher Experience Tour*, in addition to seeing the Jewish heritage, it is also possible to sample some kosher food. In the framework of the event titled *Good night, Mád*, held in the Rabbi's House in Mád, visitors can hear presentations on the history of Jews in Tokaj-Hegyalja and are also invited to sample some kosher products (pálinka, wine).

The number of Jewish tourists arriving in the area is difficult to estimate for two reasons. On the one hand, a significant part of the attractions are outdoors, and there are hardly any institutions (e.g. museums) where such data collection could take place. In the course of interviews with the leaders of national Jewish organisations as well as mayors of the settlements in the area (and my personal experience also confirms this), it was mentioned that on some of the holidays (e.g. Shabbat, Yom Kippur, Passover) and on Jahrzeit dates (the death anniversaries of wonder rabbis), 5,000 to 7,000, while on other days 50 to 100 Jewish pilgrims arrive in the region, where the main number of Jewish pilgrims from the United States can reach the country, whose total combined number per year may be up to 40-50,000 (the two countries most of them come from are Israel and the United States of America, where there is an increasing tradition of researching family trees and finding one's roots, and there is also an increasing level of consciousness about their heritage.

On the other hand, for the reason to be discussed below, information on accommodation services does not provide adequate data either. Data including sending countries relate only to commercial places of accommodation and do not include other types of accommodation (e.g. pilgrims' accommodations). In addition, the data are only available at district level, and since the Tokaj-Hegyalja region belongs to four administrative districts (Sárospatak, Sátoraljaújhely, Szerencs and Tokaj), with some settlements in these districts being outside the Tokaj-Hegyalja region, certain distortions of the data is due to occur. There is also a problem with the fact that tourists of Jewish religion arrive not only from Israel, but also from other countries, so including them in the survey may also raise problems (in the course of the research, apart from Israel, I examined the data of the United States of America, which both the experts' opinion and my own experience confirms is the most important source country of Jewish tourism). However, the analyses shed light on a number of important facts/processes (Tab 2).

In terms of the number of the guests arriving from the two countries and the number of nights they spent, after the fluctuation in the first half of the 2010s, a very significant increase occurred in the second half of the decade (in all likelihood, the developments presented earlier were in the background of this increase), which greatly exceeded the earlier figures for all foreign guests. Comparing the data of the four administrative districts, the outstanding role of the Tokaj district can be observed (75-80% of the guest nights spent by Israeli and American tourists

in the four districts belong here, while in case of all foreign tourists combined, this proportion is only 25-30%), which is due to the fact that Bodrogkeresztúr, a settlement connected to the wonder rabbi Reb Shayele, can be considered as one of the principal destinations of Jewish tourism to the region).

Tab. 2   Data on commercial accommodation in the four administrative districts comprising Tokaj-Hegyalja in the period 2011 to 2019

	number of guests			number of guests nights		
	A	B	C	A	B	C
2011	205	508	14,192	226	1,544	27,266
2012	42	424	14,557	51	879	31,291
2013	138	281	14,343	215	568	29,889
2014	165	582	19,269	277	961	43,570
2015	77	569	15,384	116	945	30,612
2016	179	750	17,661	293	1,071	39,624
2017	231	1,092	20,184	323	1,751	41,361
2018	527	1,586	22,193	771	2,418	44,508
2019	782	1,862	21,549	953	2,626	40,742

A – guests from Israel, B – guests for United States of America, C – foreign guests
Source: *edited by the authors by the data from the Central Statistical Office of Hungary*

The third important conclusion can be drawn with respect to the average length of time spent in the region, which is very low (in most years, it is less than 1.5 days for tourists from both Israel and the United States of America), and is also significantly shorter than the average length of time spent by tourists coming to the region from all the other countries (which is around 2 days), and is also shorter than the average length of time tourists from these two countries spend in Hungary (in case of Israel it is usually more than 3, while in case of the USA, it is around 2,5 days). What is behind this phenomenon is related to the characteristic features of the visits of Jewish tourists to the region, which will be discussed in the next unit.

In the course of the questionnaire-based survey, we first examined the general characteristics of the travels of Jewish tourists visiting the region. Most of the respondents have visited Tokaj-Hegyalja several times, and it was their first visit only in case of 14%. In case of the first group, the largest proportion of them spend 2-3 days in the region (50.8%), while in terms of the annual number of visits there was no major difference (51.2% visit once a year, while 48.8% more than once a year). However, with respect to the relationship between the travel characteristics of the two groups, we can draw several important conclusions (Tab. 3). On the one

hand, it can be observed that those visiting for the first time spend more than the average time in the Tokaj-Hegyalja, which is due to the fact that they wish to get to know the region better, as one they are still unfamiliar with.

Tab. 3   Travel characteristics of the tourists surveyed (%)

		first time visitors	returning visitors	total
number of days spent in the region	1 day	14.9	85.1	100.0
	2-3 days	10.7	89.3	100.0
	more days	24.4	75.6	100.0
	total	14.4	86.0	100.0

Source: *own survey*

On the other hand, among those visiting Tokaj-Hegyalja on several occasions (Tab 4), we can identify two larger groups in terms of the characteristics of their visits (as far as differences from the average can be observed). Among those who only spend one day in the region, the proportion of visitors who only come once a year is higher, which means that this probably the group that comes to Tokaj-Hegyalja for the anniversary of one of the wonder rabbis. In the group that also shows significant over-representation compared to the average we can find those who visit more than once a year and spend more than three days: these Jewish tourists are likely to also visit other attractions in the area regularly.

Tab. 4   Travel characteristics of those who are not first-time visitors to Tokaj-Hegyalja (%)

		first time visitors	returning visitors	total
number of days spent in the region	1 day	55.3	44.7	100.0
	2-3 days	50.7	49.3	100.0
	more days	38.7	61.3	100.0
	total	51.2	48.8	100.0

Source: *own survey*

Among the types of accommodation used by the respondents, private accommodations (including pilgrims' accommodations and properties purchased by tour operators) play a prominent role: the proportion of these two is 72.2%, while guesthouses account for 16.7%, and hotels for 11.0% (only the latter two belong to the category of commercial accommodations, which may justify the low figures in Table 2). However, we can observe significant differences between the groups (Tab 5). On the one hand, those arriving for the first time use hotels in a proportion

above the average (this is probably due to the uncertainty caused by the unknown situation), while returning tourists with a certain level of experience have more confidence in private accommodations. On the other hand, tourists who spend more than three days in the region prefer bed and breakfast places and hotels, which are typically higher quality accommodations, as these are more comfortable.

Tab. 5   The characteristics of accommodations used by respondents (%)

		private accommodation	guesthouse	hotel	total
novelty of visit	first-time visitors	60,7	14.3	25.0	100.0
	returning visitors	74.2	17.0	8.8	100.0
number of days	2-3 days	73.8	16.1	10.1	100.0
	more than 3 days	65.9	19.5	14.6	100.0
	total	72.3	16.7	11.0	100.0

Source: *own survey*

Respondents essentially expressed a positive opinion concerning the quality of the services used: on average, accommodation services received a grade of 4.54 (on a scale of 5), food services a grade of 4.40, traffic and transport a grade of 4.34, and the availability of shops was the only category with a grade below 4. However, substantial differences between groups of respondents could be observed in terms of perception of individual services. In terms of the evaluation of accommodations, the best average grades were given to hotels and guesthouses, while the rating for private accommodations was only 4.46. In terms of the quality of food services and shops, it could be clearly observed that first-time visitors and those spending less time in the region gave higher evaluations (Tab. 6). In our opinion, this is basically

Tab. 6   The perception of food services and shops in different groups of respondents

		quality of food services	quality of shops
novelty of visit	first-time visitors	4.85	4.02
	returning visitors	4.33	3.89
number of days	1 day	4.52	4.07
	2-3 days	4.34.	3.86
	more than 3 days	4.27	3.59

Source: *own survey*

due to two things: on the one hand, those arriving for the first time are still more captivated by the spirit of the place, and are therefore less critical; on the other hand, those who spend longer time (2-3 days or more) can gain more experience and this can lead to a more negative opinion.

The effects of Jewish tourism in Tokaj-Hegyalja

The examination of the effects of Jewish tourism in Tokaj-Hegyalja (including, in particular, the arrival of people of the Jewish faith in the region) is not separate from the characteristics of the given branch of tourism. The arrival of pilgrims is organised to a large extent by American and Israeli travel agencies, who often integrate the other centres of pilgrimage (e.g. Poland – Lezajsk, Ukraine – Uman, Romania – Bixad)in the Central European region into a complex "star-pattern" tour with trips from a central location. The pilgrims who typically arrive to Budapest are transported to the region mainly by companies with their headquarters there, but it can be seen as a favourable change that in recent years already entrepreneurs from the Tokaj-Hegyalja region are involved in this activity. In connection with the problem of transport, parking should also be mentioned: in the absence of properly built or temporary parking spaces, the large number of motor vehicles arriving sometimes obstruct traffic on the settlements. Parking spaces for only five cars were built in front of the rabbi's house in Bodrogkeresztúr, and for fifteen at the Jewish cemetery. In Olaszliszka, a total of fifteen, while in Sátoraljaújhely twenty-five cars can park next to the Jewish cemeteries. On some of the settlements (e.g. Sátoraljaújhely, Bodrogkeresztúr, the parking lots of nearby stores are used as a solution to alleviate the parking difficulties; however, this causes disturbances to the local population.

The biggest potential income for the region could be providing accommodation for arriving tourists; however, the fact that Jewish tourists – as pointed out earlier – arrive on a seasonal basis (related to major holidays or the anniversaries of wonder rabbis), meeting the additional demands during these times presents significant difficulties. Several steps have been taken to address the situation. On the one hand, it is necessary to refer once again to the aforementioned developments of accommodations, behind which there are various Jewish organisations (according to the plans, in addition to the existing ones, places of accommodation will also be created in Olaszliszka by the Foundation for Jewish Heritage in Olaszliszka). On the other hand, in order to remedy the lack of accommodation during the pilgrimages, a real estate acquisition process started in 2015 in Tokaj-Hegyalja. This trend occurred primarily on settlements with the graves of the wonder rabbis, but it can now be observed also in neighbouring settlements. American and Israeli Jewish tour operators organising the visits of religious tourists saw economic potential in buying empty houses in the settlements and operating them as places

of accommodation after some renovations. The most dynamic acquisition can be observed in Bodrogkeresztúr, where thirty properties were purchased according to the data of 2019. The process has both positive and negative consequences for the settlement. On the one hand, the organisers offer job opportunities to the local population, since they provide the cleaning and supervising of the purchased properties. On the other hand, these acquisitions have significantly increased the prices of real estate, and the fact that the new owners do not become permanent residents, combined with the high prices making it almost impossible for people to move here from nearby settlements, the population of Bodrogkeresztúr is steadily decreasing (natural population decrease also plays a role in this).

Food services play an important role in increasing the satisfaction of tourists arriving in the region, as well as generating higher incomes for the locals. It is a fundamentally positive fact that the traditions of Jewish viniculture and viticulture, which had played an important role in the region in the previous centuries, are being revived nowadays, and several wineries are involved in the production of kosher wines (e.g. Mád – Disznókő winery, Abaújszántó – Galambos winery). However, the situation with regard to food is controversial: although it is true that several settlements (e.g. Mád, Bodrogkeresztúr) have kosher kitchens in which they can produce kosher food, they do not produce and prepare suitable raw materials either in Tokaj-Hegyalja or in neighbouring areas, so these must be sourced from Budapest and abroad (which increases food costs by about 20-25% and also means untapped opportunities).

CONCLUSIONS

The most important findings of the present paper could be summarised as follows. Jewish tourism has a very significant potential in Tokaj-Hegyalja, and based on this, it can be an important attraction of the region so far mostly known for wine tourism. For a long time, however, the local authorities did not recognise the inherent potential, which is indicated by the fact that very little attention was devoted to Jewish tourism, and they also did not allocate financial resources to this purpose. As a result, the necessary investments were mainly in response to external stimulus (e.g. from national Jewish organisations) and with the use of external sources (European Union grants, support from foreign Jewish organisations/descendants). In the last decade, in line with international processes, a very significant wave of Jewish tourism has emerged in the region, with several differences that can be observed between groups of participants in terms of the novelty and the frequency of their visits, as well as the types of accommodations used. The Jewish tourists arriving to the region are essentially satisfied with the services provided, with more criticism expressed only in connection with the availability of shops.

In recent years, attempts have been made to make a better use of the attractiveness of the region to Jewish tourism, partly with an aim to also attract non-Jewish

visitors to the region (e.g. Jewish cultural events, museums presenting the history of Jews in the region), but the result of these efforts are barely measurable yet.

In terms of the effects of tourism on the region, we can observe some positive (e.g. additional income for locals) and negative factors (e.g. occasionally over-crowded settlements, an increase in real estate prices), and further developments are needed in order to increase the former.

REFERENCES

ARJANA, S.R. (2017). *Pilgrimage in Islam: traditional and modern practices*. London: Oneworld Publications.

BUCHRIESER, Y. (2019). Simulacra architecture in relation to tourism: Charles Rennie Mackintosh in Glasgow and Antoni Gaudi in Barcelona. *Journal of Tourism and Cultural Change*, 17, 1, 100-114.

BUJDOSÓ, Z., GYURKÓ, Á., BENKŐ, B. (2019). Tourism development in Hungary on the example of Northern Hungary region. *Folia Geographica*, 61,2, 86-103.

ČÁBYOVÁ, L. (2016). Pilgrime tourism in Slovakia: the potential for development. *European Journal of Science and Theology*, 12, 1, 231-244.

CERUTTI, S., PIVA, E. (2015). Religious Events And Event Management: An Opportunity for Local Tourism Development. *Internatonal Journal of Religious Tourism and Pilgrimage*, 3, 1, 55-65.

CHAKRABARTY, P., SADHUKHAN, S.K. (2020) Destination image for pilgrimage and tourism: a study in Mount Kailash region of Tibet. *Folia Geographica*, 62, 2, 71-86.

COLLINS-KREINER, N. (2010). Current Jewish pilgrimage tourism: Modes and models of development. *Preliminary Communication*, 58, 3, 259-270.

COLLINS-KREINER, N. (2010). The geography of pilgrimage and tourism: Transformations and implications for applied geography. *Applied geography*, 30, 1, 153-164.

COLLINS-KREINER, N., LUZ, N. (2017). Judaism and Tourism over the Ages: The Impacts of Technology, Geopolitics and the Changing Political Landscape. In Butler, R., Suntikul, W., eds., *Tourism and Religion: Issues, Trends and Implications*. Bristol: Channel View Publications, pp. 51-67.

CORSALE, A., & VUYTSYK, O. (2018). Jewish heritage tourism between memories and strategies. Different approaches from Lviv, Ukraine. *Current Issues in Tourism*, 21, 5, 583-598.

CSORBA, CS. (2017). „Szerettem volna, ha nem kísért a múlt" – *Sátoraljaújhely zsidóságának története*. Sátoraljaújhely: Zempléni Regionális Vállalkozásfejlesztési Alapítvány.

FENYVESI, É., KORMÁNYOS, A., SZÉKELY-KOVÁCS, I. (2020). A Budapesti vallási alapú (kóser és halál) vendéglátóhelyek jellemzői. *Deturope – The Central European journal of regional development and tourism*, 12, 1, 41-63.

GAIŽUTYTĖ-FILIPAVIČIENĖ, Ž. (2020). Jewish heritage in the creative cities of Central and Eastern Europe: Tourism, technologies and prosthetic memory. *Creativity Studies*, 13, 1, 41-52.

GLESZER, N. (2006). Zsidó búcsúk ma. A magyarországi csodarabbikhoz folytatott zarándoklatok átstrukturálódása azezredfordulón. *Magyar egyháztörténeti vázlatok.* 18, 3–4, 69–94.

GOLDINGAY, S., DIEPPE, P., FARIAS, M. (2014). 'And the pain just disappeared into insignificance': The healing response in Lourdes–Performance, psychology and caring. *International Review of Psychiatry*, 26, 3, 315-323.

GRIFFIN, K., RAJ, R. (2017). The Importance of Religious Tourism and Pilgrimage: reflecting on definitions, motives and data. *International Journal of Religious Tourism and Pilgrimage*, 5, 3, Article 2

GRIFFITHS, C. (2019). Encountering Auschwitz: Touring the Auschwitz-Birkenau State Museum. *Holocaust Studies*, 25, 1-2, 182-200.

HVIZDOVÁ, E. (2018). Religious tourism and its socio-ecnomic dimension. *European Journal of Science and Theology*, 14, 2, 89-98.

IOANNIDES, D., IOANNIDES, M.W.C. (2002). Pilgrimages of nostalgia: Patterns of Jewish travel in the United States. *Tourism Recreation Research*, 27, 2, 17-25.

IOANNIDES, M.W.C., IOANNIDES, D. (2006). Global Jewish tourism. In Timothy, D.J., Ilsen, D.D., eds., *Tourism, religion and spiritual journeys.* Routledge: London – New York, pp. 156-171.

IRIMIÁS, A. MICHALKÓ, G. (2013). Religious tourism in Hungary-an integrative framework. *Hungarian Geographical Bulletin*, 62, 2, 175-196.

KIM, B., KIM, S., KING, B. (2020). Religious tourism studies: evolution, progress, and future prospects. *Tourism Recreation Research*, 45, 2, 185-203.

KOZMA, G. *(2014). Most important characteristics of heritage planning. In Radics, Zs., Pénzes, J., eds., Enhancing Competitiveness of V4 Historic Cities to Develop Tourism – Spatial-economic cohesion and competitiveness in the context of tourism. Debrecen: Didakt, pp. 101-113.*

KRAKOVER, S. (2013). Generation of a tourism product: Jewish heritage tourism in Spain. Enlightening Tourism. *A Pathmaking Journal*, 3, 2, 142-168.

KRAKOVER, S. (2017). A heritage site development model: Jewish heritage product formation in south-central Europe. *Journal of Heritage Tourism*, 12, 1, 81-101,

KROGMANN, A., NEMČÍKOVÁ, M., OREMUSOVÁ, D., AMBROSIO, V., MRÓZ, F. (2017). Religiozita a jej reflexia v cestovnnom ruchu na Slovensku. *Konštantínove listy*, 10, 2, 178-190.

LUZ, N., COLLINS-KREINER, N. (2015). Exploring Jewish Pilgrimage in Israel. In Albera, D., Eade, J., eds., *International Perspectives on Pilgrimage Studies: Itineraries, Gaps and Obstacles.* New York: Routledge, pp. 134-151.

LUZ, N. (2020). Pilgrimage and religious tourism in Islam. *Annals of Tourism Research*, 82, 102915.

MAKOWIECKA, N., HERBERT, J., ZEGLEN, P. (2015). Jewish trail in Lezajsk as a route accompanying to chasid trail (Podkarpackie Province). *Scientific Review of Physical Culture*, 5, 3, 63-70.

MARCHENKO, A. (2018). In the Eyes of Uman Pilgrims: A Vision of Place and Its Inhabitants. *Contemporary Jewry*, 38, 2, 227-247.

MCGETTIGAN, F. (2003). An Analysis of Cultural Tourism and its Relationship with Religious Sites. In Fernandes, C., McGettigan, C.F., Edwards, J., eds., *Religious Tourism and Pilgrimage*. Fatima: Tourism Board of Léria, pp. 13-26.

MCKELVIE, J. (2005). Religious tourism. *Travel & Tourism Analyst*, 4., 1-47.

NAVAJAS-ROMERO, V., HERNÁNDEZ-ROJAS, R. D., HIDALGO-FERNÁNDEZ, A., & JIMBER DEL RIO, J. A. (2020). Tourist loyalty and mosque tourism: The case of the Mosque-Cathedral in Córdoba (Spain). *Plos one*, 15(12), e0242866.

NOMPUMELELO, L. (2020). The potential of African religious pilgrimages as a tool for tourism development in Kwazuli-Natal, South Africa. *GeoJournal of Tourism and Geosites*, 33, 4, 1501-1506.

OLSEN, D.H., TIMOTHY, D.J. (2006). Tourism and religious journey. In Timothy, D.J., Olsen, D.h., eds., *Tourism, Religion and Spiritual Journeys.* New York – London: Routledge, pp. 1-21.

PASTERNÁK, T., VERBA, V. (2018). Pilgrimage sites in Slovakia as the base for the formation of ecomuseums: Case study of L'utina pilgrimage site. Geographica Pannonica, 22, 2, 139-149.

RINSCHEDE, G. (1992) Forms of religious tourism. *Annals of Tourism Research*, 19, 51-67.

SÁNCHEZ, V. L., FERNÁNDEZ, M.D., LARA, J.Á.S. (2017). Economic impact of a religious and tourist event: A Holy Week celebration. *Tourism Economics*, 23, 6, 1255-1274.

ŠVEDOVÁ, M. (2018). Židovské cintoríny vo vybranych mestách severovychodného Slovenska a ich vyznam pre turizmus. *Mladá Veda*, 6, 4, 24-47.

SULYOK, J., MÁRTONNÉ MÁTHÉ, K. (2014). A vallási turizmus helyzete Magyarországon. *Turizmus Bulletin,* 16, 1, 11-20.

TALBOT, A.M. (2002). Pilgrimage to healing shrines: the evidence of miracle accounts. *Dumbarton Oaks Papers*, 56, 153-173.

THURNELL-READ, T-P. (2009). Engaging Auschwitz: An analysis of young travellers' experiences of Holocaust tourism. *Journal of Tourism Consumption and Practice*, 1, 1, 26–52.

TŐZSÉR, A. (2020). An examination of the Csíksomlyó shrine based on the tourist life cycle curve. *GeoJournal of Tourism and Geosites*, 32, 4, 1304-1309.

VARGA, M. (2011). A vallási turizmus jelenléte ma Magyarországon. *Keresztény szó*, 22, 12, 16-21.

ZAMMIT, V. (2020). Jewish tourism to Malta: a nostalgic pilgrimage?. *International Journal of Religious Tourism and Pilgrimage*, 8, 6, 39-47.

ZELENÁK, I. (1990). Adatok a tokaji zsidók történetéhez. In Bencsik, J., Szakál, J., eds., *Tokaj és Hegyalja II.* Miskolc: Zempléni Múzeumok Baráti Köre, pp. 89–94.

THE SOCIO-ECONOMIC TRANSFORMATIONS OF MUNICIPALITIES IN LODZ METROPOLITAN AREA IN THE CONTEXT OF THE CONSTRUCTION OF MOTORWAYS AND EXPRESSWAYS

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Abstract

As part of the programmes for the construction of national roads in Poland in the years 2004–2014, several transport investments have been made in Lodz Metropolitan Area (LMA), that significantly improved the potential availability of the municipalities located in it. The commissioning of subsequent sections of the A1, A2 motorways and S14 and S8 expressways that primarily serve transit purposes, coincided with the progressing suburbanisation processes of the municipalities located in the immediate vicinity of the largest cities of the LMA. The aim of this paper is to identify those processes of socio-economic transformations in LMA municipalities, caused to the greatest extent by the construction and operation of motorways and expressways between 2004 and 2014. The study compared the municipalities that obtained better access to motorways and expressways with other LMA municipalities. The data obtained from the Local Data Bank of the Central Statistical Office were used for the analysis. Studies have confirmed the indirect effects of motorways on population redistribution and labour market growth. This mitigated the effects of the 2008 economic crisis in the urbanising and rural communes adjacent to the motorway. It was also found that accessibility to motorway and expressway junctions can affect the location of large industrial logistics and warehousing companies in particular. This influence may precede the very process of commissioning the motorway or expressway.

Key words

Motorways, expressways, metropolitan area, suburbanisation, enterprise structure changes.

INTRODUCTION

It is widely believed that the construction of motorways and expressways positively affects economic growth and regional development, serves to equalise interregional disparities and contributes to the increase of transport accessibility to the labour market (Potrykowski and Taylor, 1982; Hanson and Giuliano, 2004; Komornicki et al. 2015). These investments thus affect the functional and spatial trans-

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formation of the surrounding area. Meanwhile, empirical research suggests that this impact is not unequivocal (Komornicki et al. 2015) and depends, inter alia, on the extent to which the investment in transport infrastructure improves the transport accessibility of the entire transport system, the availability of land for development, spatial policy at the local level, economic development at the regional level, the scale of research and other economic and social processes, influencing the spatial development of the area adjacent to the investment and time of research (Giuliano, 2017, GREEN PAPER, 1992; Koźlak, 2011). Due to the dynamically occurring processes of spatial, social, demographic and economic suburbanisation, suburban zones of large cities require special attention in terms of the impact of new road investments on socio-economic changes (Komornicki et al. 2015).

One of the largest beneficiaries of the construction of the motorway and expressway network in Poland was the Lodz Metropolitan Area (LMA), where between 2004–2014, the length of roads with the highest parameters grew steadily. In the LMA, successive sections of expressways and motorways were commissioned in 2006, 2012 and 2014. At the end of the analysed period, earthworks related to the construction of the A1 motorway were underway in the study area. This motorway was supposed to connect the expressways opened for use in the southern part with the A2 motorway located in the northern part, thus eliminating the bottlenecks of the supra-regional road transport network (Fig. 1).
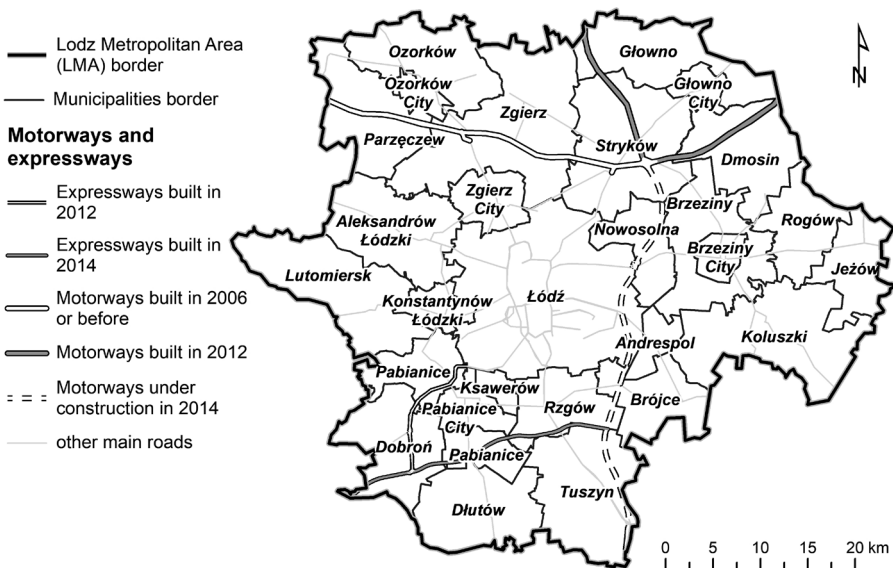

Fig. 1
Communication location of the Lodz Metropolitan Area (MLA) as of 2014
Source: adapted from General Directorate for National Roads and Highways

Taking into consideration the years 2004–2014, it was possible to capture the transformations caused both by the effects of road construction, as well as their operation. Research shows that an eight-year period from the construction of an investment is sufficient to capture changes in employment and business activity, which may imply spatial changes visible in the area, while at the same time it is short enough to avoid some of the problems related to the dynamic nature of the phenomenon, e.g., the influence of other factors such as subsequent investments, changing local economic or political conditions (Louw et al. 2013). Similar temporal assumptions, but for the ten-year period from the commencement of motorway construction were adopted by Komornicki et al. (2013), Banister and Berechman (2003) in their research to capture short- and mid-term changes.

The Lodz Metropolitan Area (LMA) is in line with the delimitation applied in the Development Strategy for the Lodz Region 2020 (Strategia 2012) and consists of 28 municipalities, including 7 urban municipalities, 5 urban-rural ones and 16 rural ones.

Its central part is Łódź with a population 774,000 in 2004 and 706,000 in 2014 respectively. Like all metropolitan areas in Poland, it is subjected to spontaneous spatial urbanisation processes but, unlike others, it was experiencing a population decline. This decline resulted from the fact that the total decrease in the number of people resulting from natural movement and migration in Łódź was not compensated by the increase in the number of inhabitants in suburban areas (Jakóbczyk-Gryszkiewicz et al. 2010).

OBJECTIVES

The aim of this paper is to identify processes of socio-economic transformations in LMA municipalities, caused by the construction and operation of motorways and expressways between 2004 and 2014. The implementation of this task required answering the following research questions:

- Has the construction of expressways and motorways changed the population density and the migration of LMA municipalities?
- Has the construction of expressways and motorways affected the social structure in individual municipalities in the LMA?
- Has the construction of expressways and motorways contributed to changes in the number, size and industry structure of enterprises in individual LMA municipalities?

The research period covers the years 2004–2014.

THEORETICAL FRAMEWORK

The first publications that started paying attention to the spatial and social consequences of the construction and functioning of motorways appeared at the end of the 1950s (e.g. Hansen, 1959). In subsequent years, referring to the economic effects of construction and operation of highways, attention was paid to the return on investment, its impact on growth and economic development on a local, regional and national scale, as well as its impact on the functional and spatial structure, entrepreneurship, real estate market and investment traffic (see Banister and Berechman, 2003; Rosik and Szuster, 2008; Koźlak, 2012; Pawłowska, 2013; Śleszyński, 2015; Kasraian et al. 2016; Giuliano, 2017). Research on the impact of highways on the spatial development of metropolitan areas was of particular interest (Boarnet and Chalermpong, 2001).

Research to date shows that there is a relationship between the construction of highways and the migration of population from the city centre to the peripheries adjacent to the motorway (e.g., Kasraian et al. 2016). Demographic changes, however, vary spatially depending on spatial development and the level of transport accessibility of a given area existing before the construction of the road (Axhausen, 2008; Funderburg et al. 2010; Kasraian et al. 2016). The size of the settlement unit and the completeness of the investment are also significant (see Kim and Han, 2016). Garcia Lopez (2012), based on census lists noted that spatial urbanisation occurs the fastest in metropolitan areas with low population density, directly adjacent to the nodes.

Numerous empirical studies, though not all, confirm the positive impact of highway construction on the labour market (Kasraian et al. 2016). Undoubtedly, this is due to the easier access to the employee market at the regional level (Giuliano et al. 2011). However, some investments may only lead to a redistribution of workplaces from central areas to places with better intra-regional and local accessibility and they do not contribute to the creation of many new jobs (Stephanedes, 1990). Such redistribution may play an important role in counteracting unemployment (Bruinsma et al. 1989, Viturka et al., 2012).

The relationship between road investments and employment growth may also depend on the scale of research and the nature of the spatial unit under study (Funderburg et al. 2010). Some research showed that the impact was positive and led to an increased number of jobs only in urban units, while in the case of rural areas there was no clear increase in employment (Iacono and Levinson, 2012) or even its declines were registered (Funderburg et al. 2010). The others states that the construction of a highway to stimulate employment growth is only meaningful in the smallest municipalities. Larger municipalities have a certain critical mass of previously existing jobs, which will attract further entrepreneurship even without the presence of the highway (Padeiro, 2013).

In Polish conditions, a smaller than expected effect of demand effects of road infrastructure investments on economic growth was observed (Komornicki et al. 2013). Infrastructural investments did not significantly contribute to the activation of the local community, nor have they led to significant development of service enterprises in the municipalities through which the investment runs (Komornicki et al. 2015). On the other hand, however, the construction of motorways and expressways has contributed to a significant improvement in the population's access to voivodship labour markets. The greatest one was noted in Upper Silesia and in the Łódź Voivodeship (Komornicki et al. 2013).

One of the basic features analysed in the context of the impact of highways on regional development is entrepreneurship. The surveys carried out in the Netherlands in the mid-1990s proved the importance of the highway (Bruinsma et al. 1997). They also showed that some companies may move their headquarters closer to the highway, reducing the average distance to the nearest node (Bruinsma et al. 1997, Martin et. al., 2010). The highway itself did not affect the decision to relocate the company. However, if the company's authorities decided to change its headquarters or create a new facility, then the availability of the highway was considered when choosing the location (Bruinsma et al. 1997).

As a general it was noticed that industrial and service areas tend to locate in places with the best transport accessibility at the regional level, i.e., in the closest vicinity of the nodes (Antrop, 2000, Villarroya and Puig, 2012, Filčák et al. 2021). Proximity of highway junctions is also particularly attractive for transport and storage services, trade and repair of motor vehicles and other services related to passenger service - e.g., hotel and catering facilities (Polyzos et al. 2008, Ziobrowski, and Korecki 2009). The surroundings of inner-city nodes are intensely built-up. Nodes on the edges of cities are characterised by larger open areas. Their level of development depends on the spatial policy of local authorities and the distance between the node and the city (Ziobrowski and Korecki 2009, Komornicki et al. 2015, Filčák et. Al. 2021).

To date, studies carried out in Poland have shown that expressways and motorways did not affect redistributive processes within the surrounding municipalities (Komornicki et al. 2015). Logistics industry in Poland was one of the largest beneficiaries of improving transport accessibility. Enterprises of this type were clearly visible and focused mainly on metropolitan centres and the largest highway junctions in Poland (Komornicki et al. 2013; Komornicki et al. 2015). It was also found that the strength of a highway's impact depends on its course in relation to metropolitan cities. When the motorway is too far from the city border, its impact is similar to the national road running parallel to it Komornicki et al. (2015). Research has also proven that, although the lack of adequate transport infrastructure can slow down or even stop economic development, the development of transport

infrastructure is not a sufficient factor for sustainable growth and economic development (Ważna, 2013).

As noted by Burnewicz (2013), Poland still experiences a lack of thorough empirical research showing relations between transport and the economy. This article is meant to partially complete the knowledge in this area.

DATA AND METHODS

The Lodz Metropolitan Area (LMA) discussed in the paper was specified in the document entitled The National Spatial Development Concept 2030 (KPZK, 2012), in which voivodship centres with population over 300,000 in the core were adopted as metropolitan areas. Therefore, it is not a metropolitan area according to the criteria adopted for the purposes of spatial development research under the ESPON project - e.g. Spatial dynamics and strategic planning in metropolitan areas (SPIMA, 2017).

This research was performed based on data collected by the Central Statistical Office (CSO) and made available through the Local Data Bank (Table 1).

Table 1 Data used in the study.

Name	Years	Aggregation level	Comments
Population	2004-2014	Municipality	Change in the compilation of balance of population between 2009 and 2010
Net migration per 1000 population	2004-2014	Municipality	Change in the compilation of balance of population between 2009 and 2010
Share of registered unemployed persons in the population	2004-2014	Municipality	Conversion of index since 2010 based on census 2011
Entities by size classes per 10,000 population at working age	2004-2014	Municipality	Methodological changes in 2014
Average monthly gross wages and salaries	2004-2014	Powiat	-

In the case of indices based on population, attention should be paid to the quality of source data. The change of the method for calculating the population balance by the CSO in 2010 slightly affects all underlying indices and may lead to an apparent sudden difference in values between 2009 and 2010. Another concern affecting the results of the analysis may be the method, used to estimate the population permanently residing in the municipality. The measure in the in-

ter-census period relies mainly on vital statistics and migration of the population. Any change of residence should be recorded in a registration book. This obligation, in turn, is often not fulfilled in Poland, which may lead to an overestimation of population in peripheral municipalities, and to its underestimation in suburban ones (see Śleszyński, 2011). As no other data on population from the inter-census periods are available in such a detail, a general direction of changes in the analysed characteristics is analysed, it may be assumed that the discussed problems do not significantly affect the final conclusions regarding the analysed variables.

Some attention should also be paid to the data on entities of the national economy. CSO statistics based on National Business Registry Number (REGON) data take into account the address of the registered office of the company, not the actual place of business. This may lead to an overestimation of the actual number of enterprises, especially in case of the smallest businesses employing up to 9 people. This needs to be considered when interpreting the results of the analysis.

Based on a distance of geometric centres of individual municipalities to the nearest motorway junction or expressway junction enabling connection with local routes, the examined municipalities were divided into four groups: A, B, C, D (Table 2). This distance was calculated based on a transport network built in ArcGIS using the shortest distance principle. The road layer from OpenStreetMap was used to build the network.

Table 2 Groups of municipalities according to the accessibility of expressways and motorways as well as functional structure of municipality

Groups	1 (urban)	2 (urbanising)	3 (rural)
A	Zgierz City, Ozorków City, Głowno City	Zgierz, Stryków	Ozorków, Parzęczew
B	Pabianice City, Konstantynów Łódzki	Brójce, Dłutów, Dobroń, Ksawerów, Pabianice, Rzgów, Tuszyn	
C	Brzeziny City , Aleksandrów Łódzki	Andrespol, Nowosolna, Lutomiersk, Brzeziny, Dmosin, Rogów, Koluszki	Głowno, Jeżów
D	Łódź		

The group A included units at a distance of up to 15 km from nodes commissioned in 2006. The group B included municipalities not included in the group A, located up to 15 km from the motorway or expressway node opened in 2012–2014. The group C included the remaining administrative units of the studied area apart from Łódź. Łódź, as the metropolis and largest city, was assigned separately to the group D. Therefore, this division also considers the different lifetime of the motorways and highways in the LMA. The distance of 15 km was chosen based on the assumption that with an average speed of moving around 60 km/h in suburban

areas, most of the municipality's area should be able to reach the node within 15 minutes.

Data included in individual groups were considered separately depending on the type of functional structure of municipalities (Bański, 2010). This approach makes it possible to identify and compare administrative units with a similar socio-economic structure. To simplify the analysis and increase the number of municipalities which could belong to the same class, urbanised municipalities were combined with multifunctional transitional ones (2) and overwhelmingly agricultural municipalities with units with predominantly agricultural functions (3).

As Aleksandrów Łódzki comprises a town with a population exceeding 20,000, which cannot be distinguished in part of statistics, and is characterised by a high degree of spatial urbanization, a decision was made to place it in the group with urban municipalities. This way, a total of 10 subgroups were distinguished (Table 2).

The work uses cross tables, analysis of the average rate of change, cartograms, and clock diagrams. To assess changes in remuneration, the pace of change ratio was used, which is expressed by the formula:

where:
$$z_g = \sqrt[n-1]{\prod_{i=2}^{n} \frac{Z_i}{Z_{i-1}}}$$

Z_i – value of characteristic in unit of time i (Jażdżewska 2013). The formula made it possible to capture the average year-on-year change in wages during the period under review.

RESULTS

In the years 2004-2014, the area under study was subject to demographic and spatial suburbanisation processes typical of metropolitan areas (see Wójcik, 2008; Jakóbczyk-Gryszkiewicz et al. 2010; Burchard-Dziubińska et al. 2014). In Lodz Metropolitan Area (LMA) municipalities in 2004-2014 the largest depopulation processes occurred in cities, towns and in rural municipalities located peripherally in relation to Łódź (Fig. 2). On the other hand, population increases were observed mainly in urbanizing municipalities directly adjacent to the largest cities in the analysed area, i.e., Łódź, Pabianice and Zgierz.

At the end of 2014, LMA was inhabited by 1.09 million people. The studied unit was characterised by a high level of spatial urbanisation. The share of the population living in the cities of LMA amounted to 87%.
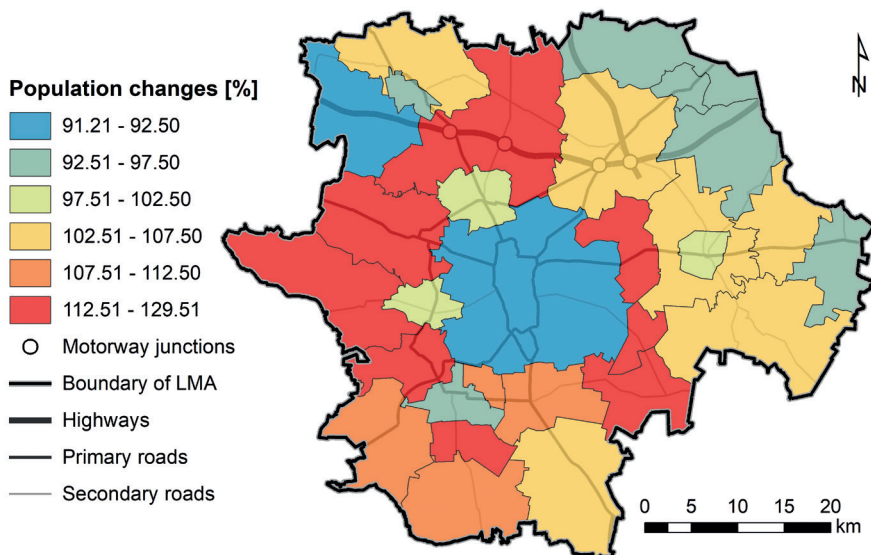
Fig. 2
Population changes in LMA municipalities in the years 2004-2014

With regard to the construction of expressways and motorways, it seems extremely interesting to analyse migratory movements in the groups of LMA municipalities under study (Fig. 3). Łódź and cities from group A were usually, especially after 2010 characterised by a negative net migration per 1,000 population, while the adjacent urbanizing ones experienced high positive balance. It can be assumed that some part of the population moved to the suburban areas of the cities they previously inhabited. These migrations, however, did not take place evenly in the urbanising municipalities. Slightly higher values of positive net migration were observed in groups A2, B2, compared to units more distant from motorways and expressways in group C2. This may suggest that these roads may have contributed somewhat to the redistribution of the population as Baum Snow showed (2007), by increasing the transport accessibility of these municipalities at the supra-regional and regional level.

For rural municipalities belonging to groups A3 and C3, no relationship could be identified between the distance to the motorway or expressway and the net migration. This is mainly due to the lack of internal homogeneity of entities in those groups. In group A3, for example, Ozorków municipality was characterised by a stable positive net migration oscillating between 5-15 per 1,000 population, while this value in Parzęczew municipality fluctuated between -45 and 9 persons. These changes in Parzęczew were largely due to the downsizing of the military unit
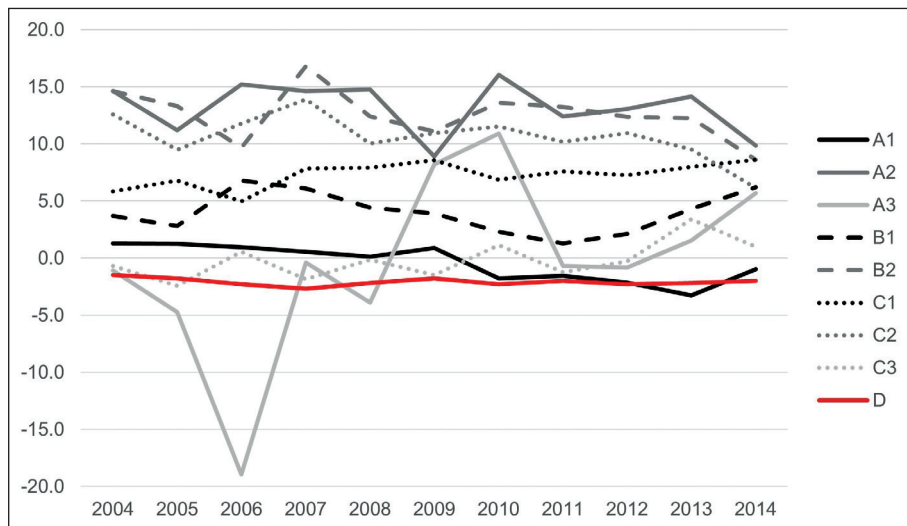
Fig. 3
Net migration per 1,000 population (averaged) in individual subgroups of LMA
municipalities in the years 2004-2014

in 2006 and the sale of housing units by Military Property Agency, in subsequent years. The obtained data did not give grounds either for averaging the results per group or for searching for relations between the impact of motorways and expressways and changes in the migration balance.

One economic factor that could have diversified under the influence of improved transport accessibility in LMA municipalities was the variability in average monthly gross wages and salaries. In the years 2004-2014, all LMA counties experienced an increase in the average monthly gross wages with the highest increase recorded in the Zgierz county (where the pace of changes amounted to 5.81%). In the case of the Zgierz county, the increase in earnings in 2006-2008 was comparable only to the metropolitan city – Łódź. This period coincided with the commissioning of the Stryków-Konin section on the A2 motorway and the good economic situation conducive to the development of new investments. The increase in the number of new investments near the motorway with declining labour resources could have contributed to the proportionally higher salary increases (Table 3). Similar relationships were not observed after the remaining sections of motorways and expressways were put into service.

It seems that the motorway could have influenced the registered unemployment rate in urbanized and rural LMA municipalities located in the vicinity of the A2 motorway (Fig. 4).

Table 3 The average dynamics of changes in mean monthly gross wages and salaries in individual subgroups of LMA municipalities in 2004-2014

County name	Average wage growth rate
East Lodz county	5.12
Pabianice county	5.24
Zgierz county	5.81
Brzeziny county	4.78
Łódź city county	5.28
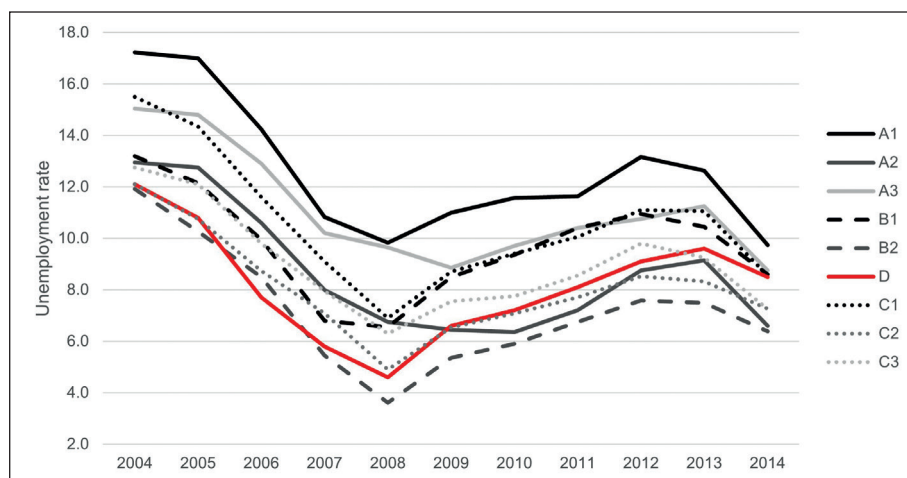
Fig. 4
Unemployment rate (averaged) in individual subgroups of LMA
municipalities in the years 2004-2014

The deteriorating economic situation in 2008-2010 led to an increase in unemployment in all municipalities. In the analysed urbanizing and rural municipalities situated in the vicinity of the A2 motorway commissioned in 2006 (from the A2 and A3 groups), the increase was smaller and shifted in time, i.e., it did not occur as in other units already in 2008. In the case of urban municipalities, no impact of the motorway on the decline in unemployment (groups A1, B1, C1, D) was observed. The commissioning of the A2 motorway could, therefore, reduce the consequences of the economic slowdown among small municipalities located near the motorway (from groups A2 and A3), characterised by lower population density in two ways. Firstly, thanks to motorways, their residents had easier access to neighbouring labour markets, and secondly, they contributed to the creation of new jobs in the vicinity of the motorway. These results are consistent with previous studies conducted, among others, by Kasraian et al. (2016). Without in-depth studies covering

other metropolises, through which a motorway or expressway ran before 2008, it is impossible to infer whether such impact was local or noticeable in other metropolitan areas of Poland.

In economic terms, the analysis of the impact of the construction of motorways and expressways on the number, size and industry structure of enterprises in individual subgroups of LMA municipalities in the years 2004-2014 leads to interesting conclusions. For cities belonging to the group A, whose transport accessibility improved in 2006, the economic slowdown was particularly hard. The situation in Głowno and Ozorków, where the number of registered enterprises dropped significantly between 2008 and 2009, disproportionately to other LMA municipalities, was particularly negative (Fig. 5).
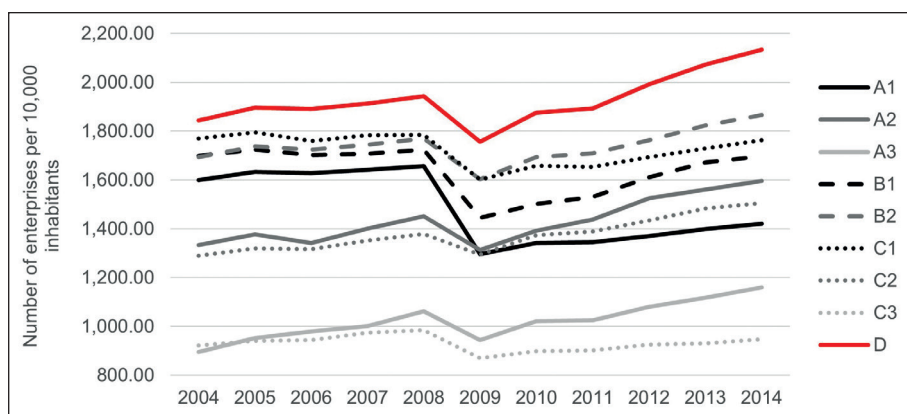
Fig. 5
Number of enterprises per 10,000 inhabitants in the analysed municipalities as compared to LMA municipalities in 2004-2014

Apart from Łódź the largest number of enterprises per 10,000 population at working age in 2004-2014 were registered in urbanized municipalities of the B2 group in which some units like Ksawerów, Rzgów, Tuszyn specialised in the manufacture and distribution of textile products. Marketplaces located in Rzgów and Tuszyn were among the largest clothing distribution centres in Poland. The urbanising communes in groups A2 and B2 were characterised by a higher increase in the number of enterprises per 10,000 inhabitants as compared to group C2. However, this is not a sufficient premise to conclude that better accessibility to motorway and expressway junctions already built or under construction may be a factor stimulating location of new enterprises.

It should be also noted that rural municipalities located near the motorway opened in 2006 (group A3) were characterised by faster growth of entrepreneurship in comparison to other rural municipalities in LMA (Fig. 5). However, they did

not contribute to a significant dissipation of economic activity at the expense of central areas, which was mentioned, among others, by Stephanedes (1990). In terms of entrepreneurship, the studies therefore coincide with the results of the evaluation of the impact of motorways and expressways on the socio-economic development of Poland developed by the Komornicki et al. (2013).

Taking into consideration the size structure of enterprises located in particular groups of LMA municipalities, it can be noted that in 2004 and 2014, micro and small enterprises employing up to 9 people dominated in the LMA, constituting, depending on the municipality, from 93.3% to 95.41% of all registered economic activities (Table 4). Calculated per 10,000 inhabitants, they were, like enterprises with 10-49 employees, mainly concentrated in urban and urbanizing municipalities (from groups A1, A2, B1, B2, C1, C2, D1).

Table 4 The number of enterprises per 10,000 population at working age of a municipality by the size of employment in individual groups of LMA municipalities in 2004 and 2014

Municipality group and type	Size of employment [people]							
	0-9		10-49		50-249		above 250	
Year	2004	2014	2004	2014	2004	2014	2004	2014
A1	1,523.8	1,348.9	61.3	56.3	13.1	15.1	1.4	0.9
A2	1,251.9	1,519.1	75.2	63.3	4.9	10.7	1.3	2.6
A3	833.5	1,102.4	56.7	52.6	4.1	3.9	1.5	0.0
B1	1,610.3	1,609.8	71.6	67.4	15.0	17.9	1.7	1.2
B2	1,595.8	1,765.7	87.2	87.0	9.5	12.0	1.3	0.0
C1	1,683.8	1,680.9	74.1	72.5	9.8	8.6	0.9	0.9
C2	1,218.0	1,440.8	64.7	58.3	5.7	5.9	0.2	0.3
C3	872.7	917.3	42.5	26.9	5.7	2.4	0.0	0.0
D	1,748.5	2,033.1	77.3	82.2	15.0	15.2	2.8	2.9

In 2004, enterprises employing more than 50 persons prevailed in Łódź and in cities of groups A1 and B1, although in the case of the largest enterprises their values varied within the group (for example, in group B1, Pabianice had 2.4, whereas Konstantynów Łódzki had 0.9 enterprises per 10,000 population at working age). The largest companies employing over 250 employees, in turn were located mainly in cities (groups A1, B1, C2, D1). Significant internal variation in the number of enterprises employing over 250 persons per 1000 population at working age was observed in municipalities with urbanizing and rural functions. For instance, in the A2 group, no such company existed in Zgierz municipality, while in Stryków tree such companies were present. One of them, Corning Optical Communications

Poland decided to move near Stryków when deciding to relocate the company. At that time, the design works on the construction of the A2 motorway were already underway.

Another important aspect of economic transformations are changes in the size structure of enterprises (Fig. 6).

Considering them dynamically, new micro and small enterprises were located primarily in Łódź (group D1), in rural municipalities located adjacent to the A2 motorway commissioned for use in 2006 (group A3). Major changes also took place in urbanising municipalities located both in the immediate vicinity of the motorway existing since 2006 (A2) and beyond (C2). While in all municipalities from the group A2 the increases exceeded 150 entities per 10,000 inhabitants at working age, the C2 group was much more diverse, with values ranging from -37.4 for Koluszki to 813.5 for Nowosolna, a municipality undergoing heavy urbanisation process.
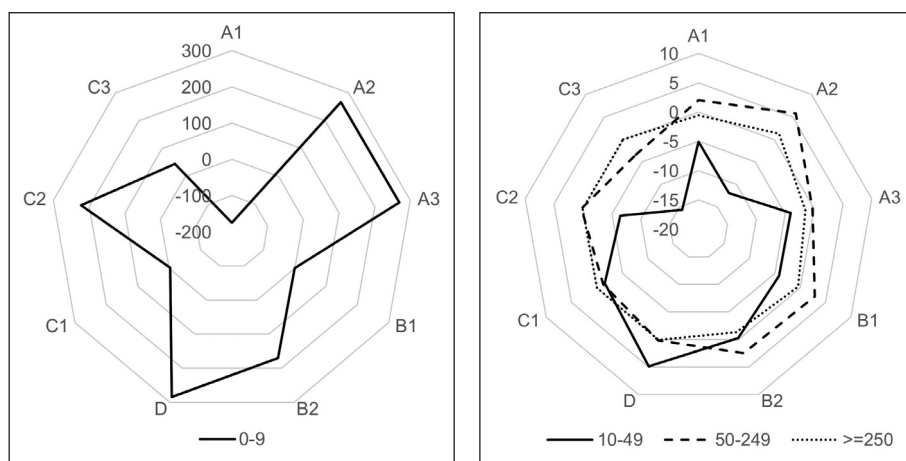
Fig. 6
The number of enterprises per 10,000 inhabitants of a municipality by the size of employment in individual groups of LMA municipalities in 2004-2014

Apart from Łódź, which performs metropolitan functions, the cities generally lost the number of micro and small enterprises, while their greatest increases were observed in municipalities already strongly urbanised, such as Nowosolna, Rzgów, or in areas with improving transport accessibility in connection with the construction of motorways and expressways, such as Zgierz, Parzęczew, Dłutów. The commissioning of new motorways and expressways could, therefore, locally imply an increase in the number of small enterprises. The factor that could have

influenced the growth of micro and small enterprises in the discussed group of municipalities could be the relocation of companies associated with the change of residence of their owners. However, without social research, this thesis cannot be confirmed with certainty.

Despite the higher increase in the number of large companies per 10,000 population at working age in cities from groups A1 and B1, it cannot be said that it is due to the impact of motorways and expressways put into use. In each of the groups, the cities had completely different characteristics. Despite high average values, group B2 was also heterogeneous. On the one hand, high increases in the number of enterprises were found in the communes of Brójce, Rzgów and Dobroń; on the other hand, the number of such businesses decreased in the communes of Tuszyn and Pabianice. It seems that a longer time of influence of the motorways might have contributed to a slightly higher and stable increase in the number of enterprises located in urbanising municipalities, situated in the vicinity of the earliest completed motorways (A2 group). Similar relationships were observed for the increase in the number of enterprises employing 250 persons and more, per 10,000 inhabitants. In the case of the municipality of Stryków, the development of its logistic and industrial functions has been the subject of many scientific studies (e.g. Bartosiewicz and Wiśniewski, 2009). Their authors drew their attention to, inter alia, location benefits, which resulted from a convenient transport location. Owing to it, in the analysed period, this municipality became one of the most important logistics centres in Poland (Bartosiewicz and Pielesiak, 2014, Burchard-Dziubińska et al. 2014).

Verification of the motorways and expressway's impact on the industry structure of enterprises was based on sections of the Classification of Business Activities in Poland PKD 2007 (CBA) in accordance with the *Nomenclature statistique des Activités économiques dans la Communauté Europenne* (NACE). Only private enterprises were considered and calculated per 10,000 inhabitants at working age. In order to better present the data, sections of CBA were aggregated into the following groups: forestry and fishery (section A), industry (sections B, C, D, E), construction (section F), wholesale and retail (section G), transport and warehouse management services (section H), specialised services and business services (sections I, J, K, L, M, N) and other services (sections O, P, Q, R, S, T, U).

In 2009-2014, the largest number of new enterprises was created in the financial and business services sector, as well as in wholesale and retail trade, along with the repair of vehicles and motorcycles (Fig. 7).

As can be seen in the chart above almost all groups recorded a decrease in the number of agricultural, forestry and fishing enterprises per 10,000 population of working age, with the greatest impact on rural municipalities (A3 and C3). In the case of units located near the A2 motorway, it may have resulted from the
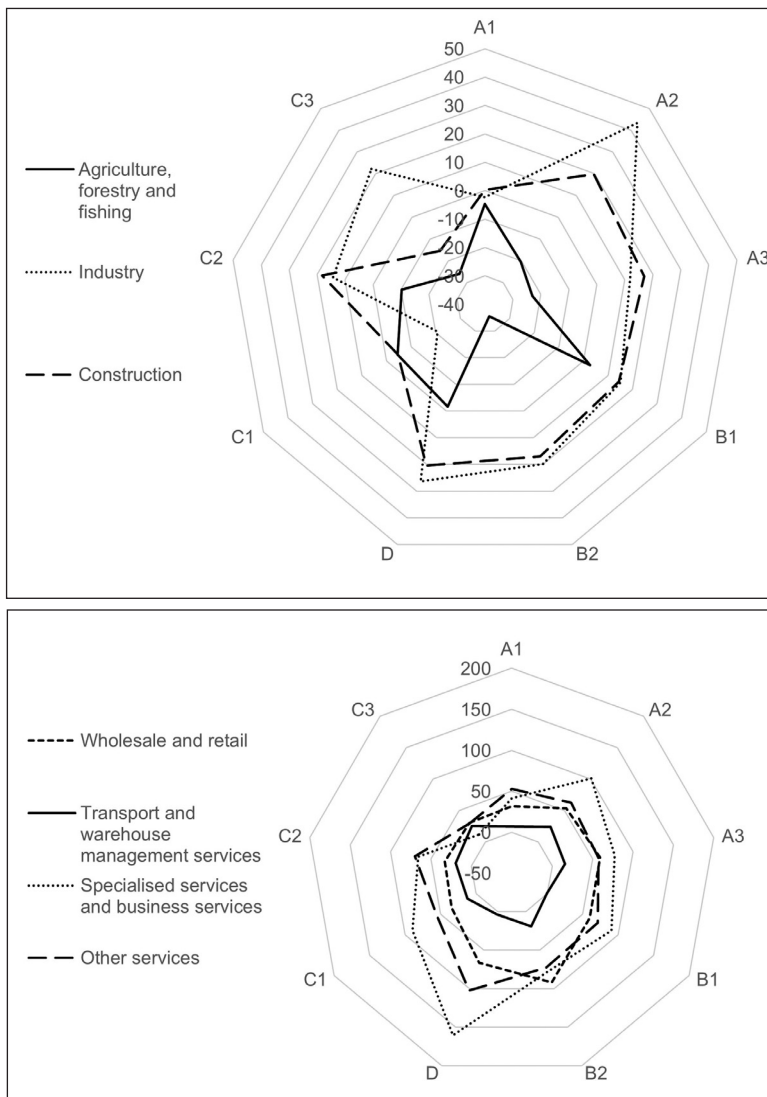
Fig. 7
The change in the industry structure of enterprises per 10,000 inhabitants according
to the groups of accessibility to the highway in LMA municipalities in 2009-2014

increased attractiveness of rural areas more distant from the metropolitan core,
due to their improved transport accessibility at the supra-regional level. The same
factor may explain the higher decrease in the number of agricultural, forestry and
fishing enterprises per 10,000 people of working age in urbanising municipalities
located near the commissioned motorways and expressways (A2, B2) compared

to peripherally located municipalities. As far as Głowno is concerned (group C3), it could additionally be a consequence of the A1 motorway running through the municipality, put into service in 2012.

In the case of rural and urbanizing municipalities, a significant increase in the intensity of industrial companies in group A2, C2 and C3 was observed. Based on the subject literature (see Tesařova and Halounová 2006; Martin et al. 2010), it can be assumed that spatial accessibility is also primarily important for space-intensive companies, such as industrial enterprises that require additional good transport accessibility on regional and national level. An increase in the number of area-intensive industrial enterprises in the vicinity of motorway interchanges was visible in all A2 municipalities, while in the case of the C2 municipalities, it occurred mainly in Nowosolna and Koluszki. Since a motorway interchange had been planned in Nowosolna municipality for many years, and the A1 motorway itself was nearing completion in 2014, location decisions of enterprises could have been taken before the motorway itself was put into use. In the case of the Koluszki commune it is difficult to find a correlation between the construction of motorways, expressways and the location of enterprises. The same groups of communes, together with the communes in group B2 were characterized by a slightly higher increase in the number of enterprises dealing with transport and storage, however value for A2 group did not differ significantly from other rural and urbanizing municipalities in the LMA.

Taking into consideration construction industry, the increase in the number of construction companies could, in turn, have been endogenous and resulted from the growth of construction traffic at the local level. Thus, these companies could have responded to local needs related to the construction or renovation of homes or enterprises.

Research on changes in the industry structure of enterprises also showed that in rural municipalities located adjacent to the A2 highway (group A2) the number of companies related to professional services-grew rapidly and only the city of Łódź had higher growth figures for this type of business.

This knowledge, however, does not give grounds to state the impact of motorways and expressways on the development of new companies dealing with services. Lower results for municipalities from groups B2 or C2 resulted only from a much greater diversity of values in those groups. On the other hand, in each group there were municipalities characterized by similar amounts of increase in the number of specialised companies as in the case of Zgierz municipality from the A2 group. Similar conclusions can be drawn from the analysis of the growth of the number of trade services per 10,000 population at working age.

CONCLUSIONS AND DISCUSSION

Responding to the objectives of this article, it was found that:

1. The changes in the demographic structure in the municipalities of ŁOM in the years 2004-2014 were mainly due to the ongoing suburbanisation processes affecting almost all towns in ŁOM, including Łódź. Slightly higher values of the migration balance in the case of urbanizing municipalities located near motorways and expressways may suggest a slight influence of transport investments on the redistribution of population within the LMA, which is consistent with the observations of Baum Snow (2007). However, based on the available data for the period under review, it is difficult to determine the strength of this impact. The data do not provide possibility to capture significant changes in the development of residential areas especially for municipalities in the B group. Time lag between deciding to change the place to live and moving into a newly built house **may last at least two years.** Also, many people do not register at their place of residence for many years after moving. Thus, indices based on population, like migration balance may be significantly underestimated, especially in suburban areas (see Śleszyński, 2011).

2. The average rate of wage growth observed in the Zgierz county could have resulted from the construction of the A2 motorway, whose commissioning coincided with the good economic situation on the global market. This may be proved by a high decrease in unemployment and a large increase in investments in rural and urban-rural LMA municipalities located near the motorway in 2006-2008. The availability of labour resources is, however, one of many factors affecting wages. For example, a worse economic situation on the market could have resulted in the lack of effects of wage increase in municipalities whose transport accessibility improved in 2012-2014. In-depth research is needed to identify the transport accessibility factor in shaping wages in Poland.

3. Data on the unemployment rate in 2004-2014 suggest that the increase in transport accessibility to the labour market resulting from the construction of the A2 motorway in the years 2004-2006 at the regional level could have contributed to the local weakening of the economic slowdown in neighbouring rural and urban-rural municipalities. These results are in line with research by Bruinsma et al. (1989), who suggested that highways can play an important role in counteracting unemployment. In the case of the analysed area of the LMA, a similar impact was not observed for rural municipalities.

4. An analysis of the change in the number of enterprises in the analysed LMA municipalities in 2004-2014 does not allow to clearly answer the question whether the motorway or expressway contributed to the increase/decrease in the number of enterprises. These studies partly overlap with the results of the evaluation of the impact of motorways and expressways on the socio-eco-

nomic development of Poland developed by Komornicki et al. (2013). A slightly faster change in the number of enterprises among urbanizing and rural municipalities located in the vicinity of the motorways and expressways commissioned for use till 2014 may suggest that they had an impact on the growth of entrepreneurship. However, the growth rate in the number of companies in the discussed rural and urbanizing municipalities was not so clear that it could be attributed to the influence of completed motorways and expressways. Especially that some municipalities were subject to the rapid process of spatial urbanisation. It was also not observed that the construction of highways significantly contributed to the dispersion of economic activity at the expense of central areas, which was suggested, among others, by Stephanedes (1990).

5. Research on changes in the size structure of enterprises in LMA municipalities has shown that in 2004-2014, the A2 motorway could locally imply an increase in the number of small enterprises. The factor that could have influenced the growth of micro and small enterprises in the discussed group of municipalities could be the relocation of companies associated with the change of residence of their owners. However, without social research, this thesis cannot be confirmed with certainty.

In the case of medium-sized, large enterprises, this impact of motorways appears to be more direct, as reflected in the more even and slightly higher growth in the number of enterprises per 10000 people of working age. In 2004, most of industries that employed over 250 people were located either in cities or in the urban-rural municipality of Stryków, characterised by improved transport accessibility since 2006. In the case of Stryków some companies admitted that when deciding on the relocation of a branch, the distance to motorway had been considered, which confirms the conclusions of Bruinsma et al. (1997). In that case, decisions were taken at the preparatory stage of the highway construction. Considering this case, it seems that the road construction project itself is sufficient for the development changes to take place (see Banister and Berechman 2003; Giuliano 2017). In 2004-2014, a further concentration of large and very large enterprises employing more than 50 people was observed above all in the Stryków municipalities, thus contributing to the creation of one of the largest logistics centres in Poland in this municipality (see Bartosiewicz and Wiśniewski 2009; Bartosiewicz and Pielesiak 2014; Burchard-Dziubińska et al. 2014). Large companies were also often located in the cities with good transport accessibility since 2006 and in rural municipalities located near expressways and motorways built in 2012-2014.

6. The presence of highways and expressways affected the industry structure of enterprises in the LMA municipalities in 2009-2014. A clear impact of highways was noted in the case of investments in industry, less in transport and warehouse management services. An increase in their number per 10,000 popula-

tion at working age was observed in urbanizing municipalities located both in the vicinity of the A2 motorway completed in 2006 and expressways and motorways commissioned between 2012-2014. In the case of municipalities in the group C2, a much greater heterogeneity in number of industry, transport and warehouse management services per 10,000 population at working age was found. The very high values of indicators for the sectors discussed in Nowosolna municipality (C3) suggest that in places with very good transit accessibility at the local level, and planned access to roads at the intraregional level, the development of enterprises is ahead of the process of commissioning motorways and expressways itself. These results are in line with evaluation studies carried out by Komornicki et al. (2013). They are also congruent with the global study of developmental changes around highways and expressways (e.g. Antrop 2000; Polyzos et al. 2008; Villarroya and Puig 2012).

This paper does not fully exhaust the problem in question. The classification of units based on the functional type of the municipality following Bański (2010) did not work well in the case of the analysis of the impact of motorways and expressways on changes in the number of service enterprises, especially those related to trade and specialist services. The specific groups featured too much internal variation of the examined characteristics. This fact, combined with the quality of data (e.g. uncertainty as to whether the declared address of a service is also the place of its provision or perhaps only the place of residence of its owner), made it impossible to draw correct conclusions. In addition to the research directions outlined in the summary, there is still a lack in Polish literature of studies conducted at the local level that would lead to a more rational spatial policy. These studies should primarily take into account the impact of motorways and expressways on functional and spatial transformations within municipalities, changes in mobility of residents and local changes in property price.

REFERENCES

ANTROP, M. (2000). Changing pattern in the urbanized countryside of Western Europe. *Landscape Ecology*, 15, 3, 257–270.

AXHAUSEN, K. (2008). Accessibility Long Term Perspectives. *Journal of Transport and Land Use*, 1, 2, 5–22.

BANISTER, D., BERECHMAN, J. (2003). *Transport Investment and Economic Development.* London: Routledge.

BAŃSKI, J. (2010). Współczesne typologie obszarów wiejskich w Polsce – przegląd podejść metodologicznych. *Przegląd Geograficzny*, 86, 4, 441-470.

BARTOSIEWICZ, B., PIELESIAK, I. (2014). Dzienna mobilność mieszkańców małych miast łódzkiego obszaru metropolitalnego. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 367, 21–29.

BARTOSIEWICZ, B., WIŚNIEWSKI, S. (2009). Przemiany małego miasta i jego otoczenia a rozwój centrów logistycznych - przykład miasta i gminy Strykowa. In Bartosiewicz, B., Marszał, T., ed., *Przemiany przestrzeni i potencjału małych miast w wybranych regionach Polski z perspektywy 20 lat transformacji*. Łódź: Wanito UŁ, pp. 93-118.

BAUM-SNOW, N. (2007). Did highways cause suburbanization? *Quarterly Journal of Economics*, 122, 2, 775–805.

BOARNET, M. G., CHALERMPONG, S. (2001). New highways, house prices, and urban development: A case study of toll roads in orange county, Ca. *Housing Policy Debate*, 12, 3, 575-605. https://doi.org/10.1080/10511482.2001.9521419.

BOARNET, M. G., HAUGHWOUT, A. F. (2000). *Do highways matter? Evidence and policy implications of highways' influence on metropolitan development*. A Discussion Paper Prepared for The Brookings Institution Center on Urban and Metropolitan Policy. Retrieved from https://www.brookings.edu/wp-content/uploads/2016/06/boarnet.pdf. Accessed on 26 July 2018.

BRUINSMA, F. R., RIENSTRA, S. A., RIETVELD, P. (1997). Economic Impacts of the Construction of a Transport Corridor: A Multi-level and Multiapproach Case Study for the Construction of the A1 Highway in the Netherlands. *Regional Studies*, 31, 4, 391–402. https://doi.org/10.1080/00343409750132991.

BRUINSMA, F., NIJKAMP, P., RIETVELD, P. (1989). *Employment Impacts of Infrastructure Investments. A Case Study for the Netherland. Amsterdam*: Vrije Universiteit, Faculteit der Economische Wetenschappen en Econometrie.

BURCHARD-DZIUBIŃSKA, M., BARTOSIEWICZ, B., NAPIERAŁA, T., JAESCHKE, A., KANIEWICZ, S., KONCZAK, S., MIKOŁAJEWSKI, W, RZEŃCA, A., WŁODARCZYK, J., WOJCIECHOWSKI, E. (2014). *Strategia Rozwoju Łódzkiego Obszaru Metropolitalnego 2020+. Diagnoza społeczna*. Łódź: Polskie Towarzystwo Ekonomiczne Oddział w Łodzi.

FILČÁK, R., ROCHOVSKÁ, A., KORŇÁK, M. (2021). Evaluation of Slovakia's R1 expressway enhancement impacts on local socio-economic development: expert panel approach. *Geografie*, 126, 1, 29–53. https://doi.org/10.37040/geografie2021126010029.

FUNDERBURG, R. G., NIXON, H., BOARNET, M. G., & FERGUSON, G. (2010). New highways and land use change: Results from a quasi-experimental research de-

sign. *Transportation Research Part A: Policy and Practice*, 44, 2, 76–98. https://doi.org/10.1016/j.tra.2009.11.003.

GARCIA-LÓPEZ, M.-À. (2012). Urban spatial structure, suburbanization and transportation in Barcelona. Journal of Urban Economics, 72(2), 176-190. https://doi.org/10.1016/j.jue.2012.05.003.

GIULIANO, G., REDFEARN, C., AGARWAL, A., HE, S. (2011). Network Accessibility and Employment Centres. *Urban Studies*, 49, 1, 77-95. https://doi.org/10.1177/0042098011411948.

GIULIANO, G. (2017). Land Use Impacts on Transportation Investments: Highway and Transit. In Giuliano, G., Hanson, S., ed., *The Geography of Urban Transportation*. New York: The Guilford Press.

GREEN PAPER. (1992). *Green Paper on the Impact of Transport on the Environment. A Community Strategy for "Sustainable Mobility"*. COM, 92, 46 final, pp. 25-26.

HANSEN, W. G. (1959). How Accessibility Shapes Land Use. *Journal of the American Institute of Planners*, 25, 2, 73–76. https://doi.org/10.1080/01944365908978307.

HANSON, S., GIULIANO, G. (2004). *The Geography of Urban Transportation*, Third Edition. New York: The Guilford Press.

HOLVAD, T., PRESTON, J. (2005). Road Transport Investment Projects and Additional Economic Benefits. *In 45th Congress of the European Regional Science Association: Land Use and Water Management in a Sustainable Network Society, 23-27 August 2005.* Amsterdam: The Netherlands.

IACONO, M., & LEVINSON, D. (2012). *Rural Highway Expansion and Economic Development: Impacts on Private Earnings and Employment*. Retrieved from http://conservancy.umn.edu/handle/11299/179816. Accessed on 26 July 2018.

JAKÓBCZYK-GRYSZKIEWICZ, J., MARCIŃCZAK, S., SIEJKOWSKA, A. (2010). *Dynamika i skutki procesów urbanizacji w regionach miejskich po 1990 roku na przykładzie regionu miejskiego Łodzi*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

JAŻDŻEWSKA, I. (2013). *Statystyka dla geografów*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

KASRAIAN, D., MAAT, K., STEAD, D., VAN WEE, B. (2016). Long-term impacts of transport infrastructure networks on land-use change: an international review of empirical studies. *Transport Reviews, 36*, 6, 772-792. https://doi.org/10.1080/01441647.2016.1168887.

KIM, J. Y., HAN, J. H. (2016). Straw effects of new highway construction on local population and employment growth. *Habitat International, 53*, 123-132. https://doi.org/10.1016/j.habitatint.2015.11.009.

KOMORNICKI, T., ROSIK, P., ŚLESZYŃSKI, P., SOLON, J., WIŚNIEWSKI, R., STĘPNIAK, M., CZAPIEWSKI, K., GOLISZEK, S. (2013). *Wpływ budowy autostrad i dróg ekspresowych na rozwój społeczno-gospodarczy i terytorialny Polski*. Warszawa: Ministerstwo Rozwoju Regionalnego.

KOMORNICKI, T., WIŚNIEWSKI, R., BARANOWSKI, J., BŁAŻEJCZYK, K., DEGÓRSKI, M., GOLISZEK, S., ROSIK, P., SOLON, J., STĘPNIAK, M., ZAWISKA, I. (2015). Wpływ wybranych korytarzy drogowych na środowisko przyrodnicze i rozwój społeczno--ekonomiczny obszarów przyległych. *Prace Geograficzne*, 249.

KOŹLAK, A. (2011). Transport w teoriach rozwoju regionalnego. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 166*, 349–360.

KOŹLAK, A. (2012). Transport jako czynnik rozwoju regionalnego. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 244*, 425–434.

KPZK. (2012). *Koncepcja Przestrzennego Zagospodarowania Kraju 2030*. Ministerstwo Rozwoju Regionalnego. M.P. 2012, poz. 252.

LOUW, E., LEIJTEN, M., MEIJERS, E. (2013). Changes subsequent to infrastructure investments: Forecasts, expectations and ex-post situation. *Transport Policy, 29*, 107-117. https://doi.org/10.1016/j.tranpol.2013.04.012.

MARTIN, J. C., GARCÍA-PALOMARES, J. C., GUTIERREZ, J., ROMÁN, C. (2010). Efficiency and equity of orbital motorways in Madrid. *The Journal of Transport and Land Use, 3*, 1. https://doi.org/10.5198/jtlu.v3i1.106.

PADEIRO, M. (2013). Transport infrastructures and employment growth in the Paris metropolitan margins. *Journal of Transport Geography, 31*, 44-53. https://doi.org/10.1016/j.jtrangeo.2013.05.007.

PAWŁOWSKA, B. (2013). *Zrównoważony rozwój transportu na tle współczesnych procesów społeczno-gospodarczyc*h. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego.

POLYZOS, S., SDROLIAS, L., KOUTSERIS, E. (2008). Enterprises' locational decisions and interregional highways: an empiric investigation in Greece. *Acta Geographica Slovenica, 48*, 1, 147–168.

POTRYKOWSKI, M., & TAYLOR, Z. (1982). *Geografia transportu : zarys problemów, modeli i metod badawczych*. Warszawa: Państwowe Wydawnictwo Naukowe.

ROSIK, P., SZUSTER, M. (2008). *Rozbudowa infrastruktury transportowej a gospodarka regionów*. Poznań: Wydawnictwo Politechniki Poznańskiej.

SACRA. (2005). *SACRA: Transport and the Economy*. Full Report. London.

ŚLESZYŃSKI, P. (2011). Oszacowanie rzeczywistej liczby ludności gmin województwa mazowieckiego z wykorzystaniem danych GUS. *Studia Demograficzne, 160*, 2, 35–57.

ŚLESZYŃSKI, P. (2015). Wpływ rozbudowy infrastruktury drogowej finansowanej ze środków unijnych na procesy osadniczo-urbanizacyjne (2004-2012). In Bilska-Wodecka, E., Sołjan, I., ed., *Geografia na przestrzeni wieków. Tradycja i współczesność. Profesorowi Antoniemu Jackowskiemu w 80. rocznicę urodzin*. Kraków: IGiGP UJ.

SPIMA. (2017). SPIMA: Spatial dynamics and strategic planning in metropolitan areas. ESPON.

STEPHANEDES, Y. (1990). Distributional effects of state highway investment on local and regional development Transportation and Economic Development, *Transportation Research Records*, 1274, 156-164.

STRATEGIA. (2012). *Strategia Rozwoju Województwa Łódzkiego 2020*. Łódzkie.

TESAŘOVA, V., HALOUNOVÁ, L. (2006). The study of land cover changes development influenced by the highway construction. In Braun, M., Ed., *Second Workshop of the EARSeL SIG on remote sensing of land use & land cover, „Application and Development",* Bonn: Universität Bonn, pp. 379–384.

VILLARROYA, A., PUIG, J. (2012). Urban and industrial land-use changes alongside motorways within the Pyrenean area of Navarre, Spain. *Environmental Engineering and Management Journal, 11*, 5, 1213–1220.

VITURKA, M., PAŘIL, P., TONEV, P. (2012). Hodnocení účelnosti projektů výstavby dopravní infrastruktury. Případová studie dálnic a rychlostních silnic České republiky. *Urbanismus a územní rozvoj*, 15, 2, 28–34.

WAŻNA, A. (2013). Relacje między inwestycjami infrastrukturalnymi w transporcie a innymi czynnikami determinującymi poziom konkurencyjności regionu. In Bąk, M., ed., *Infrastruktura transportu a konkurencyjność gospodarcza*. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego, pp. 91-106.

WÓJCIK, M. (2008). *Przemiany społeczno-gospodarcze wsi aglomeracji łódzkiej w okresie transformacji ustrojowej*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

ZIOBROWSKI, Z., KORECKI, D. (2009). Planowanie przestrzenne i formy zagospodarowania terenów w sąsiedztwie węzłów autostradowych ze szczególnym uwzględnieniem autostrady Kraków-Tarnów. In Kozioł, L., ed., *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie*, 2, Tarnów: MWSE.

SUBURBANIZATION, BUT CENTRALIZATION? MIGRATION PATTERNS IN THE POST-SOVIET FUNCTIONAL URBAN REGION – EVIDENCE FROM KYIV

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Abstract

Despite being one of the most influential paradigms of urban studies, the stages of urban development model have been criticised for inability to describe and explain the urban evolution in specific economic, social and political conditions. In particular this refers to the post-socialist world. This paper presents the study of migration patterns in Kyiv functional urban region (KFUR) using the stages urban development model and the alternative approach by Sýkora and Posová (2011) derived from the original model. In this way, the paper intends to evaluate the existing methodology and to make the comparative assessment of the results. The results show that both approaches may be used for classifying urban regions in terms of growth/decline and centralization/decentralization. At the same time, they have limited potential to predict the future development of the post-Soviet urban regions. Despite the presence of common trends, revealed migration patterns in the KFUR substantially differ from the patterns of urban evolution in the post-socialist countries of the Central Europe due to specific social, economic and political conditions in the post-Soviet space.

Key words

Migration pattern, post-Soviet functional urban region, stages of urban development, Kyiv, Ukraine.

INTRODUCTION

Starting from the 1990s, theories and models explaining the urban development (in particular, urban life cycle theory and, respectively, stages of urban development) have been tested through the lens of the post-socialist contexts and cases. Once stages of urban development are perceived as a model, the theory should re-

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flect the regions and conditions under which the models were developed (e.g. democracy, market economy). The situation in post-socialist countries differed a lot from these circumstances, mainly at the early phase of post-socialist transformation. Thus, it was expected that the considered models may be not so effective in explaining and predicting the urban development in (post)transition societies comparing with the western world.

The existing body of literature gives evidence that urban development in the post-socialist world not always can be clearly described and explained by the original urban life cycle theory (e.g. Sýkora and Posová, 2011; Novotný, 2012). The main reason for this is the specifics of the migration patterns in the conditions of the socialist political regime collapse and the transition from the state-led economy to the market. The analysis of successes and failures of the urban life cycle theory has brought valuable insights about both the theory itself and the specificity of urban development in different contexts. However, there are few researches focused on the post-Soviet countries, which differ to the post-socialist countries outside the former Soviet Union in certain aspects (Borén and Gentile, 2007; Brade et al., 2010; Stanilov and Sýkora, 2014). Testing theories of urban evolution in post-Soviet countries is valuable in order to check their adequacy in different social, economic and political conditions. This task is even more important since the adoption of the city life cycle idea has had consequences not only for the science but also for the cities and their inhabitants which became the targets of policies influenced by the idea (Roberts, 1991).

Contemporary development of urban regions in Ukraine have already been in the focus of research (e.g., Denysenko, 2010; Mezentsev and Mezentseva, 2012; Denysenko and Pidhrushnyi, 2013; Mezentsev and Kliuiko, 2015; Manshylina, 2015). However, at the moment, few contributions consider the urban development in Ukraine directly from the standpoint of the urban life cycle theories. In particular, Mezentsev and Havryliuk (2015) tested the differential urbanization model in Ukraine for the period 1840-2014; Gnatiuk (2017) apparently identified stages of urban evolution for largest Ukrainian cities, but focused predominantly on suburbanization process; Malchykova and Pylypenko (2017) tested the stages of urban development model for Kherson, but with extremely narrow time frame and ambiguous results.

Therefore, the purpose of this article is to test the stages of urban development model in post-Soviet conditions for Kyiv functional urban region (as the largest and most dynamic in Ukraine), to evaluate, in this manner, the explanatory and predictive power of the model and underlying theory, and to expand knowledge on the urban evolution in the post-Soviet countries in the broader context of post-socialist urban development.

THEORETICAL FRAMEWORK

There are several models explaining the growth and shrinkage of urban regions generally known as stages of urban development (SUD). These models (hereinafter referenced simply as a SUD model, unless otherwise specified) constituted one of the most influential paradigms of urban studies in the 1980s and 1990s (Ouřed-níček, 2005). Despite re-evaluation and criticism, they retain their importance and explanatory power with certain reservations until today. The common feature of the SUD models is definition of the consecutive stages of urban development determined by the relationship between the pattern of population change in the entire functional urban region and its structural parts: urban core (main city) and ring (suburbia or hinterland).

The earliest approach elaborated by Hall and Hay (1980) and Klaassen and Scimeni (1981), later modified by Cheshire and Hay (1989) and Cheshire (1995) under the influence of urban life cycle model, distinguished between 6 (or 8) types of urban development in terms of centralization/decentralization based on absolute or relative demographic growth/decline in the urban core and ring. The second approach, proposed by van den Berg et al. (1982), classified 4 subsequent stages of urban development (urbanization, suburbanization, desurbanization, reurbanization) and 8 phases based on absolute or relative centralization/decentralization. The model predicts the cyclical course of the stages, and therefore become known also as a model of urban life cycle. The underlining theory argues that the processes that occur in urban environment are the outcomes of the behaviour of three groups of urban actors: enterprises, households and public authorities (Leetmaa, 2008).

Osada (2003), inspired by Hall and Hay (1980), van den Berg et al. (1982), Cheshire and Hay (1989) and Cheshire (1995) proposed an integrated model that combines the types of urban development in terms of absolute or relative centralization/decentralization and the consequent stages of urban development: urbanization, suburbanization, desurbanization, reurbanization (Table 1).

In the 1980-1990s, the SUD model was tested in urban regions in different economic, social and political conditions. On the one hand, it was shown that urban regions may be classified according to the model-predicted stages, and move between them. However, even the founders of the model pointed at some its deficiencies. In particular, real functional urban regions rarely passed all four stages of the urban life cycle in the model-predicted sequence (van den Berg et al., 1982; Vartianen, 1989; Nyström, 1991; Sjöberg, 1992; van den Berg, 1999; Champion, 2001; Ouředníček, 2000; Klusáček et al., 2009; Sýkora and Posová, 2011; Wolff, 2017). The empirical evidence supports the acceptability of the model for industrial cities, but it appears to be less valuable for administrative and service centres (Cheshire and Hay, 1989; Cheshire, 1995). The economic, social, cultural, political,

Table 1 The urban development stages according to the SUD model

Hall / Hay / Cheshire		van den Berg		Population change			
				Core	Ring	Total	
Stage 1	LC-A	Stage 1	Reurbanization (I)	–	–	–	-ΔC<-ΔR
Stage 2	LC-B	Stage 2	Reurbanization (II)	+	–	–	
Stage 3	AC	Stage 3	Urbanization (I)	+	–	+	
Stage 4	RC	Stage 4	Urbanization (II)	+	+	+	ΔC>ΔR
Stage 5	RD	Stage 5	Suburbanization (I)	+	+	+	ΔR>ΔC
Stage 6	AD	Stage 6	Suburbanization (II)	–	+	+	
Stage 7	LD-A	Stage 7	Desurbanization (I)	–	+	–	
Stage 8	LD-B	Stage 8	Desurbanization (II)	–	–	–	-ΔR<-ΔC

LC-A, centralization during regional decline in population (A); LC-B, centralization during regional decline in population (B); AC, absolute centralization; RC, relative centralization; RD, relative decentralization; AD, absolute decentralization; LD-A, decentralization during regional decline in population (A); LD-B, decentralization during regional decline in population (B).

Source: *Osada (2003)*.

etc. forces influencing urban development substantially vary from place to place, making difficult to either explain or predict urban development (Zakirova, 2010). Seemingly the same urban forms can be shaped by completely different principles, and conversely, the same principles can lead to different forms of settlement in different social contexts, including geographical areas and historical periods (Sýkora and Posová, 2011). The qualitative migration characteristics appear to be important in evaluating particular stages or processes of urban development (Halliday and Coombes, 1995; Ford, 1999; Fisher, 2003; Lindgren, 2003; Hirt, 2007). Therefore, in the recent decades, urbanization, suburbanization, desurbanization and reurbanization are often considered as the processes (which may occur simultaneously) or simply tools for classification of urban regions rather than consequent stages of urban development (Roberts, 1991; Ouředníček 2005; Sýkora and Posová, 2011).

Furthermore, the choice of an indicator (e.g. change of population, change of housing, or migration) is a primary factor that may influence the overall classification results (Lisowski, 2005; Sýkora and Posová, 2011; Novotný, 2012). In particular, the model based on the overall population growth/decline cannot be correctly applied for urban regions in the condition of overall population shrinkage, including the majority of urban regions in post-socialist countries (Nuissl and Rink, 2005; Leetmaa et al., 2014). This methodological deficiency can be solved by the use of net migration rate as a key indicator (Novotný, 2012). Moreover, migration reacts to economic, political and social changes much faster than the birth rate (Drewett and Rossi, 1981). Also, the delimitation of functional urban regions is no less impor-

tant to make the results adequate and comparable (Lisowski, 2005); the commonly used approaches make it impossible to see what is happening in middle-sized or small towns (Nyström, 1991).

The other debatable matter is the use of absolute and relative indicators in the SUD model. The use of absolute values would reflect the size imbalance between core and ring rather than the relative significance of the change in each zone (Drewett and Rossi, 1981). The original authors of the urban life cycle theory allow the use of both types of data (van den Berg et al., 1982). However, in certain specific situations the original model produced different outcomes in the classification of stages of urban development depending on whether absolute or relative data were used (Sýkora and Posová, 2011). Consequently, Matznetter (2004), facing certain problems while working with relative data, described the SUD model as suitable for pedagogical purposes because of its simplicity, but nevertheless problematic for use in empirical analysis. Moreover, based on empirical findings in the analysis of Prague and Vienna urban regions, Sýkora and Posová (2011) showed that the model may work incorrect with relative data, and concluded that the model itself is constructed in a problematic way, which leads to contradicting and misleading results. Instead, they suggested (cf. Posová and Sýkora, 2011) an alternative method of classifying forms of urbanization using the combination of growth or decline of an entire urban region and the centralization or decentralization within an urban region, distinguishing between urbanization, suburbanization, desurbanization and reurbanization (Table 2):

Table 2 Forms of urbanization according to Sýkora and Posová (2011)

Process	Centralization (growing share of the core)	Decentralization (growing share of the ring)
Growth of the FUR	urbanization	suburbanization
Decline of the FUR	reurbanization	desurbanization

The initial comparative study, testing the SUD model, included some cities in socialist world (Hungary, Yugoslavia, Poland, and Bulgaria), and despite the overall prevalence of centralization compared to the Western Europe, found some decentralization processes occurring there also (Van den Berg et al., 1982). Numerous studies brought evidence that in many cities in Central and Eastern Europe, strong centralization trends were substituted with suburbanisation starting from the 1990s in the post-socialist countries (e.g. Sýkora and Čermák 1998; Kok and Kovács 1999; Brown and Schafft, 2002; Ouředníček 2005, 2007; Hirt 2007; Sýkora and Novák, 2007; Raźniak and Winiarczyk-Raźniak, 2013; Stanilov and Hirt, 2014; Sýkora and Mulíček, 2014; Kovács and Tosics, 2014; Gałka and Warych-Juras, 2018) and

from the 1990s-2000s in post-Soviet countries like Estonia, Latvia, Russia, Belarus and Ukraine (Kostinskiy 2001; Leetmaa and Tammaru, 2007; Leetmaa, 2008; Brade et al. 2010; Krisjane and Berzins, 2012; Mezentsev et al., 2012; Mezentsev et al., 2014; Brade et al. 2014; Nefedova et al., 2016; Mezentsev and Mezentseva 2017; Gnatiuk 2018). Although such a shift is predicted by the SUD model, the underlying mechanism of suburban growth in post-socialist cities is different from classical Western suburbanization (e.g. Hirt 2007; Leetmaa, 2008). A stage of reurbanization, which has been considered as hypothetical in the 1980s, has been proven for many European cities (Cheshire 1995; Herfert 2007; Kabisch and Haase, 2011), although problematic issues related to the complex understanding of reurbanization were outlined by Glatter and Siedhoff (2008). In recent decades, the SUD model itself have been tested for a limited number of post-socialist cities, including Prague (Klusáček et al., 2009; Sýkora and Posová, 2011), Bratislava (Novotný, 2012) and other functional urban regions of Slovakia (Bezák, 1999), Kherson in Ukraine (Malchykova and Pylypenko, 2017). Apart from the aforementioned methodological weaknesses of the original SUD model (Sýkora and Posová, 2011), these researches showed that it cannot correctly predict the trajectories of FURs between the stages and phases of development since it does not include local (national) economic, political and social context neither external factors influencing urban development (Novotný, 2012). The pace of stage change can be rapid and the changes themselves uncertain (Malchykova and Pylypenko, 2017). Therefore, the model is considered to be hardly applicable for predicting the further urban development, but it is a suitable tool for categorization of the regions into the clearly defined stages and phases of the urban development (Sýkora and Posová, 2011; Novotný, 2012).

DATA AND METHODS

In this article, two methodological approaches are tested. The first one is the SUD model in the interpretation by Osada (2003), which allows distinguishing consequent stages (urbanization, suburbanization, desurbanization, and reurbanization) and phases (in terms of absolute or relative centralization/decentralization) of urban development. The second one is alternative method of classifying forms of urbanization (Sýkora and Posová, 2011; Posová and Sýkora, 2011), which uses combination of growth or decline of an entire urban region and the centralization or decentralization within an urban region, distinguishing between urbanization, suburbanization, desurbanization and reurbanization, and considering them as units for classification rather than sequential stages.

Both models are working with a functional urban region (FUR), often referenced also as a functional urban area (FUA). In our case, the Kyiv functional urban region (KFUR) includes the city of Kyiv (core) and its hinterland (ring). The delimita-

tion of the FUR is one of the key methodological issues for testing the SUD model in real world. The OECD defines the hinterland as all municipalities with at least 15% of their employed residents working in a certain urban core (OECD, 2013). However, beyond the developed world, the scarcity of respective data creates a huge problem for application of such an approach. Possible alternatives include gravity approach (Vries et al., 2009; Goh et al., 2012; Persyn and Torfs, 2015; Ahlfeldt and Wendland, 2016) and radiation model (Simini et al., 2012; Masucci et al., 2013), or the concept of accessibility, including time limits to access the central city and road availability (Gajovic, 2013; Rodrigues da Silva et al., 2014; Guérois et al., 2014; Meijers et al., 2015; Moisés Obaco et al., 2017).

Reliable official statistics on commuting in Ukraine is absent. At the same time, in the conditions of post-Soviet transformations (increasing number of private cars, diversifying ways of commuting, simplified accounting of employees at enterprises, etc.), it is problematic to adequately estimate the number of suburban residents working in Kyiv. Manshylina (2015) outlined the limits of Kyiv suburban area based on the (1) public transport accessibility, (2) indicators of functions (production, service, and housing), and (3) stability of connections with the central city. Kyiv suburban area, according to this methodology, includes 9 administrative districts and 7 cities of regional significance within the Kyiv oblast (in Ukraine, oblasts are the first-order administrative units, while districts and cities of regional significance are the second-order administrative units). This delimitation generally coincides with the 1.5-hour isochrones of public transport accessibility from Kyiv, and with the limits of Kyiv suburban area according to the Draft General Plan of Kyiv and its Suburban Zone until 2025 (Department for Architecture and Planning, 2015). However, in our opinion, taking into account exclusively public transport unjustifiably narrows the limits of Kyiv ring; Manshylina (2015) herself considers the 2.0-hour isochrones by public transport as a limit of Kyiv metropolitan region. Therefore, we decided to expand the limits of Kyiv ring using 1.5-hour isochrones of motor vehicle accessibility from Kyiv, since a lot of commuters use private cars for accessing the central city. According to this criterion, the KFUR includes 16 administrative districts and 11 cities of regional significance of Kyiv oblast, 3 administrative districts and 1 city of regional significance of Zhytomyr oblast and 1 administrative district of Chernihiv oblast (district was included into the KFUR if more than a half of its population is living within the 1.5-hour isochrones) (Fig. 1). In these limits, population of the KFUR, core and ring in 2002 was 4 314 421, 2 611 327, and 1 703 085 registered inhabitants, and in 2020 – 4 649 658, 2 967 360, and 1 682 298 registered inhabitants respectively.

We used a net migration rate per 1,000 inhabitants as a key indicator for the SUD model, because it allows to avoid the effect of the size imbalance between the structural components of the urban region and is suitable for the post-socialist
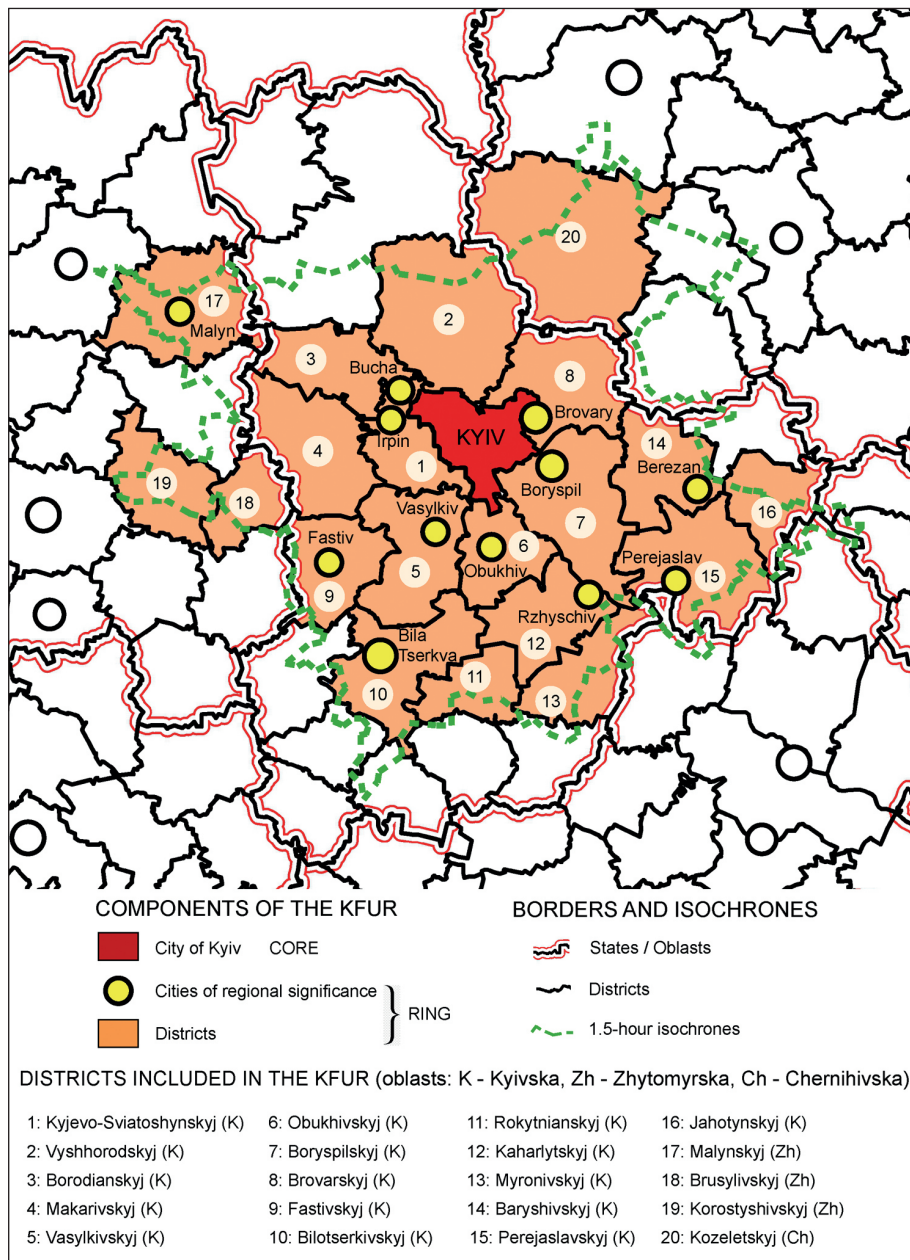
Fig. 1
Limits and spatial structure of the KFUR
Source: elaborated by the authors

context of the overall population shrinkage in the country (Sýkora and Posová, 2011; Novotný, 2012). It was calculated annually for the period of 2002-2019 for the KFUR and its components (core and ring):

Core: migration balance for Kyiv divided by the population of Kyiv in the middle of the respective year;

Ring: the sum of the migration balances of urban and rural settlements with the ring divided by the total population of the ring (calculated as a sum of populations of respective cities, townships and villages) in the middle of the respective year;

KFUR: the sum of the migration balances of Kyiv and urban and rural settlements within the ring, divided by the total population of the central city and ring.

For the alternative approach (Sýkora and Posová, 2011), average annual absolute numbers of population for the core, ring and KFUR in total were used to calculate the shares of the population in the core and the ring to the total population of the KFUR.

The data on the population and migration for the studied area in 2002-2020 were taken from the State Statistics Service of Ukraine. The available migration statistics includes annual numbers of arrivals and departures per districts and cities of regional significance, as well as separate cities, townships, and the remainder of rural areas. The available statistics does not distinguish between the internal and international migration flows. Although the impact of international migration on urban development in Ukraine is not negligible, we suppose its recorded volume to be too low to impact general trends of urban development at regional level. It should be also remembered that internally displaced persons due to the Donbas military conflict and annexation of Crimea, which had not changed the official registration place, drop from the official statistics. When calculating net migration rates for 2002, data from the 2001 census were taken as an initial value and data of January 1, 2003 was taken as the final value for the calculation of the mid-year population.

RESULTS

Based on the net migration rates in 2002-2019 for the core, ring and the KFUR in general, we identified certain stages of urban development according to the SUD model (Osada, 2003). In 2002-2010, the KFUR was at the stage of urbanization (II) with its relative centralization: both core and ring were growing in terms of migration, but the core was growing faster than the ring () (Fig. 2, compare with Table. 1). However, starting from 2005, net migration rate in the core steadily decreased, while net migration rate in the ring slowly increased, creating background for the following change of stages.

Interesting stage fluctuations were observed after 2010. In 2011, ring started to slightly overwhelm the core and the KFUR in terms of migration growth (). Such a pattern corresponds to the suburbanization (I) stage with relative decentralization. However, the following period of 2012-2013 was marked by the next burst of the migration attractiveness of Kyiv (), causing increase in the migration attractiveness of the KFUR; the ring was also intensively growing, with smaller rates those of the KFUR and the core. According to the model, this pattern should be interpreted as the urbanization (II) stage with relative centralization of population.

Fig. 2
Net migration rates for KFUR and its components, 2002-2019
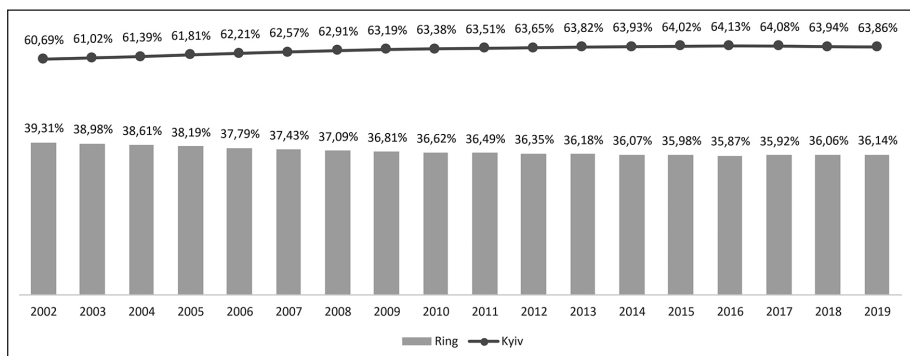*Source: State Statistics Service of Ukraine, own calculations*

Since 2014, net migration rate in the ring continuously overwhelms the net migration rate in the core (), both permanently been positive. At first, migration attractiveness of the ring only slightly surpassed that of the core. However, starting from 2016, net migration rate in ring showed very quick and significant growth, while net migration rate in the core, on the contrary, showed significant decline. According to the model, the period of 2014-2019 corresponds to suburbanization (I) stage with relative decentralization of population.

Taking into account the full sequence of patterns, we may suggest that the period of 2011-2013 is a proto-suburbanization stage with the transition from

relative centralization to relative decentralization, so-called inter-stage. Probably, the time frame of this inter-stage should be expanded to 2011-2015, since clear migration trends typical for the stage of suburbanization (I) are evident only starting from 2016.

Thus, we may suggest three urban development patterns in the KFUR: 1. Urbanization-II (2002-2010): Kyiv is the main destination for migrants (), although the ring is also growing; 2. Urbanization-II/Suburbanization-I or proto-suburbanization (2011-2013, possibly 2011-2016): Kyiv and the ring alternate as main destination for migrants (); 3. Suburbanization-I (2014-2019, possibly 2016-2019): ring is growing faster than Kyiv (), but both have positive values of the net migration rate.

Fig. 3
Shares of the core and ring population in the KFUR, 2002-2019
Source: State Statistics Service of Ukraine, own calculations

However, the results described above should be treated with caution, especially with regard to trends in population centralization / decentralization. Sýkora and Posová (2011) criticize the original SUD model for the use of population/migration growth rate in identifying (de)centralization patterns. Instead, they suggest using the relationship between the population of a core and a ring as a criterion of (de)centralization. According to their approach, development of the KFUR in 2002-2016 should be classified as urbanization. In particular, in 2014-2016 the share of the core in the population of the KFUR was growing () despite the more rapid migration growth of the ring (); the SUD model classified this pattern as suburbanization (I) stage (compare Table 1, Table 2 and Fig. 2, Fig. 3). Since 2017, the development of the KFUR is classified as a stage/form of suburbanization according to both the SUD model and the approach of Sýkora and Posová (2011): the share of the ring in the population of the KFUR begins to grow (), which means, according to the second approach, the transition to suburbanization form of urban development.

DISCUSSION

Unlike the post-socialist metropolises of the Central Europe, which experienced absolute decentralization in the 1990s – early 2000s (Lisowski, 2005; Sýkora and Posová, 2011; Novotný, 2012), in particular accelerated growth of the suburban areas (Pichler-Milanović, 2014; Kovács and Tosics, 2014; Sýkora and Mulícek, 2014; Stanilov and Hirt, 2014; Leetmaa et al., 2014), a stable centralization is observed in the KFUR until the beginning of 2010s. According to the available data, Kyiv retained positive values of the net migration not only for the period of 2003-2019 (on which this study is based), but also in the previous period of 1991-2001, except for 1994 and 1996, when the values were negative and zero, respectively. Unlike Prague and Bratislava, where in 1990s and early 2000s rings were growing in terms of migration together with the migration outflow from the cores (Sýkora and Posová, 2011; Novotný, 2012), migration attractiveness of the KFUR ring started to grow only in the second half of the 2000s, and a clear transition to the suburbanization stage/form is apparent only in the 2010s, i.e. with a 10-year delay. Thus, Kyiv may be treated as an intermediate case between the post-socialist capitals of the Central Europe, characterized by distinct decentralization pattern, and Moscow, where steady centralization persists despite the start of suburbanization process (Brade et al., 2010; Brade et al., 2014).

What are the reasons for these differences in the post-Soviet context? In our opinion, they should be attributed to the lower level of social welfare in the post-Soviet countries like Ukraine, including late and small-scale formation of the middle class. Middle class is a key actor of a classical western-type suburbanization driven by environmental motives. The slow rate of reforms in Ukraine largely defined the delay in the suburban growth comparing with the post-socialist countries of the Central Europe. The relocation of upper- and middle-class families from the core to the ring in the KFUR gained momentum only in the third decade of post-socialist transition, triggered by the national economic revival in the country in the beginning of 2000s (Mezentsev and Mezentseva, 2017). Thus, the stage of intensive mass suburbanization (Borén and Gentile, 2007) or so-called suburban boom (Stanilov and Sýkora, 2014) is only beginning to gain momentum around the large cities in Ukraine.

Also, in the early transition period, big cities in the post-Soviet space concentrated opportunities for economic activity and converted into engines of economic growth towering over the stagnating hinterlands (Golubchikov, 2004; Stanilov, 2007; Stanilov and Sýkora, 2014). Thus, strong centralization in the early and middle period of transition may be attributed to the centripetal migration to the central city from the hinterland, including outside the ring. However, since 2010, the demand for housing in the capital has even increased, but in Kyiv there has been an acute shortage of good land plots for development. In addition, housing

in the capital is not affordable for many people coming from the other regions, so they benefit from buying a relatively cheap apartment in the close suburbia near the urban edge. Developers and administrations of suburban settlements are also interested in the housing construction: the first benefit from the cheaper land plots and getting construction permits easier, the latter receive growing revenues to local budgets and infrastructure development (Olijnyk et al., 2019).

Based on the available statistics on the net migration rate in Kyiv in 1991-2001 and the visible start of residential urbanization in the Kyiv's suburbia in 2000s (Mezentsev and Kliuiko, 2015; Mezentsev and Mezentseva, 2017), the first post-socialist decade of the KFUR development most likely may be classified as a stage of urbanization (I). That means that during the last 3 decades the KFUR almost consequently passed the stages of urbanization (I) – urbanization (II) – suburbanization (I), in full accordance with the SUD model. However, this does not mean that the SUD model perfectly works in the case of the KFUR or in post-Soviet space in general. First, the initial urbanization stage was not the normal development stage but was conditioned by the peculiarities of post-Soviet economic and social conditions. Second, the shift to decentralization via accelerated suburban growth is explained not only by the centrifugal migration with environmental motives, by also the centripetal migration with economic motives. Third, the transition between the stages is not clear, e.g. a rather long period of trend fluctuation, so called inter-phase between the urbanization (II) and suburbanization (I) is observed in 2010s. Probably, Malchykova and Pylypenko (2017), writing about the rapidly changing trends for Kherson, observed similar inter-phase period.

And last, but not the least: the migration patterns in the KFUR are very sensitive to the ongoing changes in the political situation, legislation, etc. We are going to illustrate this thesis with certain examples. Transition to suburbanization (I) stage in 2013-2016 was very slow and ambiguous due to the political, economic and military crisis in Ukraine, when people were on a knife edge and therefore cautiously invested in residential estate. With a relative improvement in 2017, in particular de-escalation of the Donbas military conflict, suburban growth resumed very rapidly. However, deeper or prolonged crisis could result in the return to urbanization or even desurbanization stage. Furthermore, according to the SUD model, now we may expect the KFUR to make transition to the suburbanization (II) stage with positive net migration rate in the ring and migration outflow in the core. However, according to the newly adopted version of the Ukrainian state construction rules (2019), it is forbidden to build residential buildings above 4 floors in the rural areas, where high-rise residential suburbanization is currently concentrated (Mezentsev and Kliuiko, 2015; Mezentsev and Mezentseva, 2017). This means that (1) large developers, seeking for profits, are likely to leave the suburbia and return to the city, (2) the population density in newly constructed suburban neighbourhoods will be lower than in the previous years of suburban boom. Together, these

processes may result in the return back to the urbanization (II) stage contrary to the expectations according to the SUD model.

The KFUR illustrates the differences between the SUD model and the approach proposed by Sýkora and Posová (2011). In particular, two models differently determine the beginning of the stage/form of suburbanization in the KFUR. What is more important for identifying the stage/form of suburbanization: the share of ring population or the faster growth in the ring comparing with a core? In our opinion, both are important and relevant for the *process* of suburbanization. However, the SUD model deceptively uses the terms of centralization/decentralization. For example, in 2014-2019, the population within the KFUR concentrated in the core, but the SUD model defines this stage as relative decentralization. At the first glance, the approach of Sýkora and Posová (2011) works more correctly in this case. However, its reliability may be in turn questioned since it addresses both migrations and natural growth. In case of the KFUR, the share of the core increased partly due to the natural increase, and the share of the ring decreased partly to the natural decrease.

Also, we believe that the names of the stages/forms of urban development should capture the dominant process (e.g. suburbanization process), and the SUD model appears to be more sensitive in catching suburbanization process. In particular, in the KFUR, distinct start of suburban development relates to the end of 2000s, but the approach of Sýkora and Posová (2011) detects suburbanization form of urban development only in the end of 2010s. The problem is that centralization should not be equated with urbanization/reurbanization, and decentralization with suburbanization/desurbanization, if we treat them all as processes rather than the conventional stages or forms. Therefore, both approaches are possible as instruments for cognition if the respective stages/phases of urban development are considered as conventional terms for classification of urban regions (cf. Ouředníček, 2005; Novotný, 2012).

Although a need for theorizing is undeniable, we assume that shifting from the conventional stages/forms to tangible processes is a more effective way of studying all the diversity of urban development forms and trajectories. Supporting Ouředníček (2005), we believe that cities really go through different stages of development, but different kinds of cities may go through specific sequences of stages, and each of these stages may be represented by unique combination of individual processes (for example, simultaneous suburbanization and reurbanization) depending on local conditions. In particular, the pattern of residential suburbanization in the metropolitan areas in the post-socialist period varies in different countries and regions, which is conditioned by the imposition of the socialist heritage, globalization impact and individual peculiarities of development (Brade et al., 2010). Consequently, real urban regions display a number of variations of the spatial dynamics and patterns of suburbanization (Stanilov and Sýkora, 2014).

CONCLUSIONS

Testing the SUD model (Osada, 2003) allowed identifying three consequent stages of urban development in the KFUR: urbanization (II) (2002-2010), inter-phase of proto-suburbanization (2011-2013): urbanization (II)/suburbanization (I), and suburbanization (I) (2014-2019). The use of approach proposed by Sýkora and Posová (2011) also revealed the transition from urbanization to suburbanization, although in different time frames. The revealed migration pattern substantially differs from the patterns of urban evolution in the post-socialist countries of the Central Europe due to specific social, economic and political conditions in the post-Soviet space. At the same time, common trends of accelerated suburban development, typical for the whole post-socialist realm, are also observed, but with notable delay.

Despite certain deficiencies, both approaches are suitable instruments for classifying functional urban regions in terms of overall growth/decline and inner centralization/decentralization. However, shift from conventional stages/forms to processes of urban development seems to be a more perspective approach. Since the SUD model does not take into account external factors influencing the urban development, in particular socio-economic and political crises, it has limited potential to predict the future development of the urban region. Especially this is true for post-Soviet countries with their unstable economic, social and political conditions.

REFERENCES

AHLFELDT, G. M., WENDLAND, N. (2016). The spatial decay in commuting probabilities: Employment potential vs. commuting gravity. *Economics Letters*, 143, 125-129.

BEZÁK, A. (1999). Development of urban and rural populations in Slovakia between 1970 and 1995. *Geographica Slovenica*, 31, 170-177.

BORÉN, T., GENTILE, M. (2007). Metropolitan processes in post-communist states: an introduction. *Geografiska Annaler B*, 89, 2, 95-110.

BRADE, I., MAKHROVA, A., NEFEDOVA, T. (2014). Suburbanization of Moscow's urban region. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 97-132.

BRADE, I., SMIGIEL, C., KOVACS, Z. (2010). Suburban residential development in postsocialist urban regions: the case of Moscow, Sofia and Budapest. In Kilper,

H., ed., *German Annual of Spatial Research and Policy 2009. New Disparities in Spatial Development in Europe*. Berlin: Springer, pp. 79-104.

BROWN, D., SCHAFFT, K.A. (2002). Population deconcentration in Hungary during the post-socialist transition. *Journal of Rural Studies*, 18, 233-244.

CHAMPION, T. (2001). Urbanization, suburbanization, counterurbanization and reurbanization. In Paddison, R., ed., *Handbook of Urban Studies*. SAGE Publications Ltd, pp. 143-161.

CHESHIRE, P. (1995). A new phase of urban development in Western Europe? The evidence for the 1980s. *Urban Studies*, 32, 7, 1045-1063.

CHESHIRE, P., HAY, D.G. (1989). *Urban Problems in Western Europe – An Economic Analysis*. London: Unwin Hyman.

DENYSENKO, O. (2012). *Protsesy metropolizatsiji: svitohospodars'kyj aspect* [Процеси метрополізації: світогосподарський аспект]. Kyiv: NAS of Ukraine.

DEPARTMENT FOR ARCHITECTURE AND PLANNING (2015). Draft General Plan of Kyiv and its Suburban Zone until 2025. Access mode: https://kga.gov.ua/generalnij-plan/genplan2025.

DE VRIES, J.J., NIJKAMP, P., RIETVELD, P. (2009). Exponential or power distance-decay for commuting? An alternative specification. *Environment and Planning A*, 41, 2, 461- 480.

DREWETT, R., ROSSI, A. (1981). General urbanisation trends in Western Europe. In Klaassen, L.H., Molle, W.T.M., Paelinck J.H.P., eds., *Dynamic of Urban Development*. Hants: Gower, pp. 119-136.

FISHER, T. (2003). Differentiation of growth processes in the peri-urban region: an Australian case study. *Urban Studies*, 40, 3, 551-565.

FORD, T. (1999). Understanding Population Growth in the Peri-Urban Region. *International Journal of Population Geography*, 5, 4, 297-311.

GAJOVIC, V. (2013). Comparative analysis of different methods and obtained results for delineation of functional urban areas. *Spatium*, 29, 8-15.

GAŁKA, J., WARYCH-JURAS, A. (2018). Suburbanization and migration in Polish metropolitan areas during political transition. *Acta Geographica Slovenica*, 58, 2, 63-72.

GOH, S., LEE, K., PARK, J.S., CHOI, M.Y. (2012). Modification of the gravity model and application to the metropolitan Seoul subway system. *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, 86, 2, 1-6.

GLATTER, J., SIEDHOFF, M. (2008). Reurbanisation: inflationary use of an iInsufficiently defined term? Comments on the definition of a key concept of urban geography, with selected findings for the city of Dresden. *Die Erde*, 139, 4, 289-308.

GNATIUK, O. (2017). Demographic dimension of suburbanization in Ukraine in the light of urban development theories. *Acta Universitatis Carolinae Geographica*, 52, 2, 13-25.

GOLUBCHIKOV, O. (2004). Urban planning in Russia: Towards the market. *European Planning Studies*, 12, 2, 230-247.

HALL, P.G., HAY, D.G. (1980). *Growth Centres in the European Urban System*. London: Heinemann.

HALLIDAY, J., COOMBES, M. (1995). In search of counterurbanisation: some evidence from Devon on the relationship between patterns of migration and motivation. *Journal of Rural Studies*, 11, 4, 433-446.

HERFERT, G. (2007). Regionale Polarisierung der demographischen Entwicklung in Ostdeutschland – Gleichwertigkeit der Lebensverhältnisse? *Raumforschung und Raumordnung,* 65, 435-455.

HIRT, S. (2007). Suburbanizing Sofia: characteristics of post-socialist peri-urban change. *Urban Geography ,* 28, 755-780.

KABISCH, N., HAASE, D. (2011). Diversifying European agglomerations: Evidence of urban population trends for the 21st century. *Population Space and Place*, 17, 3, 236-253.

KLAASSEN, L.H., SCIMENI, G. (1981). Theoretical issues in urban dynamic. In Klaassen, L.H., Molle, W.T.M., Paelinck, J.H.P., eds., *Dynamic of Urban Development*. Hants: Gower, pp. 8-28.

KLUSÁČEK, P., MARTINÁT, S., MATZNETTER, W., WISBAUER, A. (2009). Urban development in selected Czech and Austrian city regions. *Acta Universitatis Palackianae Olomucensis – Geographica*, 40, 2, 27-57.

KOK, H., KOVÁCS, Z. (1999). The process of suburbanization in the metropolitan area of Budapest. *Netherlands Journal of Housing and Built Environment*, 14, 2, 119-141.

KOSTINSKIY, G. (2001). Post-Socialist Cities in Flux. In Paddison, R., ed., *Handbook of Urban Studies.* London: Sage Publications, pp. 451-465.

KOVÁCS, Z., TOSICS, I. (2014). Urban Sprawl on the Danube: The Impacts of Suburbanization in Budapest. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 33-64.

KRISJANE, Z., BERZINS, M. (2012). Post-socialist urban trends: new patterns and motivations for migration in the suburban areas of Riga, Latvia. *Urban Studies*, 49, 2, 289-306.

LEETMAA, K. (2008). *Residential Suburbanisation in the Tallinn Metropolitan Area.* Tartu: Tartu University Press.

LEETMAA, K., KÄHRIK, A., NUGA, M., TAMMARU, T. (2014). Suburbanization of Moscow's urban region. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 192-224.

Oleksii HAVRYLIUK, Oleksiy GNATIUK, Kostyantyn MEZENTSEV

LEETMAA, K., TAMMARU, T. (2007). Suburbanisation in countries in transition: destinations of suburbanizers in the Tallinn metropolitan area. *Geografiska Annaler, Series B: Human Geography*, 89, 127-146.

LINDGREN, U. (2003). Who is the counter-urban mover? Evidence from the Swedish urban system. *International Journal of Population Geography*, 9, 5, 399-418.

LISOWSKI, A. (2005). Procesy centralizacji i decentralizacji w aglomeracji warszawskiej w latach 1950–2002. *Prace i Studia Geograficzne*, 35, 13-44.

MALCHYKOVA, D., PYLYPENKO, I. (2017). Vid "rozirvanoho" prostoru do metropolizatsii i suburbanizatsii: Khersonska miska ahlomeratsija u novykh vymirakh urbohenezu [Від «розірваного» простору до метрополізації і субурбанізації: Херсонська міська агломерація у нових вимірах урбогенезу]. In Mezentsev, K., Olijnyk, Ya., Mezentseva, N., eds., *Urbanistychna Ukrajina: V Epitsentri Prostorovykh Zmin* [Урбаністична Україна: в епіцентрі просторових змін]. Kyiv: Feniks, pp. 326-338.

MANSHYLINA, T. (2015). *Suspil'no-heohrafichne doslidzhennia rozvytku mist-suputnykiv ta prymis'koji zony Kyjeva* [Суспільно-географічне дослідження розвитку міст-супутників та приміської зони Києва]. PhD thesis. Taras Shevchenko National University of Kyiv.

MASUCCI, A.P., SERRAS, J., JOHANSSON, A., BATTY, M. (2013). Gravity versus radiation models: On the importance of scale and heterogeneity in commuting flows. *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, 88, 2, 1-9.

MATZNETTER, W. (2004). The Vienna and Bratislava urban regions: comparing urban development under (welfare) capitalism and (post-) communism. *European Spatial Research and Policy*, 11, 1, 61-77.

MEZENTSEV, K., KLIUIKO, T. (2015). Prostorovi transformatsiji zhytlovykh funktsij u prymis'kij zoni Kyjeva [Просторові трансформації житлових функцій у приміській зоні Києва]. *Human Geography Journal*, 18, 1, 87-93.

MEZENTSEV, K., BRADE, I., MEZENTSEVA, N. (2012). New social and economic processes in Kyiv's hinterland. *Human Geography Journal*, 12, 1, 156-160.

MEZENTSEV, K., BRADE, I., MEZENTSEVA, N. (2014). Suburbanizatsija v metropolitenskikh regionakh: opyt Ukrajiny [Субурбанизация в метрополитенских регионах: опыт Украины]. In Druzhinin, A. G., ed., *Pozicionirovanie Rossii i ee regionov v sovremennom mire: obshchestvenno-geograficheskij analiz i prognoz*. Saint-Petersburg – Rostov-on-Don, pp. 120-125.

MEZENTSEV, K., HAVRYLIUK, O. (2015). Testuvannia modeli dyferentsial'noji urbanizatsiji v Ukrajini [Тестування моделі диференціальної урбанізації в Україні]. *Ekonomichna ta Sotsialna Geografija*, 73, 15-26.

MEZENTSEV, K., MEZENTSEVA, N. (2012). Urbanizovani terytoriji Ukrajiny: prychyny ta naslidky transformatsiji u postradyans'kyj period [Урбанізовані території України: причини та наслідки трансформації у пострадянський період]. In

Berghauer, O., Genci, S., Dnistrianskyi, M., eds., *Social Geographical Challenges in the Eastern Central Europe of the XXI Century*, vol. 1. Uzhhorod: Lira, pp. 310-317.

MEZENTSEV, K., MEZENTSEVA, N. (2017). Zhytlova suburbanizatsija v Ukrajini: trendy ta vidminnosti [Житлова субурбанізація в Україні: тренди та відмінності]. In Mezentsev, K., Olijnyk, Ya., Mezentseva, N., eds., *Urbanistychna Ukrajina: V Epitsentri Prostorovykh Zmin* [Урбаністична Україна: в епіцентрі просторових змін]. Kyiv: Feniks, pp. 268-287.

NEFEDOVA, T.G., SLEPUKHINA, I., BRADE, I. (2016). Migration attractiveness of cities in the post-Soviet space: a case study of Russia, Ukraine, and Belarus. *Regional Research of Russia*, 6, 2, 131-143.

NOVOTNÝ, L. (2012). Trendy migracji i rozwój miejskiego regionu funkcjonalnego Bratysława. *Przestrzeń i forma*, 17, 381-394.

NUISSL, H., RINK, D. (2005). The 'production' of urban sprawl in Eastern Germany as a phenomenon of post-socialist transformation. *Cities*, 22, 2, 123-134.

NYSTRÖM, J. (1992). The cyclical urbanization model: a critical analysis. *Geografiska Annaler B*, 74, 2, 133-144.

OECD. (2013). *Definition of Functional Urban Areas (FUA) for the OECD metropolitan database*.

OLIJNYK, YA., ZAPOTOTSKYI, S., ZAPOTOTSKA, V. (2019). *Rynok zhytla Kyjivskoho rehionu: suspilno-heohrafichnyj vymir* [Ринок житла Київського регіону : суспільно-географічний вимір]. Kyiv: Taras Shevchenko National University.

OSADA, S. (2003). The Japanese urban system 1970–1990. *Progress in Planning*, 59, 3, 125-231.

OUŘEDNÍČEK, M. (2000). Teorie stádií vývoje měst a diferenciální urbanizace. *Geografie – Sborník České geografické společnosti*, 105, 4, 361-369.

OUŘEDNÍČEK, M. (2005): New suburban development in the post-socialist city: the case of Prague. In Eckardt, F., ed., *Paths of Urban Transformation*. Peter Lang, pp. 143-156.

OUŘEDNÍČEK, M. (2007). Differential suburban development in the Prague urban region. *Geografiska Annaler B*, 89, 111-125.

PERSYN, D., TORFS, W. (2015). A gravity equation for commuting with an application to estimating regional border effects in Belgium. *Journal of Economic Geography*, 16, 155-175.

PICHLER-MILANOVIĆ, N. (2014). Confronting suburbanization in Ljubljana: from "urbanization of the countryside to urban sprawl. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 65-96.

PIDGRUSHNYI, G., DENYSENKO, O. (2013). Kyjiv ta prylehla terytorija v systemi tsentro-peryferijnoji vzajemodiji [Київ та прилегла територія в системі центро-периферійної взаємодії]. *Ukrainian Geographical Journal*, 1, 27-35.

POSOVÁ, D., SÝKORA, L. (2011). Urbanizace a suburbanizace v městských regionech Prahy a Vídně: strukturální rozdíly v podmínkách odlišných politicko-ekonomických režimů. *Geografie*, 116, 3, 276-299.

RAŹNIAK, P., WINIARCZYK-RAŹNIAK, A. (2013). Spatial distribution and differences in migration patterns and revenues of gminas in the Kraków Metropolitan Area. *Bulletin of Geography. Socio-Economic Series*, 19, 73-86.

ROBERTS, S. (1991). A critical evaluation of the city life cycle idea. *Urban Geography*, 12, 5, 431-449.

RODRIGUES DA SILVA, A.N., MANZATO, G.G., PEREIRA, H.T.S. (2014). Defining functional urban regions in Bahia, Brazil, using roadway coverage and population density variables. *Journal of Transport Geography*, 36, 79-88.

SIMINI, F., GONZÁLEZ, M.C., MARITAN, A., BARABÁSI, A.-L. (2012). A universal model for mobility and migration patterns. *Nature*, 484, 96-100.

SJÖBERG, O. (1992). Underurbanisation and the zero urban growth hypotheses: diverted migration in Albania. *Geografiska Annaler B*, 74, 3-19.

STANILOV, K., ed. (2007). *The Postsocialist City: Restructuring of Urban Form and Space in Central and Eastern Europe after Communism*. Dordrecht: Springer.

STANILOV, K., HIRT, S. (2014). *Sprawling Sofia: postsocialist suburban growth in the Bulgarian capital*. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 163-191.

STANILOV, K., SÝKORA, L. (2014). Postsocialists suburbanization patterns and dynamics: a comparative perspective. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 256-295.

SÝKORA, L., CERMÁK, D. (1998). City growth and migration patterns in the context of 'communist' and 'transitory' periods in Prague's urban development. *Espace, Population, Sociétés*, 3, 405-416.

SÝKORA, L., MULÍCEK, O. (2014). Prague: urban growth and regional sprawl. In Stanilov, K., Sýkora, L., eds., *Confronting Suburbanization: Urban Decentralization in Postsocialist Central and Eastern Europe*. Wiley-Blackwell, pp. 133-162.

SÝKORA, L., NOVÁK, J. (2007). A city in motion: time-space activity and mobility patterns of suburban inhabitants and the structuration of the spatial organization of Prague metropolitan area. *Geografiska Annaler B,* 89, 2, 147-167.

SÝKORA, L., POSOVÁ, D. (2011). Formy urbanizace: kritické zhodnocení modelu stadií vývoje měst a návrh alternativní metody klasifikace forem urbanizace. *Geografie*, 116, 1, 1-22.

VAN DEN BERG, L. (1999). The urban life cycle and the role of a market-oriented revitalization policy in Western Europe. In Summers, A., Cheshire, P., Senn, L., eds., *Urban Change in the United States and Western Europe. Comparative Analysis*. Washington, DC: The Urban Institute Press, pp. 539-558.

VAN DEN BERG, L., DREWETT, R., KLAASSEN, L.H., ROSSI, A., VIJVERBERG, N.H.T. (1982). *A study of growth and decline*. Oxford: Pegasus.

VARTIANEN, P. (1989). Counterurbanization: a challenge for socio-theoretical geography. *Journal of Rural Studies*, 5, 123-136.

WOLFF, M. (2017). Understanding the role of centralization processes for cities – evidence from a spatial perspective of urban Europe 1990 – 2010. *Cities*, 75, 20-29.

ZAKIROVA, B. (2010). Shrinkage at the urban fringe: crisis or opportunity? *Berkeley Planning Journal,* 23,1, 58-82.

RECOMMENDATION FOR A TYPOLOGY OF CITIES AND MUNICIPALITIES IN CROATIA ACCORDING TO DEVELOPMENT LEVEL

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Abstract

The goal of this paper is to create a typology of municipalities according to development level, using what little data are available. Both economic (municipal income, employment, and entrepreneurship) and demographic (educated and immigrant population) indicators are used. Three economic types of municipality were defined using three economic indicators: income per capita (used as the main indicator); number of residents per entrepreneur; and share of employed in the total population. Following this, we defined demographic types of municipalities, using the three aforementioned economic indicators as well as two demographic indicators: average education level of the population and share of immigrants in the total population. Education level of the population is more important than employment or entrepreneurship for economic development. The typology indicates an above-average level of development on the Adriatic coast and islands, as well as in large cities and the immediate surroundings of Zagreb. In contrast, the typology also shows below-average development levels in southeastern Slavonia and northwestern Croatia. Areas of special state concern, such as those that were occupied during the Croatian War of Independence, have above-average municipal income and below-average education levels, employment, and entrepreneurship. Tourism, activities in large cities, and (paradoxically) state subsidies in areas of special state concern contribute the most to development level, while industry and (especially) agriculture do not make significant contributions to development level. The tradition of managing population size is no longer significant for development level, because a large number of sparsely-populated "new" municipalities have significantly higher incomes than "old" municipalities. This paper should serve as a supplement to the frequent discussions regarding the optimization of Croatia's system of local government units.

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INTRODUCTION

The goal of this paper is to determine types of Croatian municipalities and cities in relation to development level. The ability of a municipality to reach its goals is largely determined by its capacity for development, especially because lack of intervention in the scope of its normal function can generate long-term negative consequences. For example, the lack of such interventions in the social sphere can lead to both short-term and long-term negative consequences for families, which is also reflected in the economic and social development of the community (Ajduković et al. 2019). A good typology of municipalities is also important for methodological planning of future studies in various research areas, especially for those studies that use stratified sampling or are interested in examining multilevel effects that happen due to the nesting of data (Lorah, 2018).

In this paper, we will attempt to determine the causes of differences in development level among Croatian regions. The choice of criteria for determining types of municipalities according to economic development level was narrowed. Over the last 30 years, the issue of territorial organization has been especially important and has developed turbulently. Croatian public administration has been observed through the lens of economies of scale. This sort of reform took place in the northern part of Western Europe (Belgium, Denmark, Finland, Norway, Sweden, Holland, Germany, and Great Britain). The consequences of territorial consolidation in Western Europe were also felt in Eastern Europe (Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia). The fall of the Berlin Wall (1989) marked the beginning of an opposing trend in Eastern Europe: territorial fragmentation, as a result of pressures from local areas and also partially as a reaction to their prior forced union. The political atmosphere after 1990 leaned heavily toward fragmentation of local self-government units, which in some states went to the level of the "right" of everyone, even the smallest settlement, to their own separate local self-government unit. In this light, attempts to maintain larger territorial units of local government were regarded as "attacks" against local autonomy (Swianiewicz et al. 2017).

A wide-spread discourse about territorial organization was begun, with an emphasis on administration efficiency and economic sustainability. The majority of research on the topic confirms the link between economic success of administration and the size of a municipality. For example, strong industrial development

in Lodz, Poland has significantly demographically and economically increased the size of the city, and influenced the appearance and to what extent certain industrial areas are built up (Jażdżewska and Kotlicka, 2020). Large centers enjoy additional advantages in the time of globalization. Namely, agglomerations of large size and regional economic specialization have long been global phenomena, but the processes of agglomeration and regional specialization associated with globalization have increased in intensity in recent years (Scott and Storper, 2003). The factor of mobility is a key element in the creation of agglomerations (Fujita and Krugman, 2004). Of the numerous local government units (municipalities and cities) in Croatia, less than half (240 out of 556) succeed in covering over 75% of their expenses with their own income, which indicates that only 43% of local government units are somewhat sustainable, while the rest are dependent on the central state government to a significant extent (Koprić, 2010). The emphasis on achieving balanced regional development can be seen in the routing of public funding toward regions with below-average development and low socio-economic status in southeastern Slovakia, rather than to its more developed northwestern regions, via Local Action Groups (LAGs) (Klamár et. al. 2019). In Croatia, a frequent opinion is that municipalities that are too small demographically or economically find it difficult to effectively manage themselves, in part due to the fact that their own administrative bodies are often too large.

Immediately prior to the shaping of Croatia's new territorial organization in 1993, the main flaw of the territorial organization inherited from Yugoslavia with its 105 municipalities was its expressed polarization of industrial development, in which the primary importance was held by a municipality's main center, i.e. municipal industrial monocentrism (Feletar and Stiperski, 1992). Throughout Croatia, municipal monocentrism resulted in the tendency to place as many functions as possible in the main center of the municipality, which often meant that municipal administration did not pay enough attention to the other settlements within the municipality (Glamuzina and Glamuzina, 1998). The main intent of the creators of the post-1993 territorial organization was to weaken municipal monocentrism, with the goal of opening more opportunities for development of more settlements in Croatia via reduction in the size of municipalities. As the number of municipalities grew from 105 to over 500, the average distance from a given settlement to the municipal center greatly decreased. The problematic relationship between the size of a municipality and administrative efficiency is complex and, as such, is only briefly touched upon. Research with the goal of optimizing the system of municipalities can find important starting points and conclusions in the typology of municipalities according to economic development level in this paper.

DATA AND METHODS

The first instrument of regional development policy in Croatia is the development index (Perišić and Wagner, 2015), which consists of human development (income, employment, and education) and the development of administrative units (municipal income and population change) (Marcelić, 2015). In this case, analysis identified three types of development level: the first type is found in eastern Croatia and Dalmatinska Zagora; the second type is found along the coast; and the third is found in northern Croatia (Marcelić, 2015). One study of models for calculating the development index for local and regional self-government units recommends the use of a unique composite development index, based on six indicators: average net income per capita; average gross income per capita; average unemployment rate; general population change; aging index; and education level (tertiary education) (Denona Bogović et. al. 2017). In research of 50 small municipalities (up to 5,000 inhabitants according to the 2011 population census) in Šibenik-Knin and Split-Dalmatia counties, calculations were made that should be tested and perhaps worked into a development index; the following indicators were used to determine this development index: average net income per capita; average gross income per capita, unemployment rate; general population change; and education level (Bačelić-Grgić, 2016). Using multivariate classification of regional and local self-government units according to socio-economic development level, it was confirmed that the majority of local self-government units that lag in terms of development are found in central and eastern Croatia, while the most developed are found in Primorje-Gorski Kotar and Istria counties, along with the City of Zagreb (Perišić, 2014).

The greatest methodological challenge while writing was the choice of criteria and data that would be used as indicators of development level. The difficult part was that the majority of data for indicators of economic development level are available on the state or county level, while data on the municipal or city level is limited. The basic data in the analysis that indicates the level of development of a municipality or city is municipal income per capita. We first analyzed the state of each local self-government unit according to three economic indicators: income per capita (the main indicator); employment level in the total population; and number of residents per entrepreneur. In doing this, we wanted to determine to what extent the level of entrepreneurship and employment were linked in relation to a given area's development level (income per capita). Using a combination of above-average and below-average values of the three aforementioned economic indicators, we obtained eight different types of municipalities and cities. Thus we obtained economic types of municipalities. Next, we calculated demographic types of municipalities using the aforementioned economic indicators combined with two demographic indicators: average education level of the population and share

of immigrants in the total population. In this step we were attempting to determine the extent to which education level and share of autochthonous population were linked with the level of development. Using a combination of above-average and below-average values of the aforementioned demographic indicators it was possible to define eight different types of municipalities. Thus we obtained two sets of types of municipalities: the first with emphasis on economic indicators, and the second with emphasis on demographic indicators. The significance of indicators in describing certain occurrences, i.e. the strength of positive or negative links between indicators was obtained using the Pearson correlation coefficient of linear correlation between all pairs of indicators. In this way, the indicators that showed the strongest positive correlation with income per capita (the main indicator for determining the level of development of a municipality or city) were determined. The complexity of regional research that leads to the creation of typologies of municipalities according to certain criteria is expressed, and is partially a consequence of temporal and ideological efforts (Matlovič and Matlovičová, 2020).

All analysis was done using Excel and R v3.5.1 programming packages. For geographic displays, the rgdal package (Bivand et. al. 2020) and ggplot2 (Wickham, 2016) were used. Within the framework of the analysis, fundamental descriptive characteristics for each indicator were calculated and the division of municipalities into categories was performed by sorting each variable used into quartiles.

RESULTS

Changes in local self-government in Europe and Croatia

Numerous changes in the organization of local self-government have been happening throughout Western Europe since the 1970s, while similar change did not begin to take place in Eastern Europe until after the fall of authoritarian regimes at the end of the 20th century. Territorial organization of local self-government is often inherited and regarded as a complex developmental and political problem. The European Economic Community started to studiously work on the problem of administrative regions and local self-government units in 1974. In Denmark, this meant reducing the number of municipalities; for example, there were plans to regionalize historical provinces into regional units in Holland, as well as plans regarding formal developmental regions in France (Žuljić, 2001). The major financial and economic crisis of 2008 spurred a wave of restructuring of organization of local self-government in Europe (Swianiewicz et al. 2017). All of these changes influenced government on all levels in the majority of European countries, from the lowest level (municipal or city), to mid-level (county or provincial) to high-level (regional) local self-government. Clearly, not all countries have the same number of governmental levels in local self-government. Larger states typically have complex systems of local self-government, i.e. two to three levels of local self-government,

while smaller countries often have only one or two (at most) levels of local self-government. These changes sometimes also include reorganization of the entire state structure of local self-government on various levels. During the 2008 economic crisis, the aforementioned changes mainly had the goal of reducing the number of local self-government units (municipalities and cities) by grouping some together and improving inter-municipal cooperation. This resulted in a major reduction in the number of local self-government units and an increase in geographic (spatial), demographic (population), and economic (business capacity) size. In 2014, Europe had 106,000 fewer municipalities in relation to the previous era. The changes that often included increasing the size of municipalities did not move forward at the same speed in all parts of Europe. Thus, there has been a constant tendency toward reducing the number of local self-government units in certain Western European countries. In post-communist Europe, the tendency towards territorial fragmentation, i.e. spatial reduction of local self-government, was dominant until 2006, and was followed by a decade of significant reforms of local self-government.

The size of local self-government units significantly varies among European states. The average size of the lowest level of English local self-government (municipality) is nearly 100 times larger than the average French equivalent. From this, we can conclude that there is no typical or prevalent European "model" of territorial organization on the lowest level of local self-government. The issue of legal and territorial organization of local self-government has given rise to discussion and conflict of varied and often completely opposing attitudes in political and professional arenas of several European countries (Swianiewicz et al. 2017).

In the area of former Yugoslavia, there has been a significant increase in the number of local self-government units. The 1993, the territorial organization of Croatia consisted of 488 municipalities and cities, which grew to 566 in 2006. This was a huge amount of growth in relation to the number of municipalities in Croatia from 1963 to 1993 (between 104 and 111) (Malić and Stiperski, 1993). In Serbia, the number of regions increased (from 10 to 25), while in Slovenia and North Macedonia there are three times more municipalities today than in 1991. Bosnia and Herzegovina is divided into two entities, of which only the Federation of Bosnia and Herzegovina is divided into cantons (counties).

After the dissolution of Czechoslovakia there was an increase in the number of regions in Czechia (from 8 to 14) and in Slovakia (from 4 to 8). The opposite took place in former East Germany (DDR): East Germany was divided into 14 administrative units (Bezirk), but the area of former East Germany adopted the West German model of territorial organization of local self-government after reunification in 1990, whereby six federal states were created. Administrative counties continue to exist in most federal states of Germany, but were partially disbanded after 1999 and now are only found in North Rhine-Westphalia, Baden-Württemberg, Bavaria, and Hessia (Klarić, 2016).

In contrast with post-communist Eastern Europe, the states that emerged from the collapse of the Soviet Union have largely retained the territorial structure of local self-government from the socialist era. Russia, Ukraine, and Belarus are divided into nearly the same number of provinces as they were 50 years ago, and local self-government units in Estonia, Lithuania, and Moldavia cover the same area as "raions" from the USSR era. Only in Latvia have there been any larger changes in territorial organization of local self-government, whereby the 33 raions from the USSR era have since been divided into 118 municipalities.

Numerous European states have not altered the size of territorial local self-government units. Significant changes after 1990 were undertaken by Great Britain, Denmark, Iceland, Albania, Poland, and Greece. Denmark, Albania, and Poland created significantly spatially larger units of self-government on the regional level, while Iceland and Great Britain created smaller territorial units. Greece has two levels of self-government under which numerous smaller territorial units have been formed, but changes have tended towards transferring power from lower levels to higher levels of governance. From this, we can conclude that real reduction in the number of self-government units, i.e. growth in the average size of local self-government units, has only happened in the case of Danish regions, Polish voivodships, and Albanian counties (Klarić, 2016).

In regards to the situation in Croatia, the Constitution of the Republic of Croatia from 1990 and the Law on the Areas of Counties, Cities, and Municipalities (1992) stated that, in place of 103 municipalities and nearly 4,000 local communities, there shall be a new territorial organization of local self-government units: 418 municipalities and 69 cities as local self-government units of the first level of governance; and 20 counties plus the City of Zagreb (which also has the status of county) as units of the second level of governance. Between 1993 and 2006 (when the last changes to Croatia's territorial organization were made), 58 new municipalities were formed and 58 municipalities gained the status of city; This meant that Croatia had 429 municipalities, 126 cities and the City of Zagreb, i.e. 555 local self-government units of the first level, along with 20 counties and the City of Zagreb on the second level, giving a total of 576 local and regional self-government units. Namely, all municipalities and cities belong to counties, and only the City of Zagreb has both city and county status.

Under the former territorial organization (1963–1993), the territorial unit "kotar" was eliminated (1967), and all of its functions were transferred the 111 municipalities. The dynamic nature of territorial organization can be seen in the fact that the number of self-government units changed from 8 to 111 over just 21 years (1946–1967) (Malić and Stiperski, 1993). Despite the fact the municipality is the most stable territorial unit of local self-government in both Croatia and Europe, the number thereof has changed remarkably over the last 70-odd years. In Croatia, this oscillation was in the range of 104 to 555 municipalities. The reasons for this

change vary, and political and traditional motivations are most often mentioned (Hrženjak, 2009).

Municipalities and cities provide public services in their self-governance areas. These services are indirectly created by the needs of local residents that are not directly, i.e. constitutionally or legislatively, ordained by state institutions. Counties, on the other hand, provide regional services. The law states that the status of city can be obtained by settlements that are in the center of their county or those that have more than 10,000 residents. The law also, however, allows settlements to gain the status of city if there is a special reason (historical, economic, geo-transitory, etc.), which is the case with 42% of settlements that have the status of city (Ivanišević, 2000). The difference between municipality and city is in the highest level of local tax (prirez) that can be levied, which is 10% in municipalities, 12% in smaller cities, 15% in larger cities, and 18% in Zagreb.

The average number of residents for municipalities in Croatia is a bit more than 3,000, and cities have an average of a bit over 18,000 residents. The median value is 2,983.5 residents per municipality, which means that 50% of municipalities in Croatia have less than 2,983.5 residents. The Municipality of Civljane has the fewest residents (239) out of all Croatian municipalities, while the Municipality of Viškovo has the most residents (14,445). A total of 30 municipalities have less than 1,000 residents. In contrast, Croatia has large/populous municipalities, i.e. cities like Zagreb, Split, Rijeka, Osijek, and other large urban areas. Among cities, Zagreb has
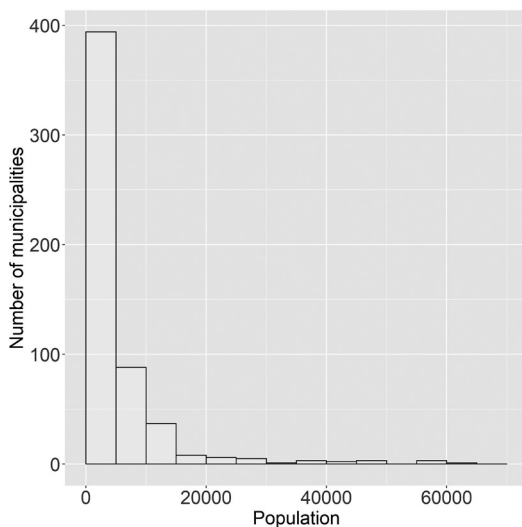
Fig.1
Distribution of population among Croatian municipalities and cities
Source: authors

the most residents (790,017), while Komiža has the fewest (1,526). According to the table below, we can see that the distribution of population among municipalities is decidedly asymmetrical (Fig. 1). By comparing the average demographic size of municipalities with their equivalents in other European states, it is clear that the average size is similar. In France and Switzerland there are municipalities with 100 residents, but such small municipalities do not represent a problem to the state because they are led by local citizens who serve the municipality on a voluntary basis (Hrženjak, 2009).

Indicators of development level of municipalities and cities

In this paper, income per capita was used as the main indicator, along with four other indicators: 1) number residents per entrepreneur; 2) share of employed in the total population; 3) average education level of the population; and 4) share immigrants in the total population.
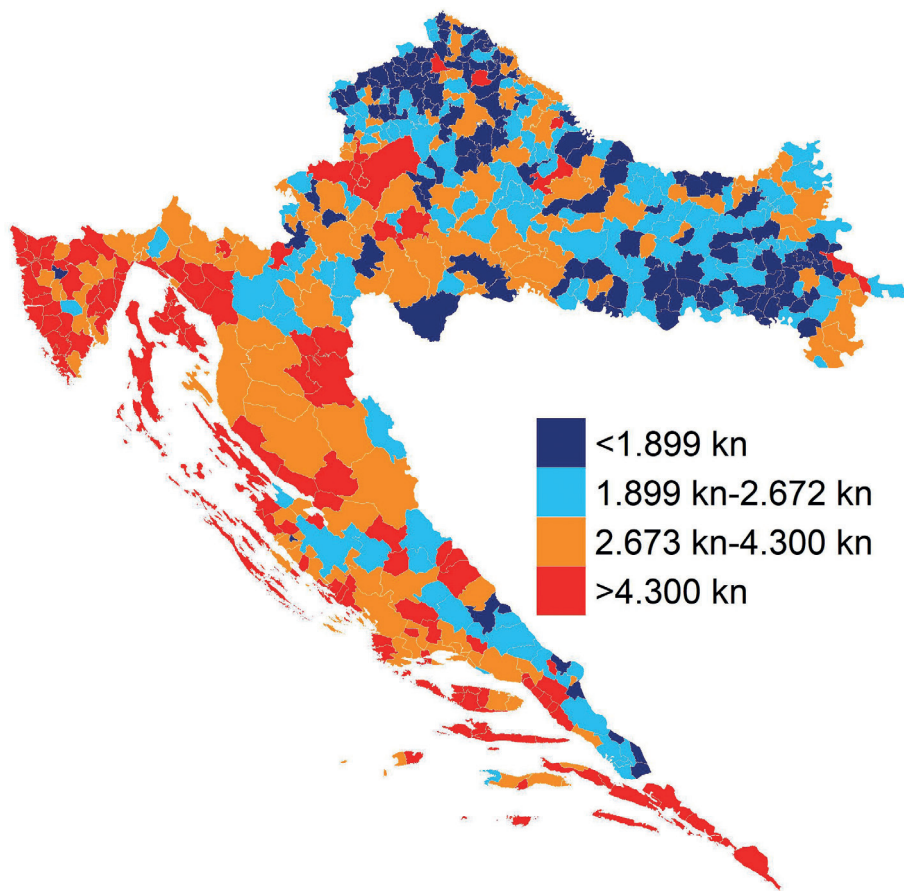
1) **Municipal income per capita.** Distribution of income of municipalities and cities per capita is asymmetrical and has a median value of 2,672 kuna (1 euro roughly 7.5 kuna) per capita (Tab. 1). The highest income per capita was documented in coastal and island municipalities, while the highest concentration of weakly-developed municipalities is found in southeastern Slavonia and northwestern Croatia (Fig. 2). A small concentration of municipalities with very high income per capita is found in and around Zagreb. The leading municipalities in terms of income are smaller Adriatic municipalities such as Sutivan, Vir, and Baška, with over 15,000 kuna per capita. The City of Zagreb has 8,071 kuna income per capita, while the other macro-regional cities have lower income per capita: Rijeka with 5,029 kuna per capita; Split with 3,949 kuna per capita; and Osijek with 3,220 kuna per capita. All of the cities with more than 10,000 residents that also have more income per capita than Zagreb are located on the Adriatic Sea (Umag, Dubrovnik, Rovinj, and Opatija). Municipalities with the lowest income per capita (below 1,300 kuna) are mainly found in the continental part of Croatia and have lower populations.

Tab. 1   Municipal income per capita in 2016 (in Kuna)

Variable	N	Min	Max	M	SD	C	Q1	Q3
Income per capita	556	721	16.591	3.542	2.460	2.672	1.898	4.300

Legend: N – number of municipalities; Min – minimum value; Max – maximum value; M – arithmetic mean; SD – standard deviation; C – median; Q1 – result from the first quartile; Q3 – result from the third quartile

Source: *authors*

Fig. 2
Spatial distribution of municipalities according to income per capita
Source: authors

2) **Number of residents per entrepreneur.** This data indicates the level of entre-
preneurship in a given municipality. The distribution of this parameter is also
asymmetrical, and the median for Croatia is 85.8 residents per entrepreneur
(Tab 2.). The spatial distribution shows that for this indicator, the most success-
ful municipalities are found along the coast and in central Croatia, especially in
and around Zagreb. The largest concentration of local self-government units
with low levels of entrepreneurship is in Slavonia, in parts of central Croatia,
and in mountainous areas around the country. The greatest levels of entrepre-
neurship (less than 18 residents per entrepreneur) were documented in a few
smaller municipalities and cities. The lowest levels of entrepreneurship (more
than 500 residents per entrepreneur) were found in smaller continental mu-

nicipalities. Of the four macro-regional centers, Zagreb has the highest level of entrepreneurship (23 residents per entrepreneur), followed by Split (28), Rijeka (30), and Osijek (45).

Tab. 2   Number of residents per entrepreneur

Variable	N	Min	Max	M	SD	C	Q1	Q3
Residents per entrepreneur	556	3	826	115.0	98.9	85,8	50.6	146.1

Legend: N – number of municipalities; Min – minimum value; Max – maximum value;
M – arithmetic mean; SD – standard deviation; C – median; Q1 – result from the first quartile;
Q3 – result from the third quartile

Source: *authors*

3) **Share of employed in the total population.** This share is more symmetrical than the two previous indicators, and is distributed around an average value of 32% (Tab. 3). At the regional level, the number of employed decreased between 2009 and 2016 in all Croatian counties. The uneven regional development of Croatia, characterised by the polarisation of economic activities, is also manifested in the unequal reduction of the number of employed persons (Braičić, Lončar, 2018). In the most successful municipalities employment in the total population is over 50%, while the same value can be under 10% in the weakest municipalities. The spatial distribution shows high levels of employment in the northern and western parts of Croatia (Istria and Kvarner), in Zagreb and its surroundings, and in southern Dalmatia. Municipalities with the lowest levels of employment in the total population were documented in Slavonia, Lika, Banovina, Kordun, Dalmatinska Zagora, and northern Dalmatia. Of the four macro-regional centers, Zagreb has the highest level of employment in the total population (41%), followed by Rijeka (39%), Split (36%), and Osijek (36%).

Tab. 3   Share of employed in the total population

Variable	N	Min	Max	M	SD	C	Q1	Q3
Employment	556	0.06	0.56	0.32	0.074	0.32	0.26	0.37

Legend: N – number of municipalities; Min – minimum value; Max – maximum value;
M – arithmetic mean; SD – standard deviation; C – median; Q1 – result from the first quartile;
Q3 – result from the third quartile

Source: *authors*

4) **Average education level of the population.** The population of the majority of municipalities and cities in Croatia has finished 9–10 years of education, i.e. primary school and 1-2 years of secondary school. Higher education levels (more

than 9.72 years of education) were found in western (Istria and Kvarner), central, and northwestern Croatia, and on the central and southern Dalmatian islands (Tab. 4). Lower education levels (below 9.72 years of education) were documented in Slavonia and mountainous areas of Croatia. Of the macro-regional centers, Zagreb had the highest average education level (12.0 years), followed by Split (11.8), Rijeka (11.6), and Osijek (11.4).

Tab. 4   Average education level of the population

Variable	N	Min	Max	M	SD	C	Q1	Q3
Employment	556	5.90	12.08	9.78	0.87	9.72	9.21	10.39

Legend: N – number of municipalities; Min – minimum value; Max – maximum value; M – arithmetic mean; SD – standard deviation; C – median; Q1 – result from the first quartile; Q3 – result from the third quartile

Source: *authors*

5) **Share of immigrants in the total population.** The distribution of the share of immigrants in the total population is asymmetrical and most municipalities and cities have a low share of immigrant population (Tab. 5). The lowest share of immigrants in the total population was found in municipalities in northwestern Croatia (Međimurje, Hrvatsko Zagorje, and upper Podravina), the interior of Istria, and Dalmatinska Zagora. The highest share of immigrants in the total population was documented in areas of Croatia that were occupied during the Croatian War of Independence (1990–1995) along the border with Bosnia and Herzegovina, in Zagreb and it surroundings, the western coast of Istria, and in some parts of the Dalmatian coast. Among the macro-regional centers, Zagreb has the highest share of immigrants in the total population (47%), followed by Rijeka (41%), Osijek (29%), and Split (25%).

Tab. 5   Share of immigrants in the total population

Variable	N	Min	Max	M	SD	C	Q1	Q3
Employment	556	0.04	0.92	0.24	0.15	0.22	0.14	0.29

Legend: N – number of municipalities; Min – minimum value; Max – maximum value; M – arithmetic mean; SD – standard deviation; C – median; Q1 – result from the first quartile; Q3 – result from the third quartile

Source: *authors*

Significance of economic and demographic indicators in describing development level

A positive link between income per capita and the number of entrepreneurs (0.108), residents per entrepreneur (-0.391), and employment (0.195) (Tab. 6) was determined. This means that higher income per capita is expected in areas that have more total entrepreneurs, more entrepreneurs per resident, and higher employment. A positive link between income per capita, and higher employment and entrepreneurship levels is expected in particular. Higher income per capita is expected in local self-government units with higher populations, in contrast to local self-government units with lower populations, but this is a very weak link that can be disregarded. In comparing demographic data (education level and share of immigrants), we see a significantly stronger positive connection between income per capita and the aforementioned demographic indicators (number of entrepreneurs and employment level). There is also a very strong positive connection between average education level (0.407) and income per capita, i.e. economic development level. If we go deeper, we see an even stronger link expressed between income per capita and two categories: the share of the population with an associate or vocational degree (bachelor's) in the total population (0.542) and the share of the population with a university degree (master's) in the total population (0.505). In principle, the average education level is higher in areas with higher population, higher income, more entrepreneurs, higher entrepreneurship (fewer residents per entrepreneur) and higher employment.

The other demographic indicator—share of immigrants in the total population—has an expressed positive connection with income per capita (0.158), but a much stronger link with education level (0.407). This shows that income levels are somewhat higher in areas with more immigrants or fewer autochthonous residents. It is to be expected that people will relocate to areas with better economic indicators. Some weakening of the positive relationship between the share of immigrants and income per capita is due to the fact that the highest share of immigrants in the total population of municipalities and cities was recorded in the economically underdeveloped part of Croatia along the border with Bosnia and Herzegovina, which was occupied during the Croatian War of Independence (1990–1995).

The main conclusion that emerged was that the average education level and especially the share of the population with tertiary education in the total population were the most important positive indicators of the level of municipal income per capita, i.e. of economic development level.

Tab. 6 Pearson correlation coefficient of economic and demographic indicators

No.	Indicator	1	2	3	4	5	6	7	8	9	10	11
1	Population, 2011	1										
2	Income per capita, 2016	.077	1									
3	Number of entrepreneurs	.989	.108	1								
4	Number of residents per entrepreneur	-.097	-.391	-.094	1							
5	Employment	.095	.195	.099	-.447	1						
6	Average education level	.237	.407	.210	-.529	.548	1					
7	Share of the population with 3 years of secondary school education in the total population	-.080	.233	-,072	-.335	.277	.485	1				
8	Share of the population with 4 years of secondary school education in the total population	.224	.421	.190	-.504	.385	.899	.363	1			
9	Share of the population with an associate/vocational degree in the total population	.175	.542	.158	-.494	.370	.826	.346	.813	1		
10	Share of the population with bachelor's or master's degree in the total population	.370	.505	.340	-.506	.416	.875	.261	.828	.847	1	
11	Share of the population with a PhD in the total population	.507	.395	.493	-.343	.312	.620	.171	.563	.576	.738	1
12	Share of immigrants in the total population	.092	.158	.080	-.037	-.233	-.030	-.099	.082	.118	.099	.158

All values of Pearson coefficients of 0.092 or higher are significant (p<0.05)
All values of Pearson coefficients of 0.118 or higher are significant (p<0.01)

Source: *authors*

Types of municipalities and cities according to level of development

1) **Typology of municipalities/cities according to economic indicators.** Types of municipalities and cities were calculated according to the main indicator (IPI – income per capita) and two other economic indicators (IPE – number of residents per entrepreneur and EMP – share of employed in the total population). Using a combination of above-average and below-average values of the aforementioned economic indicators we obtained eight different types of municipalities and cities. Municipalities/cities that have above-average values according to all three indicators (red) are those with the most entrepreneurs and entrepreneurship, higher employment, and are generally successful in terms of business and income (Fig. 3). Such municipalities/cities are mostly found in Istria, Kvarner, larger Dalmatian municipalities, Zagreb and its surroundings, Osijek, and in the vicinity of certain larger cities. Conversely, municipalities with below-average values according to all three indicators (black) dominate in Slavonia and parts of Dalmatinska Zagora, and are found in some parts of Bjelovar-Bilogora and Hrvatsko-Zagorje counties.

There are a large number of local self-government units in northwestern Croatia that have below-average income per capita, but also have an above-average concentration of entrepreneurs and total employment (green). This type of municipality is rare in other parts of Croatia. These are areas with lower incomes in which work-intensive industry dominates. A very interesting type of municipality is represented by those that have above-average income despite also having below-average employment and concentration of entrepreneurs (blue). These municipalities dominate in Lika, Ravni Kotari, and the southeastern part of Pannonian Croatia (Srijem). The type of local self-government units that have above-average income and above-average employment, with a below-average concentration of entrepreneurs (orange) are mostly found along the Adriatic coast, and "trail" the type that has above-average values for all three types (red). It is expected that the 20 county centers will be of the type where all three values are above-average (red), due to their function as their county's "engine," but there are exceptions. The type with below-average income and employment (purple) describes both Slavonski Brod and Požega, while the type with below-average employment (orange) describes Krapina, Vukovar, and Vinkovci.
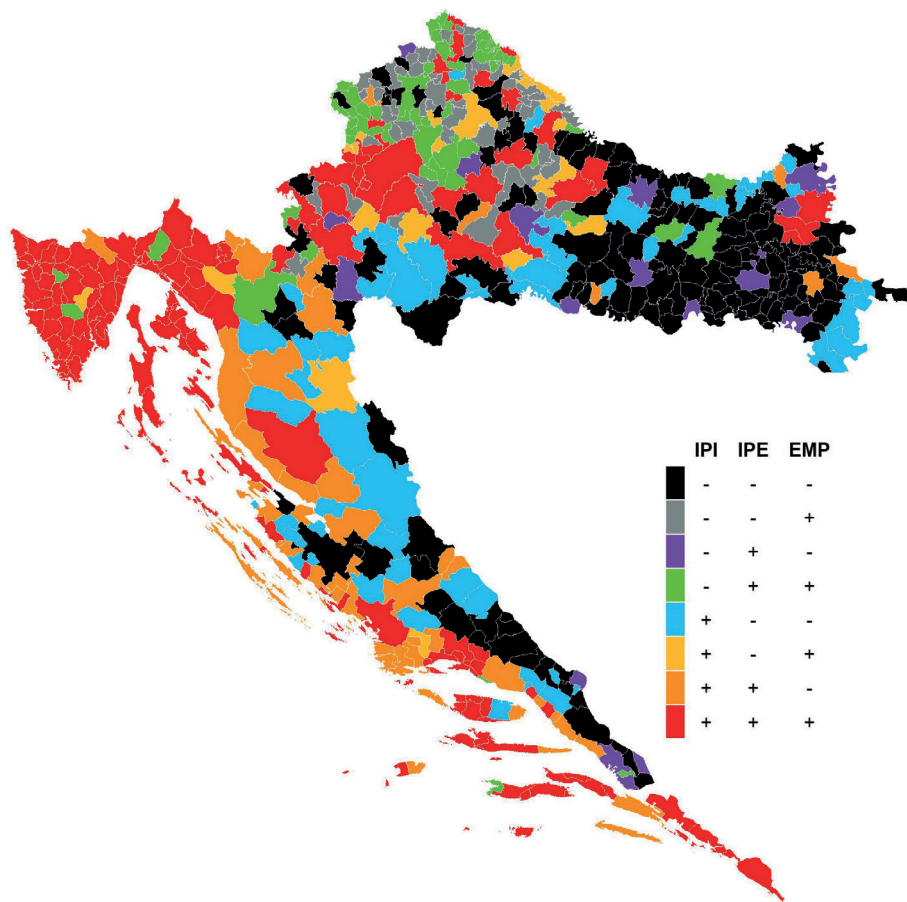
Fig. 3
Spatial distribution of types of municipalities and cities in relation to economic indicators.

Legend:
IPI – income per capita; IPE – number of residents per entrepreneur;
and EMP – share of employed in the total population. A "+" indicates above-average,
and a "-" indicates below-average.
Type 1 (red) = more-developed municipalities/cities according
to all three economic indicators
Type 2 (orange) = developed municipalities/cities with weaker employment
Type 3 (light orange) = developed municipalities/cities with weaker entrepreneurship
Type 4 (blue) = developed municipalities/cities with weaker employment
and entrepreneurship
Type 5 (green) = less-developed municipalities/cities with stronger employment
and entrepreneurship
Type 6 (purple) = less-developed municipalities/cities with stronger entrepreneurship
Type 7 (grey) = less-developed municipalities/cities with stronger employment
Type 8 (black) = less-developed municipalities according to all three economic indicators
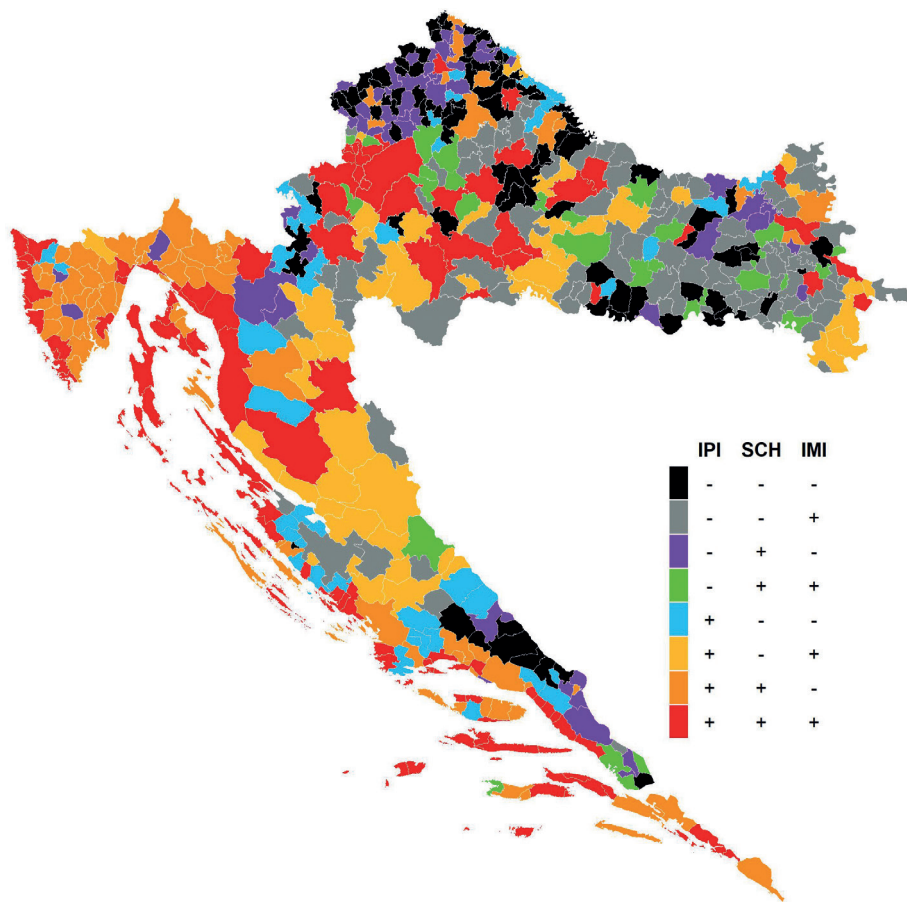*Source: authors*

2. **Typology of municipalities/cities according to demographic indicators.** Types of municipalities and cities were calculated in relation to the main indicator (IPI – income per capita) and the other two economic indicators (SCH – average education level of the population and IMI – share of immigrants in the total population). It is important to note at this point how the average education level of the population indicator was confirmed earlier in the paper to have the greatest positive connection, out of all analyzed indicators, with municipal income per capita. Using a combination of above-average and below-average values of the three economic indicators, we were able to define eight types of municipalities and cities. Municipalities/cities that had above-average values for all three economic indicators (red) were those that had the highest average education level, the highest share of immigrants in the total population, and were successful in terms of business/income (Fig. 4). These municipalities/cities were mostly found along the Adriatic coast, in Zagreb and its surroundings, and in or around certain larger cities. In contrast, municipalities with below-average values of the aforementioned indicators (black) dominate in parts of northwestern Croatia, along the Sava River in Slavonia, and in parts of Dalmatinska Zagora.

The interior of Istria, Gorski Kotar, Lika, and parts of the continental area of Croatia are dominated by the type which show an above-average development level and education level with a higher share of autochthonous population. It follows that such above-average developed centers are not attractive to the broader population as a place to resettle. In contrast to the previous type of municipality, we have those with a below-average development level and an above-average share of immigrants in the total population (grey). This type is often found throughout Slavonia and in some places in the eastern part of central Croatia. In northwestern Croatia we often find the type of municipality that has a below-average development level, a higher share of autochthonous population, but also an above-average education level (purple). In some places in the Pannonian part of Croatia we have municipalities that have a higher share of autochthonous population, an above-average education level, but a below-average development level (green).

Like in the economic typology, the demographic typology shows a number of county centers with below-average values. The type with a below-average share of immigrants in the total population (orange) describes Čakovec, Krapina, Pazin, and Šibenik, while the type with below-average income per capita describes Slavonski Brod and Požega.

Fig. 4

Spatial distribution of types of municipalities and cities in relation to demographic indicators

Legend:

IPI – income per capita; SCH – average education level of the population;
and IMI – share of immigrants in the total population. A "+" indicates above-average,
and a "-" indicates below-average.

Type 1 (red) = more-developed municipalities/cities according to both
demographic indicators

Type 2 (orange) = developed municipalities/cities with weaker immigration

Type 3 (light orange) = developed municipalities/cities with a weaker education level

Type 4 (blue) = developed municipalities/cities with weaker immigration
and education level

Type 5 (green) = less-developed municipalities/cities with stronger immigration
and education level

Type 6 (purple) = less-developed municipalities/cities with a stronger education level

Type 7 (grey) = less-developed municipalities/cities with stronger immigration

Type 8 (black) = less-developed municipalities according to both demographic indicators

Source: authors

DISCUSSION

The dominance of municipalities/cities which show the highest levels of development according to both economic and demographic indicators along the Adriatic coast and islands has provoked some surprising conclusions. According to Croatian law, islands are areas of special state concern, but the data of this paper indicates that these are areas of relative economic and social prosperity. This in turn prompts the important question of the role of certain economic activities vis-à-vis the results of this analysis. Successful regions usually are also large metropolitan regions, or are connected to strong industrial or tourism development (Bański and Mazurek, 2018). There are four main elements of territorial capital that make a positive contribution to regional development: entrepreneurship; receptivity; creativity; and transit infrastructure (Camagni and Capello, 2013). Regional innovativeness is the fundamental factor for economic development (Capello et al. 2014). In Croatia, tourism stands out as the leading economic activity, i.e. the activity that contributes the most to the development of local self-government units. According to the detailed statistical method known as Tourism Satellite Account (TSA), the effect of tourism on the total economy can be measured. Various estimates of the influence of tourism on the GDP of Croatia hover around 18%, but the share in 2016 was much lower according to TSA assessment (11.4%). The same method used to exactly calculate the contribution of tourism to the GDP of Croatia in 2016, giving a total of 16.9% (Dobrota, 2019). The total contribution is the sum of direct and indirect factors. The complex system of tourism is one of the most influential and significant geographic and socio-economic phenomena in Croatia. The influence and significance of tourism can be seen in its direct, indirect, and incentivized role in the socio-economic development on the local, regional, and state levels. The influence of tourism can also be seen in employment in tourism, demand for goods and services on the part of foreign tourists, share of imports, its role in investment, image, its contribution to state GDP, and in other indicators (Vojnović, 2018). In smaller centers where tourism is the main engine of development, numerous economic subjects from the selfsame sector dominate economic life and are the reason behind above-average results on the national level. Furthermore, numerous households are active in tourism, foremost in terms of renting housing capacity/lodgings to tourists. In Croatia in 2019, there were 18.2 million foreign tourists, who accounted for 95 million overnight stays (Ministry of Tourism, 2020), while Croatia itself has a bit over 4 million residents. While foreign tourists accounted for the bulk of measured tourism statistics, domestic tourists tallied a respectable 2.4 million registered arrivals and nearly 14 million overnight stays. Most tourist arrivals and overnight stays took place on the Croatian coast and islands, which have a population of roughly 1 million, but if we disregard cities with tens of thousands of inhabitants, the normal population of the numerous coastal and island tourism

areas drops to around 500,000. From this comparison we can conclude that tourism traffic in these small settlements is large enough to generate above-average results in terms of economic development on the national level. It goes without saying that other economic activities develop in these settlements alongside tourism, such as agriculture or industry. Rovinj is a city that is very developed thanks to its extremely highly-developed tourism supply, but it also boasts well-developed industry. Another example is Kali, a center of marine activities that exports tuna to Japan, which contributes to its economic development alongside tourism.

Analysis of the indicators shows that agriculture is not such a strong factor for economic development level. Though financial incentives amount to roughly 1.3% of GDP (Grupacija Svjetska Banka, 2019), Croatian agriculture is undergoing a process of structural transformation that includes modernization of agriculture, significant increases in productivity, reduction in the share of agricultural workers in total employment, and the agricultural sector is becoming increasingly associated with poverty. Furthermore, the contribution of agriculture to GDP is noticeably smaller (Grupacija Svjetska Banka, 2019). In the market-industrial economy, only a low percent of the total number of workers are employed in agriculture (Obadić, 2001), so agriculture can not be expected to contribute significantly to state GDP. The domination of municipalities and cities with below-average levels of development in Slavonia shows how agriculture lacks the power of tourism in terms of economic development. The main areas for food production have below-average levels of development, low employment, and below-average education levels.

The area where industry is exceptionally important is northwestern Croatia, however, this area is also dominated by below-average development and education levels, which show that Croatian industry does not generate sufficient developmental power by itself. There is also the pressing problem of weakening competitiveness of the Croatian manufacturing industry, which is a consequence of its unfavorable technological structure that is characterized by the domination of low-tech industry (Rašić Bakarić and Vizek, 2010). The Croatian manufacturing industry accounted for only 14.9% of GDP and 17.7% of employment in 2015 (Prester and Rašić Bakarić, 2017). This shows the relatively weak share of the manufacturing industry in Croatia's economy and its below-average level of development. This is partially a consequence of presence of industry dependent on cheap labor that, despite its dwindling presence over the last 30-odd years, is still quite widespread in Croatia.

It is a phenomenon that mountainous areas of Croatia (Lika, Banovina, Kordun) show above-average development levels (income per capita) despite below-average employment, entrepreneurship, and education levels. Such areas are of special state concern, which allows us to account for above-average values by citing various state incentives.

Frequent discussions regarding the need to achieve effective administration of local self-government units or optimize systems of local self-government come to the same conclusion: the number of municipalities should be reduced, especially those that can not support themselves economically and depend on the central state government for financial aid. This problem is very complex and it is questionable whether a simple reduction in the number of municipalities would be an effective measure by itself. Prior to deciding the number of municipalities or potentially reverting to a system similar to the previous one (1963–1992), the following data must be taken into account. Above-average values of municipal income per capita were documented for 189 municipalities and cities (49 of which were in the top 25%--Q1), i.e. for 34% of all local self-government units (Tab. 7). Of the "old" 105 municipalities, 49 of them generated above-average values and 29 of those numbered among the top 25% according to development level (Q1). Of the "new" municipalities, 140 of them generated above-average values for municipal income per capita. From this we can conclude that 140 "new" municipalities generate more municipal income per capita than 56 "old" municipalities, i.e. more than half of the "old" municipalities are below-average today. It is interesting that the leading 23 municipalities according to municipal income per capita are all low population "new" municipalities and cities.

Tab. 7 "New" and "old" municipalities and cities according to municipal income per capita, as a measurement of the development level of municipalities and cities.

Municipalities and cities	Number of municipalities and cities	Above- average municipal income per capita (Q1 = >4300)	Above- average municipal income per capita (>3542)	Below- average municipal income per capita (<3542)
"Old municipalities and cities" and the City of Zagreb	105 (19 %)	29 (21 %)	49 (26 %)	56 (15 %)
"New municipalities and cities"	451 (81 %)	110 (79 %)	140 (74 %)	311 (85 %)
Total	556 (100 %)	139 (100 %)	189 (100 %)	367 (100 %)

Legend: "New municipalities and cities" = municipalities and cities formed between 1993 and 2006 under the new territorial organization of local self-government (1993 to present; and "Old municipalities and cities" = municipalities and cities that were part of the previous system of territorial organization (1963–1992), which continued to exist under the new system of territorial organization, but covered a smaller area.

Source: *authors*

CONCLUSIONS

For the needs of typology of municipalities and cities in Croatia according to level of development we used five indicators: income per capita; share of employed in the total population; number of entrepreneurs per resident; average education level of the population; and share of immigrants in the total population. The Pearson correlation coefficient was highest among the indicators income per capita and average education level of the population. The level of development was higher in municipalities and cities where the population was more educated, where there were more immigrants, higher employment, and more entrepreneurs; there were, however, numerous exceptions according to one or more indicators.

In the economic typology we used the indicators: income per capita; share of employed in the total population; and number of entrepreneurs per resident. For the demographic typology we used the indicators: income per capita; average education level of the population; and share of immigrants in the total population. Classes of types of economic development dominate the Adriatic coast and islands, in Zagreb and its immediate surroundings, larger cities, and partly in the areas that were occupied during the Croatian War of Independence. The strength of the influence of larger cities on their wider surroundings is modest, and even Zagreb does not significantly spread its above-average level of development to the rest of central Croatia. Types of below-average economic development level dominate in Slavonia, partly in Dalmatinska Zagora, and in northwestern Croatia. Types of development level according to demographic criteria largely match the results of the economic typology.

Three activities contribute to development level (municipal income per capita): tourism; activities of large cities; and (to an extent) state subsidies for sparsely-settled municipalities and areas that were occupied during the War. Industry and especially agriculture are not activities that contribute to above-average development levels. Numerous low-population and "new" (created after 1993) municipalities are significantly more developed than the "old" (pre-1992) municipalities.

REFERENCES

AJDUKOVIĆ, M., RAJTER, M., REZO, I. (2019). Obiteljski odnosi i roditeljstvo u obiteljima različitog prihoda: kako je život u visokom riziku od siromaštva povezan s funkcioniranjem obitelji adolescenata? *Revija za socijalnu politiku,* 26, 1, 69-95.

BAŃSKI, J., MAZUREK, D. (2018). Smart Specialisation and the Internal Potential of Regions in Poland. *Folia Geographica*, 60, 1, 5–30.

BIVAND, R., KEITT, T., ROWLINGSON, B. (2020). rgdal: Bindings for the 'Geospatial' Data Abstraction Library. R-package version 1.5-10. https://CRAN.R-project.org/package=rgdal

BAČELIĆ-GRGIĆ, I. (2016). *Karakteristike malih općina u Republici Hrvatskoj s obzirom na indeks razvijenosti.* Graduate thesis. Split: University of Split.

BLAŽEVIĆ, I. (1980). Utjecaj turizma na proces litoralizacije i na transformaciju agrarnog pejzaža u Istri. In *Spomen-zbornik proslave 30. obljetnice GDH*. Zagreb: Geographical Society of Croatia, pp. 25-38.

BRAIČIĆ, Z., LONČAR, J. (2018). Spatial concentration and regional distribution of economic activities in the Republic of Croatia. *Croatian Geographical Bulletin*, 80, 2, 33-54.

CAMAGNI, R., CAPELLO, R. (2013). Regional Competitiveness and Territorial Capital: A Conceptual Approach and Empirical Evidence from the European Union. *Regional Studies*, 47, 9, 1383-1402.

CAPELLO, R., CARAGLIU, A., FRATESI, U. (2014). Modeling Regional Growth between Competitiveness and Austerity Measures: The MASST3 Model. *International Regional Science Review*, 1-38.

DOBROTA, A. (2019). Izravan udio turizma u BDP-u je 11,4 posto, uz ukupan utjecaj na gospodarstvo Hrvatske od 16,9 posto. In *Cimerfraj.hr*. [accessed on 6 April 2020]. Retrieved from: https://www.cimerfraj.hr/ aktualno/tsa-statistika-2016

DENONA BOGOVIĆ, N., DREZGIĆ, S., ČEGAR, S. (2017). *Studija evaluacija postojećeg i prijedlog novog modela za izračun indeksa te izračun novog indeksa razvijenosti jedinica lokalne i područne samouprave u Republici Hrvatskoj.* Rijeka: University of Rijeka. Rijeka: CLER - Centar za lokalni ekonomski razvoj Ekonomskog fakulteta Sveučilišta u Rijeci. Zagreb: Institut za razvoj i međunarodne odnose.

DRŽAVNI ZAVOD ZA STATISTIKU (2011). *Popis stanovništva Republike Hrvatske 2011*. Zagreb.

MINISTARSTVO FINANCIJA (2018). *Prihod općina 2016.* Zagreb.

MINISTARSTVO TURIZMA (2020). *U 2019. godini 21 milijun turista, 5 posto više nego u 2018., noćenja 2,4 posto više.* Retrieved from: https://mint.gov.hr/vijesti/u-2019-godini-21-milijun-turista-5-posto-vise-nego-u-2018-nocenja-2-4-posto-vise/20762. Accessed on 6 April 2020.

FELETAR, D., STIPERSKI, Z. (1992). Međuzavisnost procesa industrijalizacije i promjena u prostorom rasporedu i pokretljivosti stanovništva u Hrvatskom zagorju. *Acta geographica Croatica,* 27, 141-161.

FINA, Financijska agencija (2020), Zagreb. Retrieved from: www.fina.hr. Accessed on 10 Mart 2020.

FUJITA, M., KRUGMAN, P. (2004). The new economic geography: Past, present and the future. *Papers in Regional Science*, 83, 139-164.

GLAMUZINA, M., GLAMUZINA, N. (1998). Problem centralnog naselja u općini Gradac. *Geoadria*, 3, 57-63.

GRUPACIJA SVJETSKA BANKA (2019). *Stanje sektora i analiza javnih izdataka za poljoprivredu i ruralni razvoj.* Zagreb: Svjetska banka.

HRŽENJAK, J. (2009). Napomene o lokalnoj I regionalnoj samoupravi u Hrvatskoj. *Hrvatska javna uprava,* 9, 4, 999–1010.

IVANIŠEVIĆ, S. (2000). Teritorijalna osnova lokalne i regionalne samouprave uz posebni osvrt na položaj Grada Zagreba i njegovu samoupravu. *Hrvatska javna uprava,* 2, 4, 585-601.

JAŻDŻEWSKA, I., KOTLICKA, J. (2020). Application of Cluster Analysis in Urban Morphology Research. The Example of Industrial Plots in Łódź (Poland). *Folia Geographica*, 62, 2, 5-21.

KLAMÁR, R., MATLOVIČ, R., IVANOVÁ, M., IŠTOK, R., KOZOŇ, J. (2019). Local Action Group as a Tool of Inter-municipal Cooperation: Case Study of Slovakia. *Folia Geographica*, 61, 1, 36-67.

KLARIĆ, Z. (2016). Geografski aspekti teritorijalnog ustroja Hrvatske i usporedba s drugim europskim zemljama. *Hrvatski geografski glasnik,* 78, 2, 49-75.

KOPRIĆ, I. (2010). Karakteristike sustava lokalne samouprave u Hrvatskoj. *Hrvatska i komparativna javna uprava: časopis za teoriju i praksu javne uprave,* 10, 2, 371-386.

LORAH, J. (2018). Effect size measures for multilevel models: Definition, interpretation, and TIMSS example. *Large-Scale Assessments in Education*, 6, 1, 1-11.

MALIĆ, A., STIPERSKI, Z. (1993). Političko-teritorijalni ustroj i centralitet naselja Republike Hrvatske. *Acta Geographica Croatica*, 28, 67-83.

MARCELIĆ, S. (2015). Kritička analiza hrvatskog indeksa razvijenosti: tri tipa razvoja i njihov regionalni položaj. *Revija za socijalnu politiku,* 22, 3, 309-333.

MATLOVIČ, R., MATLOVIČOVÁ, K. (2020). First and second order discontinuities in world geographical thought and their primary reception in Slovak geography. *Folia Geographica*, 62, 1, 52-76.

OBADIĆ, A. (2001). Značaj industrije za gospodarski razvitak. *Ekonomski pregled*, 52, 9-10, 1100-1112.

PERIŠIĆ, A. (2014). Multivarijatna klasifikacija jedinica lokalne i regionalne samouprave prema socioekonomskoj razvijenosti. *Društvena istraživanja,* 23, 2, 211-231.

PERIŠIĆ, A., WAGNER, V. (2015). Indeks razvijenosti: analiza temeljnog instrumenta hrvatske regionalne politike. *Odabrani prijevodi,* 30, 15, 1-24.

PERKOVAC, Ž. (1993). *Turizam i geoprostor Poreštine*. Pazin: IKD Juraj Dobrila.

PRESTER, J., RAŠIĆ BAKARIĆ, I. (2017). Analiza strukturnih obilježja prerađivačke industrije Republike Hrvatske. *Ekonomski pregled,* 68, 4, 341-383.

RAŠIĆ BAKARIĆ, I., VIZEK, M. (2010). Analiza konkurentnosti i strukturnih obilježja prerađivačke industrije Republike Hrvatske. *Ekonomski pregled,* 61, 5-6, 241-270.

SCOTT A. J., STORPER M. (2003). Regions, Globalization, Development. *Regional Studies*, 37, 6-7, 579-593.

SWIANIEWICZ, P., GENDŹWIŁŁ, A., ZARDI, A. (2017). *Territorial reforms in Europe. Does size matters? Territorial Amalgamation Toolkit*. EU: Council of Europe.

VOJNOVIĆ, N. (2018). Intenzitet turizma u vodećim hrvatskim turističkim gradovima i općinama. *Geoadria,* 23, 1, 29-50.

WICKHAM, H. (2016). ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York, 2016.

ŽULJIĆ, S. (2001). Regionalno i teritorijalno ustrojstvo Hrvatske u razdoblju između godina 1945.-2000. *Ekonomski pregled,* 52, 1-2, 3-28.

AGRICULTURAL SOIL AND FRESHWATER ECOSYSTEM SERVICES IN SLOVAKIA – OPPORTUNITIES AND CHALLENGES FOR THEIR PRACTICAL APPLICATION

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Abstract

Water and soil belong to natural resources which are essential for the existence and development of human civilization. Ecosystem services (ESS) which provide bring different benefits to people. In Slovakia, mapping and valuation of ecosystem services of agricultural soil and freshwater, driven by development in soil functions concept and later by nature and biodiversity protection, have been focused especially on provisioning and regulation & maintenance sections. The integration of ESS concept into decision making remains challenging issue both in area of soil and water policy as well as creation of new and useful information on the total and sustainable capacity of individual ecosystem services in space and time.

Concerning the quality of the existing ESS-related information, the immediate use of ESS concept in the land area can be seen at spatial planning to decrease the irreversible soil loses which occur during urban sprawl, industry and infrastructure development. In the area of freshwater, the valuation of related ESS can be considered at the selection of cost-effective measures provided that the assessment of the ESS will be specified for the conditions of a particular water body and/or related watershed. To achieve unambiguous and lasting improvement of environment and related ecosystem services, which clearly includes the sustainable use of agricultural soils and freshwaters, it is necessary to address deeper causes, closely related to human thinking and activities which are not punishable/solvable solely by the ESS concept.

Key words

Ecosystem services, Soil functions, Agricultural soil, Freshwater.

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INTRODUCTION AND OBJECTIVES

Deterioration of natural resources recorded in several documents (e.g. MEA, 2005; EEA, 2019; Ekins et al., 2019) is a great challenge for the maintenance or improvement the welfare of human civilization on Earth in the future, the reassessing priorities and restructuring of the global economy, for more efficient use of natural resources and environment protection.

Soil and water belong to natural resources which are essential for the existence and development of human civilization. These resources create essential part of natural capital and provide many ecosystem services (ESS) (Leach et al., 2019; Fairbrass et al., 2020). Ecosystem services are defined as the outputs of natural systems of which people benefit (e.g. NRC, 2004; Boyd and Banzhaf, 2007). According to the typology of ecosystems (Maes et al., 2013), agricultural soil/land is linked to terrestrial ecosystems (cropland, grasslands) and freshwater corresponds with freshwater ecosystems (rivers, lakes) as well as groundwater.

Employing the ecosystem service concept is not an end in itself. It should to serve as frame at development of policies and instruments for ecosystem management (Birkhofer et al., 2015; Bouwma et al., 2018) as well as at integrating of ESS natural capital into mainstream economic policy and review the existing expression of the gross domestic product (Constanza et al., 2017).

This paper is focused on significant agricultural soil and freshwater ecosystem services relevant to Slovakia in accordance to current knowledge and the Common International Classification of Ecosystem Services (CICES) v. 5.1 (Haines-Young and Potschin, 2018). Actual state of valuation of ecosystem services and practical utilisation of existing information in Slovakia are analysed and discussed.

ECOSYSTEM SERVICES RELATED TO AGRICULTURAL SOIL

Until now, the evaluation of the benefits of soil for human and their use was based on soil functions. The aim to define these functions was to highlight their importance to society and the necessity to protect this natural resource (e.g. Blum, 1990; European Commission, 2006). While some authors make difference between functions and ecosystem services (e.g. NRC, 2004; Potschin and Haines-Young, 2011), some do not. In fact, many of the soil ecosystem services and soil functions overlap in content (e.g. Dominati et al., 2014; Coyle et al., 2016) and as stated by Baveye et al. (2016), it is possible to use both "function" and "ecosystem service" if they are articulated correctly.

The most common ecosystem services relevant to agricultural soil in Slovakia are introduced in Table 1. Naturally, the most important agricultural soil related ecosystem service is biomass production followed by water accumulation, filtration and decomposition of pollutants as confirmed by Coyle et al. (2016). These functions closely correspond with production and regulation ESS.

The following functions (marked in Table 1 with an asterisk) have been valuated both bio-physically and economically, and spatially delineated in Slovakia so far (Vilček, Koco, 2018): biomass production, rainwater accumulation, filtration of inorganic pollutants, filtration of organic pollutants and transformation/detoxification of organic pollutants.

Table 1 Most common Ecosystems services relevant to agricultural soil

Division	Group
Provision services	
Biomass	Cultivated terrestrial plants for nutrition, materials or energy*
Non-aqueous natural abiotic ecosystem outputs	Mineral and non-mineral substances used for nutrition, materials or energy (peat, sand, gravel, clays)
Regulation and maintenance services	
Transformation of biochemical or physical inputs to ecosystems	Mediation of wastes or toxic substances of anthropogenic origin by living and non-living processes (substances filtration*, accumulation, sequestration, remediation*)
Regulation of physical, chemical, biological conditions	Regulation of baseline flows and extreme events (water infiltration and accumulation*, soil erosion and flood control)
	Regulation of soil quality (decomposition of organic matter, nutrients turnover, buffering pH changes)
	Lifecycle maintenance, habitat and gene pool protection
Cultural services	
Direct, in-situ and outdoor interactions with living systems that depend on presence in the environmental setting	Physical and experiential interactions with natural environment (e.g. recreation or agritourism)
	Intellectual and representative interactions with natural environment (scientific, education, heritage, cultural, aesthetic issues)

* so far valuated soil functions or ESS

Principles of bio-physical valuation of several regulation functions/ecosystem services in the Slovak Republic are based on key soil parameters, relief and in the case of biomass production also on climate which primarily affect the biomass production. Regarding the valuation of biomass production, the expert approach is applied. It is based on pricing of production and cost parameters obtained from economic valuation of homogenous fields within typical set of land evaluated unit. In the case of regulation functions, the existing economic valuation is based on the use of cost methods – namely on saved or avoided costs, and replacement costs (Vilček et al., 2020; Bujnovský et al., 2009; Vilček and Bujnovský, 2014).

While the current valuation of specified ESS is satisfactory in terms of spatial variability (done at the scale of 1: 10000), the development changes in the capacity of soils to provide individual functions over time is currently lacking. Elimination of stated deficit presupposes taking into account the impact of management practices which significantly affect the evolution of relevant soil parameters and eventually the capacity of relevant ESS. For example, the increase of soil organic matter content via carbon sequestration belongs to climate change mitigation goals. The rate of carbon sequestration depends on both the soil texture and soil/land use. While soil texture primarily determines the general carbon sequestration capacity, exploitation the potential of this ecosystem service requires the application of minimum or no-tillage systems. Of course, the conversion of arable land to permanent grassland, or forest, is the best solution in this regard, provided that it remains enough land to grow field crops. Forestry and Agroforestry systems provide a number of ecosystem services. Numerous research works clearly indicates that forestry and agroforestry, as part of a multifunctional working landscape, can be a viable land-use option that, in addition to alleviating poverty, offers a number of ecosystem services and environmental benefits e. g.: carbon sequestration, biodiversity conservation, soil enrichment and air and water quality (Fleischer et al 2017; Gomoryová et al. 2013; Mindaš et al. 2018; Bartík et al. 2016).

Some soil functions or ecosystem services, especially those which belong to cultural ones (as space for recreational purposes and agri-tourism). These are not tied to soil parameters and if yes so rather in inverse way because for these activities are usually attractive pre-hilly and hilly areas where usually occur less productive soils with often less capacity to provide regulation ESS. Presumably, until now this ecosystem service has marginal importance even from the economic point of view. Space for human activities as urban sprawl and industry development was originally assumed as one of soil functions (Blum, 1990), however, is not on the ESS list (Haines-Young and Potschin, 2018). It is fully understandable, because in this case the initial capacity of the soil to provide ESS is destroyed.

ECOSYSTEM SERVICES RELATED TO FRESHWATER

The most common freshwater ecosystem services in Slovakia are introduced in Table 2. Valuation of water-related ecosystem services in Slovakia has been so far focused on those where the highest benefit was expected and sufficient information was available to estimate their use at the level of 10 sub-basins without GIS-based delineation. Some of above introduced ecosystem services, marked in Table 2 with an asterisk, were subject to valuation (Bujnovský, 2018) with a focus on the demand side or actual use.

Until now, the amount of abstracted water or extracted mineral substances (sand, gravel) serves as base for biophysical valuation of many ESS. In other cases,

the amount of transported cargo (waterways transport), amount of caught fishes (angling) or the number of visitors (bathing) served as a starting point (Bujnovský, 2018). Economic valuation of freshwater ecosystem services was mostly based on the non-preferential methods (in particular the methods of market valuation and cost methods) applicable in the case of valuation of production and regulatory services as reported by several authors (e.g. COWI, 2014; Grizzetti et al., 2016).

The results from corresponding assessment show that the greatest benefit from the use of water related ESS is identified at provisioning ESS, especially at electricity generation, raw material and cooling medium in industry, waterways transport, water for drinking purposes and for crop irrigation. These ESS are often related to the amount of water consumed. As for inland waterway transport, it should be noted that this ecosystem service is not explicitly listed in the current ESS categorization (Haines-Young and Potschin, 2018) but has its importance in terms of reducing of greenhouse gas emissions in the transport sector.

Table 2 Most common freshwater ecosystem services

Division	Group
Provision services	
Biomass	Reared aquatic animals for nutrition, materials or energy
Water	Surface water and groundwater used for nutrition – drinking water*, materials (crop irrigation*) or energy*
	Other aqueous ecosystem outputs (waterways transport*)
Aqueous natural abiotic ecosystem outputs	Mineral and non-mineral substances used for material (e.g. river bed sediments, sand and gravel*)
Regulation and maintenance services	
Regulation of physical, chemical, biological conditions	Water conditions (decomposition/removal of pollutants, dilution of pollutants)
Cultural services	
Direct, in-situ and outdoor interactions with living systems that depend on presence in the environmental setting	Physical and experiential interactions with natural environment (e.g. swimming*, boating, angling*)
	Intellectual and representative interactions with natural environment (scientific, education, heritage, cultural, aesthetic issues)

* so far valuated freshwater ESS

It can be noted that the overuse of ESS, in particular provisioning and some regulating services, put pressure on the water bodies. Excessive use of water (water abstraction) and dilution of pollutants due to wastewater discharge, may create considerable pressure on the water bodies and increase the risk of not achieving WFD objectives.

The ecological status of waters is often considered as a quality indicator of the structure and functions (and consequently services) related to aquatic ecosystems linked to surface water (e.g. Giakoumis and Voulvoulis, 2018). This assumption, however, does not apply to ESS which are not linked to the achievement of the good ecological status of surface waters (electricity generation, waterways transport or aqueous natural abiotic ecosystem outputs).

Naturally, an freshwater ecosystem with improved ecological status (as a result of implementation of measures and restoration) will often be able to provide a higher variety of ecosystem services, however, in view of that many of water uses (ecosystem services) have fixed locations (e.g. water abstraction for drinking purposes, natural bathing waters), final effect of improved water state on value of used ESS will be lower.

UTILISATION OF ECOSYSTEM SERVICES MAPPING AND ASSESSMENT

The concept of ecosystem services was originally developed to illustrate the benefits of natural ecosystems for society and to raise awareness of biodiversity and ecosystem conservation while managed systems were not the primary aim (Birkhofer et al., 2015). Later it was extended into a platform for management of specific environmental issues and corresponding policy interventions (Karabulut, et al., 2016; Bouwma et al., 2018).

Integration of ESS concept into decision-making remains challenging issue, especially in soil and water policy areas (Grêt-Regamey et al., 2017; Bouwma et al., 2018), as a result of *i)* insufficient precision and accuracy of ESS assessment often based on data unavailability, *ii)* missing the demand/supply ratio and available capacity of ESS for their sustainable use, and *iii)* insufficient outputs for decision-making aspects (Schägner et al., 2013; Laurans and Mermet, 2014; Wolff et al., 2015; Bujnovský, 2018). Some other related issues are *iv)* inconsistent approaches to ecosystem service modelling, assessment and valuation, *v)* the expense of applying sophisticated enough methods to adequately answer the questions, *vi)* the lack of appropriate institutional networks and also an underestimation of the role of science in the continuous development of methods for measuring, modelling, valuing and managing ecosystem services at different levels (Seifert-Dähnn et al., 2015; Maes et al., 2016; Constanza et al., 2017; Francesconi et al., 2016).

Given that the ESS mapping and valuation were originally driven by biodiversity protection, it is only natural that primary attention is primary focused to protection of natural and semi-natural areas (Maczka et al., 2019; Mederly et al., 2020; Roy et al.). The use of ESS information can be also expected in the area of spatial planning (Bateman et al., 2013; Tammi et al., 2017) where capacity/value of given environment to provide ESS should be considered before the permanent land take for urban sprawl, industry and infrastructure development. Similarly, when consid-

ering the case of permanent urban sprawl on agricultural land, the value of land ESS can serve as a criterion for spatial decisions (Greenhalgh et al., 2017) but the discount rates, expressing the future costs, or long-term benefits/losses at land use change remain the open issue.

Soil production potential or capacity of agricultural land to produce biomass is still used as an indicator for the classification of soils into nine soil quality groups which are specified in the Soil Protection Act. In terms of regulation permanent occupation of agricultural land in Slovakia, the revision of national legislation, redefinition of soils under primary protection as well as the amount of the fee for land take of these soils may be considered. Whereas around ten years ago, the top four soil quality classes (1st to 4th class) were protected nationwide, after the amendment have been made to the national soil protection law in recent years, the protection was limited to the top three classes in a given cadastre (local administrative unit). It means that in less productive/marginal areas even lower quality soils (6th to 8th class) are subject of protection. If the "political will" is clearly directed towards the development of industry and infrastructure, regardless of soil quality and capacity of ESS provided by soils, the valuation of the relevant ESS has no practical application in this regard.

The bio-physical valuation of soil functions or ecosystem services is often seen as basic precondition for their local use with regard to mitigate the anthropogenic pressures and their consequences (degradation processes). To consider payment for ecosystem services – PES (e.g. Bateman et al., 2013; Robinson et al., 2014) seems problematic for now. Main reason is that effect assessment through a change of soil parameters relevant to given ecosystem service is significantly affected by spatial and temporal effects. Shifting the emphasis from compliance with set level of management (what has been a reality so far) to achieving results or increasing ESS capacity and thus, paying for performance (European Commission, 2019), which closely corresponds with the allocation and effectiveness of measures (Talberth et al., 2015; Sidemo-Holm et al., 2018) remains great challenge.

Even though the achievement of WFD environmental objectives a has positive impact on the preservation/improvement of habitats and biodiversity, the term 'ecosystem services' is not explicitly defined in the WFD. Despite that, there is an effort to identify the incorporation of the ESS assessment into water policy (e.g. COWI et al., 2014; Vlachopoulou et al., 2014; Grizzetti et al., 2016). Ecosystem services assessment for potential application of derogations under Article 4 of the WFD, selection of cost-effective measures (Article. 11 WFD) and also for designing of measures beyond legislative requirements and limits within payments for ESS can serve as an example in this regard.

Seifert-Dähnn et al. (2015) pointed out to several shortcomings in the use of ecosystem service approach in the implementation of the WFD. Challenges include both methodological (namely, selection of proper valuation method, proper con-

sideration of the trade-offs and side effects) and practical parts. Moreover, practical application of ESS valuation presupposes the use of models that should enable to consider trade-offs and side effects of specific measures. Mentioned problem is also reminded by Maes et al. (2016) who state that the fundamental problem of a complete assessment of the ESS is insufficient data. That leads to the use of such indicators which reflect pressures on ecosystems rather than the contribution of ecosystems to regulation and maintenance.

Concerning freshwater, Everard (2012) is of the opinion that ecosystem services provide a more effective means of communication of the benefits of implementing measures to deliver the WFD than a more mechanistic focus on compliance with technical standards. The assessment of the proposed measures to address specific problems in river basins as well as the description of the associated positive and negative impacts can be expressed in a more socially relevant way by using the language of ecosystem services which can serve also for justification the cost-effectiveness of the proposed measures.

In other words, valuation of freshwater ecosystem services can serve mainly as the support for selection of cost-effective measures by considering co-benefits of measures (COWI, 2014).

The specific objectives of the WFD – such as "good status" and "no deterioration" – do not directly describe the benefits of which the EU citizens could experience. Hence, translating these objectives into the ecosystem services that benefits the population could significantly improve the whole stakeholder involvement throughout the implementation process (COWI, 2014). Public engagement represents an essential aspect of WFD implementation. But, as stated by Everard (2012), support for WFD implementation may be regarded as an altruistic task, as the public may not be able to appreciate the benefits of delivering its aims and the effects on their life quality.

The information on the significance and economic value of ESS could serve as the basis for development of social awareness. However, it appears that an increase in environmental awareness alone is not sufficient in terms of the protection of ecosystems and their services (Schröter et al., 2014; OECD, 2017). In this regard Bujnovský and Vilček (2011) recall that to achieve unambiguous and lasting improvement of environment and related ESS (which clearly includes the sustainable use of agricultural land and inland waters), it is necessary to address deeper causes, closely related to human thinking and activities which are not punishable/solvable solely by the ESS concept.

Without having a thorough knowledge of the real problems, we only address symptoms instead of getting to the root cause. One of the main driving forces of current environmental problems is growing consumption. People are trying to satisfy their infinite desires instead of simply meeting the needs, that are finite.

CONCLUDING REMARKS

In Slovakia, similar to other countries, the protection of nature and biodiversity accelerated the interest for the ESS from the research side. In the case of soil, this was originally the concept of its functions (Blum, 1990; European Commission, 2006). It is undisputed that economic valuation of soil and water resources through ecosystem services offers a broader view of their real importance and value for society. Besides that, the sustainable use of ESS capacities is a basic precondition for the preservation of relevant natural capital.

There is an effort to integrate the concept of ecosystem services into individual policies at the global level (Bouwma et al., 2018). Integration of the ESS concept into decision-making, in the field of soil and water policy, remains challenging. The area of knowledge creation in the field of ESS assessment is, however, equally important as the decision-making, policy implementation, and governance (Primmer et al., 2015). While the soil policy is currently partly covered by the EU's Common Agricultural Policy, the water policy is on the table for at least 20 years up to now. Until the concept of the ESS becomes a systematic government agenda, implementing the relevant research results into practice will be difficult.

Defining the total and sustainable capacity of individual ESS (in the field of agricultural soils and water-related ESS in particular) remains a challenging issue in Slovakia. In many cases, this can be done only through modelling, which is, Defining the total and sustainable capacity of individual ESS (in the field of agricultural soils and water-related ESS in particular) remains a challenging issue in Slovakia. In many cases, this can be done only through modelling, which is, either way, necessary for water pressure measurements, as well as for assessing environmental and cost-effectiveness measures, proposed/adopted in terms of achieving the WFD objectives.

At least for now, the ESS concept in the land area has its immediate use in spatial planning through better regulation the irreversible soil losses which occur during urban sprawl, industry, and infrastructure development. In the freshwater area, the use of the ESS concept could find application in the evaluation of the benefits of some measures (cost/benefit analysis) provided that the ESS assessment will be specified for the conditions of a particular water body and/or related its surrounding watershed.

REFERENCES

BARTÍK, M., JANČO, M., STŘELCOVÁ, K., ŠKVARENINOVÁ, J., ŠKVARENINA, J., MIKLOŠ, M., VIDO, J., WALDHAUSEROVÁ, P. D. (2016). Rainfall interception in a disturbed montane spruce (Picea abies) stand in the West Tatra Mountains. *Biologia*, 71(9), 1002-1008.

BATEMAN, I., HARWOOD, A.R., MACE, G.M. et al. (2013). Bringing ecosystem services into economic decision-making: land use in the United Kingdom. *Science,* 341, 45-50.

BAVEYE, P.C., BAVEYE, J., GOWDY, J. (2016). Soil "ecosystem" services and natural capital: Critical appraisal of research on uncertain ground. *Fontiers in Environmental Science*, 4, 41.

BIRKHOFER, K., DIEHL, E., ANDERSSON, J. et al. (2015). Ecosystem services – current challenges and opportunities for ecological research. *Frontiers in Ecology and Evolution,* 2, 87, 1-12.

BLUM, W.E.H. (1990). The challenge of soil protection in Europe. *Environmental Conservation* 17, 1, 72-74.

BOUWMA, I., SCHLEYER, CH., PRIMMER, E. et al. (2018). Adoption of the ecosystem services concept in EU policies. *Ecosystem Services,* 29, 213-222.

BOYD, J., BANZHAF, S. 2007. What are ecosystem services? The need for standardized environmental accounting units. *Ecological Economics,* 63, 2-3, 616-626.

BUJNOVSKÝ, R., VILČEK, J. (2011). Soil degradation and soil value in Slovakia - two problems with common denominator. *Agriculturae Conspectus Scientificus,* 76, 1, 9-14.

BUJNOVSKÝ, R., BALKOVIČ, J., BARANČÍKOVÁ, G. et al. (2009). *Hodnotenie a oceňovanie ekologických funkcií poľnohospodárskych pôd Slovenska*. VÚPOP: Bratislava.

Bujnovský, R. (2018). Estimation of benefits from the actual use of inland water ecosystem services in the Slovak Republic. *Ekológia (Bratislava),* 37, 3, 201-218.

CONSTANZA, R., DE GROOT, R., BRAAT, L. et al. (2017). Twenty years of ecosystem services: How far have we come and how far do we still need to go? *Ecosystem Services*, 28, 1-16.

COWI (2014). Support Policy Development for integration of an ecosystem services approach with WFD and FD implementation. Towards practical guidelines to support River Basin Planners. Kongens Lyngby: COWI A/S.

COYLE, C., CREAMER, R.E., SCHULTE, R.P.O. et al. (2016). A functional land management conceptual framework under soil drainage and land use scenarios. *Environmental science and Policy*, 56, 39-48.

DOMINATI, E., MACKAY, A., GREEN, S., PATTERSON, M. (2014). A soil change-based methodology for the quantification and valuation of ecosystem services from

agro-ecosystems: A case study of pastoral agriculture in New Zealand. *Ecological Economics*, 100, 119-129.

EEA, (2019). *The European environment – state and outlook 2020. Knowledge for transition to a sustainable Europe*. Copenhagen: EEA.

EKINS, P., GUPTA, J, BOILEAU, P. (2019). *Global environmental outlook 6.* Cambridge: Cambridge University Press.

EUROPEAN COMMISSION, (2006). *Proposal for a directive of the European Parliament and of the Council establishing a framework for the protection of soil and amending Directive 2004/35/EC*. COM(2006) 232 final.

EUROPEAN COMMISSION, (2019). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. The European Green Deal*. COM(2019) 640 final.

EVERARD, M. (2012). Why does "good ecological status" matter? *Water and Environmental Journal*, 26, 165-174.

FAIBRASS, A., MACE, G., EKINS, P., MILLIGAN, B. (2020). The natural capital indicator framework (NCIF) for improved national natural capital reporting. *Ecosystem Services,* 46, 101198.

FLEISCHER, P., PICHLER, V., FLEISCHER, P. JR., HOLKO, L., MÁLIŠ, F., GÖMÖRYOVÁ, E., CUDLÍN, P., HOLEKSA, J., MICHALOVÁ, M., HOMOLOVA, Z., SKVARENINA, J., STŘELCOVÁ, K., HLAVÁ, P. 2017. Forest ecosystem services affected by natural disturbances, climate and land-use changes in the Tatra Mountains. *Climate Research,* 73, 57-71.

FRANCESCONI, W., SRINIVASAN, R., PEREZ-MINANA, E. et al. (2016). Using the Soiô and Water Assessment Tool (SWAT) to model ecosystem services: a systematic review. *Journal of Hydrology,* 535, 625-636.

GIAKOUMIS, T., VOULVOULIS, N. (2018). A participatory ecosystem services approach for pressure prioritisation in support of the Water Framework Directive. *Ecosystem Services*, 34, 126-135.

GÖMÖRYOVÁ, E., STŘELCOVÁ, K., ŠKVARENINA, J., GÖMÖRY, D. (2013). Responses of soil microorganisms and water content in forest floor horizons to environmental factors. *European journal of soil biology,* 55, 71-76.

GREENHALGH, S., SAMARASINGHE, O., CURRAN-COURNANE, F. et al. (2017). Using ecosystem services to underpin cost–benefit analysis: Is it a way to protect finite soil resources? *Ecosystem Services*, 27, 1-14.

GRÊT-REGAMEY, A., SIRÉN, E., BRUNNER, S.H., WEIBEL, B. (2017). Review of decision support tools to operationalize the ecosystem services concept. *Ecosystem Services*, 26, 306-315.

GRIZZETTI, B., LANZANOVA, D., LIQUETE, C. et al. (2016). Assessing water ecosystem services for water resource management. *Environmental Science and Policy*, 61, 194-203.

HAINES-YOUNG, R.H., POTSCHIN, M.B. (2018*). Common international classification of ecosystem services (CICES) V5.1 and Guidance on the application of the revised structure.* Fabis Consulting Ltd.: Nottingham.

KARABULUT, A., EGOH, B.N., LANZANOVA, D. et al. (2016). Mapping water provisioning services to support the ecosystem–water–food–energy nexus in the Danube river basin. *Ecosystem Services,* 17, 278-292.

LAURANS, Y., MERMET, L. (2014). Ecosystem services economic valuation, decision-support system or advocacy? *Ecosystem Services,* 7, 98-105.

LEACH, K., GRIGG, A., O'CONNOR, B. et al. (2019). A common framework of natural capital assets for use in public and private sector decision making. *Ecosystem Services*, 36, 100899.

MACZKA, K., CHMIELEWSKI, P., JERAN, A. et al. (2019). The ecosystem services concept as a tool for public participation in management of Poland's Natura 2000 network. *Ecosystem Services,* 35, 173-183.

MAES, J., TELLER, A., ERHARD, M. et al. (2013*). Mapping and assessment of ecosystems and their services. An analytical framework for ecosystem assessments under action 5 of the EU biodiversity strategy to 2020*. Luxembourg: Publications office of the European Union.

MAES, J., LIQUETE, C., TELLER, A. et al. (2016). An indicator framework for assessing ecosystem services in support of the EU Biodiversity Strategy to 2020. *Ecosystem Services,* 17, 14-23.

MEA (Millenium Ecosystem Assessment), (2005). Ecosystems and human well-being: Synthesis. Washington, DC: Island Press.

MEDERLY, P., ČERNECKÝ, J., ŠPULEROVÁ, J. et al. (2020). National ecosystem services assessment in Slovakia – meeting old liabilities and introducing new methods. *One Ecosystem*, 5, e53677.

MINDAŠ, J., BARTÍK, M., ŠKVARENINOVÁ, J., REPISKÝ, R. (2018). Functional effects of forest ecosystems on water cycle–Slovakia case study. *Journal of Forest Science*, 64(8), 331-339.

NRC (National Research Council), (2004). *Valuing ecosystem services: toward better environmental decision-making*. Washington, DC: National Academy Press.

OECD, (2017). *Tackling environmental problems with the help of behavioural insights*. Paris: OECD Publishing.

POTSCHIN, M.B., HAINES-YOUNG, R.H. (2011). Ecosystem services: Exploring a geographical perspective. *Progress in Physical Geography*, 35, 5, 575–594.

PRIMMER, E., JOKINEN, P., BLICHARSKA, M. et al. (2015). Governance of ecosystem services: A framework for empirical analysis. *Ecosystem Services*, 16, 158-166.

ROBINSON, D.A., FRASER, I., DOMINATI, E.J. et al. (2014). On the value of soil resources in the context of natural capital and ecosystem service delivery. *Soil Science Society of America Journal*, 78, 3, 685-700.

ROY A. K., GHOSH, P.K., DATTA, D. (2020). Typological inventorization and rapid eco-
logical health assessment of the wetlands of Medinipur Coastal Plain, India. *Fo-
lia Geographica*, 62(2), 22-47.

SEIFERT-DÄHNN, I., BARKVED, L.J., INTERWIES, E. (2015). Implementation of the
ecosystem service concept in water management – Challenges and ways
forward. *Sustainability of Water Quality and Ecology,* 5, 3-8.

SCHÄGNER, J.P., BRANDER, L., MAES, J., HARTJE, V. (2013). Mapping ecosystem ser-
vices' values: current practice and future prospects. *Ecosystem Services*, 4, 33-46.

SCHRÖTER, M., STUMPF, K.H., LOOS, J. et al. (2017). Refocusing ecosystem services
towards sustainability. *Ecosystem Services*, 25, 35-43.

SIDEMO-HOLM, W., SMITH, H.G., BRADY, M.V. (2018). Improving agricultural pol-
lution abatement through result-based payment schemes. *Land Use Policy*, 77,
209-219.

TALBERTH, J., SELMAN, M., WALKER, S., GRAY, E. (2015). Pay for performance: Op-
timizing public investments in agricultural best management practices in the
Chesapeake Bay watershed. *Ecological Economics,* 118, 252-261.

TAMMI, I., MUSTAJÄRVI, K., RASINMÄKI, J. (2017). Integrating spatial valuation of
ecosystem services into regional planning and development. *Ecosystem Servi-
ces*, 26, 329-344.

VILČEK, J., BUJNOVSKÝ, R. 2014. Soil environmental index for Slovak agricultural
land. *Pedosphere*, 24, 1, 137-144.

VILČEK, J., KOCO, Š. 2018. Integrated index of agricultural soil quality in Slovakia.
Journal of maps, 14, 2, 68-76.

VILČEK, J., KOCO, Š., LITAVCOVÁ, E., TORMA, S. 2020. Characteristics of Soil Parame-
ters of Agricultural Land Use Types, Their Location and Development Forecast.
Land, 9, 6, 197.

VLACHOPOULOU, M., COUGHLIN, D., FORROW, D. et al. (2014). The potential of
using the ecosystem approach in the implementation of the EU Water Fra-
mework Directive. *Science of the Total Environment,* 470-471, 684-694.

WOLFF, S., SCHULP, C.J.E., VERBURG, P.H. (2015). Mapping ecosystem services de-
mand: a review of current research and future perspectives. *Ecological Indica-
tors,* 55,159-171.

THE DEVELOPMENT OF ECOTOURISM WITH COMMUNITY-BASED TOURISM (CBT) IN CLUNGUP MANGROVE CONSERVATION (CMC) OF TIGA WARNA BEACH FOR SUSTAINABLE CONSERVATION

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Abstract

Clungup Mangrove Conservation (CMC) of Tiga Warna beach is located in Tambakrejo Village, Sumbermanjing Wetan District, Malang Regency has a beautiful view and offered conservation and educational activities. The research purpose was to determine (1) tourism potential in the CMC in Tiga Warna beach, (2) ecotourism in the CMC for conservation and education purpose, (3) community role in the community-based tourism (CBT) to make sustainable conservation activities. The research design used quantitative and qualitative methods with analysis using a SWOT assessment. Primary data was collected through the rapid integrated survey, interviews, observations, and group discussion forums (FGD). Secondary data was collected from the documentation of CMC management in Tiga Warna beach. The results showed that the CMC in Tiga Warna beach has a high potential to be developed. The management of CMC in Tiga Warna beach applied a reservation system by limiting the number of visitors to 100 people per session or 10 groups per day. Tourists are required to make reservations in advance using social media or by phone. Also, the tour guide must accompany group to check the waste brought by visitors. All activities were done for the sustainability of the CMC ecotourism.

Key words
Ecotourism, Community-based Tourism, Conservation.

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INTRODUCTION

One of tourism aspect that can accomplish sustainable ecosystem management is through the development of ecotourism (Fandeli, 2002). The development of coastal ecotourism is an environmental service that provides benefits to someone satisfaction because it contains certain aesthetic values (Ali, 2004). A place can be developed into a tourist destination needed to fulfil 4 (four) components of tourism called 4A, which are Attraction, Accessibility, Amenities and Ancillary (Sugiama, 2014; Odum, 2018).

The development of tourism potential needs to consider the ecology in each development program and integrated conservation (integrating conservation and development program) classified as ecotourism (Borlido and Coromina, 2018). It includes taking the carrying capacity of the environment (carrying capacity). Ecotourism activities can minimize the negative impact on environmental damage because of mass or conventional tourism activities (McIntyre, Hetherington and Inskeep, 1993; Andronicus, Yulianda and Fahrudin, 2016).

The management that has the opportunity to implement effectiveness is community-based management. Community participation in management is better known as Pengelolaan Berbasis Masyarakat (PBM) or Community based management (CBM). Community-Based Resource Management (CBRM) is a strategy to achieve human-centered development, where the decision making of sustainable resources and environments is in the organizations within the community in the area (Dahuri, 2003).

The tourism development should have a direct impact on society. Communities around tourist objects have an important role in supporting the sustainable tourism. The impact including to increase community's income around tourist sites (Sumarmi et al., 2020; Matlovičová et al., 2016). The tourism development was focused on three groups, namely: (1) economic benefit strategies for the community, (2) strategies for improving profit for the community, (3) policy strategies in tourism management (Matlovičová et al., 2016; Untari and Suharto, 2020).

Development of tourism areas can also be formulated based on tourism concept and territorial marketing. The paradigm offers competencies for tourism actors to develop cognitive abilities such as knowledge, skills and related competencies (Matlovič and Matlovičová, 2016). Geographical cognitive abilities are needed to find the relationship between physical conditions of human and nature in the spatial context of tourism development (Oťaheľ et al., 2019).

Tiga Warna beach has a natural view because it is in a protected forest conservation area. It has a uniqueness of seawater that has three gradations (shades of reddish-brown, dark green and deep blue) to attract visitor. The color appears due to specific reasons, such as the reddish-brown color that arises due to the ability of sunlight to penetrate this beach water to a depth of 20 meters, the green color

obtained from siltation mixed with plankton in large amounts, while the blue color indicates the depth of seawater. The combination looks beautiful with the brown sand beach alloys.

Many tourists visit Tiga Warna beach, because of the fine white sand, coral reefs under the sea, different colors of seawater, and surrounded by protected forests as a conservation area. Tourists can enjoy the natural view of land and sea surface and snorkel to enjoy the seaview. Tiga Warna Beach has a coral reef ecosystem and is included in a conservation area of mangrove plants and the MPA (Marine Protective Area). Therefore, the number of tourists entering is limited in number and time of visit in 2 hours. It is intended to preserve the natural environment in the conservation area. Tourists visiting the tourist area must be accompanied by a local tour guide to guide and at the same time supervise.

The supervision is very important to maintain environmental sustainability and ecotourism activities. Marine ecotourism activities can cause various threats on the environment or existing ecosystems. Negative impacts occur because of poor planning and management, for example planning the development of tourism activities that ignore to carrying capacity (environmental carrying capacity) and lack of awareness, as well as public and tourist knowledge of environmental sustainability (Dahuri, 2003).

The high tide moment of seawater is the best time to fully enjoy the beach view. Gradations of color on the beach will be seen not only dark blue and light blue but also green. The preservation is very much maintained as conservation, also due to the richness of the ecosystem. In addition to swimming, snorkeling, and diving activities, the visitor can ride along the mangrove by boat, canoeing, visit floating homes or do conservation activities such as planting mangrove seedlings, releasing turtles and installing artificial coral reefs for the fish. Because of that, the manager limits the number of visitors, and always maintains beach cleanliness. Every visitor is required to use floats and snorkeling equipment, to maintain safety and protect coral reefs from being trampled by tourists.

Located 72 km from the center of Malang, Tiga Warna beach can be reached in approximately 2 hours on the road. Visitors can start from the CMC front office, then choose 2 paths to the beach, through the eastern sector which is the fastest access because it uses a boat or the western sector where visitors must walk through the main post then along the mangrove forest and past the Clungup beach and Gatra beach.

OBJECTIVES

Based on the background problems found during the observation, this study aimed to determine 1) tourism potential on Tiga Warna Beach, 2) CMC ecotourism management towards conservation and education, 3) the actor role in community-based tourism to actualize the sustainable conservation in Tiga Warna Beach.

THEORETICAL FRAMEWORK

The key factor in managing tourism is the community-based tourism (CBT) (Sumarmi et al., 2020). The main components include the community, local governments, non-governmental organizations, fund raiser, entrepreneurs and tourists (Matlovičová et al., 2016; Kurniawati et al., 2020). Besides, tourism can bring positive impact supported by large investments. The investment can support to construct the tourism facilities. Good communication between in the CBT management is needed to facilitate decision making and development strategies (Untari and Suharto, 2020).

Several approaches were taken to conduct tourism planning, including (1) continuous incremental, and flexible approach, (2) system approach, (3) comprehensive approach (4) integrated approach, (5) environmental and sustainable development approach, (6) community approach (7) implementable approach, (8) application of systematic planning approach (McIntyre, Hetherington and Inskeep, 1993). Ecotourism development is carried out by making a formulation of well planning and management. Marine ecotourism activities have potential value to support wildlife conservation. Also, it can encourage research to reduce the negative impacts of marine ecotourism activities. Therefore, to ensure the preservation of marine and coastal resources and wildlife conservation, it was necessary to develop an ideal and integrated marine ecotourism management concept (Asmit and Syahza, 2020; Untari and Suharto, 2020).

The three main principles in sustainability development are (1) ecological sustainability to ensure development following the ecological, biological, and diversity of existing ecological resources, (2) social and cultural sustainability to ensure that the development has a positive impact for the surrounding community along with the culture and values that applied to the community, (3) economic sustainability to ensure it is economically efficient and the resources used can stand for future needs (McIntyre, Hetherington and Inskeep, 1993; Organization, 1998; Borlido and Coromina, 2018).

The principles of ecotourism are 1) minimizing negative impacts, 2) building awareness and respect for the environment and culture, 3) providing positive experiences to visitors and hosts, 4) providing direct financial benefits for conservation needs, and gaining political sensitivity (The International Ecotourism Society, 2020). There are five core principles of ecotourism that are (1) nature-based with a focus on biological, physical or cultural uniqueness, (2) sustainable ecology, (3) environmental education, (4) local benefits, and (5) gives satisfaction to visitors (Dowling, 1998; Dowling, 2003).

Ecotourism works well with collaboration between the government, the private sector and local communities. Resource management has several types, which are (1) managed by communities that have characteristics, such as a) have customary

rights/law; b) are informal leaders, such as Sasi, Awig, Panglima Laot, Nyale, (2) managed by governments that have characteristics, such as a) have state-owned resources, b) have a top-down approach, (3) collaboration, that has characteristics a) resources are public property, b) government as regulator (manager), c) community as users. In general, the roles of stakeholders that can increase the potential of marine ecotourism in Indonesia can be seen in the following table 1.

Tab. 1   Role of Stakeholders in Tourism Development

No	Stakeholder	Roles
1	Government Institutions	1. Make regulations regarding marine ecotourism 2. Allocate tourism development funds 3. Form a tourism driving group 4. Provide education and training 5. Coordinate the development of activities 6. Directing the local community
2	Management Center	1. Make rules and laws 2. Supervise marine ecotourism areas 3. Provide a supporting infrastructure system 4. Coordinate the program 5. Preserve the environment and culture of the region 6. Develop activities 7. Directing tourists
3	Tourism Industry	1. Develop marine ecotourism activities 2. Marketing 3. Carry out assistance and cooperation 4. Opening job opportunities 5. Directing tourists
4	Research Institutions	1. Conduct an inventory of the potential of marine ecotourism areas 2. Provide education and training 3. Conduct ongoing research
5	Non-Governmental Organizations (NGOs) and Community	1. Conduct development of marine ecotourism activities 2. Provide support and commitment 3. Volunteer 4. Supervise the area

Source: *Arlin (2015) in (Yulius et al., 2018)*

Development of marine tourism has the main components, includes culture of 60%, nature of 35%, and manmade of 5%. From the nature component, there are three sub-components, which are ecological tourism, marine ecotourism, and adventure tourism. Marine ecotourism consists of three tourism zones, that are coastal zone, marine zone, and underwater tourism (Yulius et al., 2018), as shown in the following table 2.

Tab. 2   Attractions, Activities and Tourism Facilities

Tourist Area	Attractions	Activities	Facilities		Tourism Products
			Public	Private	
Coastal	1. Tradition / lifestyle in the Coastal / Fisherman Village 2. Seascapes 3. Beach/sand 4. Cultivation 5. Mangrove Forest	1. Swim 2. Sunbathe 3. Cross-culture 4. Mangrove exploration 5. Research 6. Other beach activities	1. First Aid 2. TIC 3. Coast guard 4. Toilets 5. Etc.	1. Disability 2. Elderly 3. Children	1. Culture 2. Beach Sports 3. Entertainment 4. Health 5. Ecotourism
Marine	1. Waves 2. Wind 3. Reef 4. Seagrass	1. Surfing 2. Sail 3. Fishing 4. Skiing / Jetski 5. Paragliding 6. Snorkeling 7. Subglass bottom 8. Etc.	1. First Aid 2. TIC 3. Coast guard 4. Toilets 5. Etc.	1. Disability 2. Elderly 3. Children	1. Sports 2. Entertainment 3. Adventure 4. Ecotourism
Submarine	1. Flora Fauna a. Coral b. Seagrass beds c. Sea animals 2. Cultural heritage a. City b. Dock c. Shipwreck 3. Natural symptoms	1. Fun Dive 2. Diving 3. Research dive 4. Underwater 5. Archeology 6. Research 7. Etc.	1. First Aid 2. TIC 3. Dive center 4. Toilets 5. Hospital 6. Dive Instructure 7. Equipment Dive 8. Etc.	1. Professional 2. Amateur 3. Beginner	1. Culture 2. Sports 3. Diving 4. Adventure 5. Ecotourism

Source: *(Yulius et al., 2018)*

Tab. 3   Tourism Activities That Can Be Developed

Marine Tourism	Beach Tourism
1. Beach recreation 2. Panorama 3. Resort / resort 4. Swim, sunbathe 5. Beach sports (beach volleyball, beach road, discus throwing, etc.) 6. Boating 7. Fishing 8. Mangrove tourism	1. Beach and sea recreation 2. Resort / resort 3. Diving and snorkeling tours 4. Surfing, jet skiing, banana boat, glass boat, submarine 5. Seagrass ecosystem tourism, fishing tourism, island tourism, educational tourism, fishing tourism 6. Animal tourism (turtles, dugongs, whales, dolphins, birds, mammals, crocodiles)

Source: *(Yulianda, 2007)*.

Ecotourism can be grouped into beach tourism and marine tourism (Yulianda, 2007). Beach tourism is a tourism activity that prioritizes coastal resources and the culture of coastal communities, such as recreation, sports, and the view and climate. In comparison, marine tourism is a tourism activity that prioritizes underwater resources and seawater dynamics (Yulianda, 2007).

DATA AND METHODS

The research used descriptive methods with quantitative and qualitative analysis techniques. The primary data were obtained through interviews with visitors, tour guides, coast guards, conservation actors, observations of locations and visitors, and Focus Group Discussions (FGD) with the Bhakti Alam Foundation's management in Sendang Biru, which manages tourism, village, and sub-district governments. The secondary data were obtained from the village and sub-district government offices.

Data were analyzed using SWOT analysis related to tourism management and conservation of mangroves, coral reefs, and seagrass areas. The results were used as guidelines to make policies. The policy was then used to realize sustainable tourism in Malang Regency. Based on research and coastal development plans, three groups of strategies can be drawn. Conservation of mangroves, coral reefs, and seagrass areas helped sustainably produce fish and empower communities in tourism management. The strategy was (1) aimed to conserve mangroves, coral reefs, and seagrass areas to increase sustainable fisheries products, (2) ensured the cleanliness of the beach at CMC Tiga Warna by checking visitor luggage so that the beach area can be used for snorkeling activities, (3) ensured community empowerment in tourism management to improve welfare. One of the policies is to limit visits to 2 hours and close the area every Thursday. SWOT analysis is carried out before determining the policy to be suggested, with the following formula:

SO = Using the maximum strength to find opportunities.
ST = Using the maximum strength to anticipate threats and to make opportunities.
WO = Minimizing weaknesses to take opportunities.
WT = Minimizes weaknesses to avoid threats
(Source: Damanik and Weber, 2006)

RESULTS AND DISCUSSION

Potential of Tiga Warna CMC
(Tiga Warna Beach, Gatra Beach and Clungup Beach)

Beaches included in the Clungup Mangrove Conservation (CMC) are Tiga Warna beach, Gatra beach and Clungup Beach. The Clungup Mangrove Conservation Area (CMC) is managed by the Gatra Olah Alam Lestari (GOAL) Community Supervisory Group (POKMASWAS) under the auspices of the East Java Provincial Maritime and

Fisheries Office. The CMC tourism object is located in Tambakrejo village, Malang district, Indonesia, ± 72 km from the city center to the south. The location of the beach is shown in Figure 1 below.

Fig. 1
The View of the Tiga Warna Beach
Author: Sumarmi

Analysis of resources in the CMC of Tiga Warna Beach has used SWOT analysis. The results of IFAS and EFAS matrix rating weights were shown in table 4.

The quadrant diagram of the results of the SWOT analysis on the CMC of Tiga Warna beach can be seen in the following figure 2.

The CMC of Tiga Warna beach was located in quadrant 1, with an x value of 0.5 and y of 0.45. The value of x is an internal factor obtained from strength (S) minus weakness (W), while the value of y is an external factor obtained from opportunity (O) reduced by threat (T). The CMC of Tiga Warna beach attractions was in quadrant 1 means that the object is in developing status. The position of the area is in the Stable Growth Strategy, which is a stable growth strategy where the development is carried out in stages, and the target is adjusted to the conditions. The SO (White Area) strategy in The CMC of Tiga Warna beach means that the beach has prospective opportunities and also has advantages and opportunities

Tab. 4 The Tiga Warna Beach IFAS and EFAS CMC Matrix

Internal factors	Weight	Rating	Score
Strength			
1. View and well-maintained cleanliness	0.15	5	0.75
2. Security that is maintained conducive	0.10	5	0.50
3. Education on plastic waste management with the eco break	0.15	5	0.75
4. Beautiful mangrove conservation	0.15	5	0.75
5. Conservation of the reef	0.15	5	0.75
6. There are beach sports areas (swimming, snorkeling, and diving)	0.05	4	0.20
7. Community involvement as beach manager	0.15	5	0.75
8. Use of social media for communication with potential visitors	0.10	3	0.30
Total			**4.75**
Weakness	Weight	Rating	Score
1. Unclear entrance gate	0.20	5	1.00
2. Access roads that difficult and far	0.25	4	1.00
3. Tourism support infrastructure is still limited	0.20	4	0.80
4. Limited promotion by The Tourism Department Lack of	0.15	3	0.45
direction sign	0.20	5	1.00
Total			**4.25**
X= Strength-Weakness			**0.50**
External Factors			
Opportunity	Weight	Rating	Score
1. The beach with three colors at high tide	0.20	4	0.80
2. Providing opportunities for research related to conservation	0.25	5	1.25
3. There are already regulations that govern the development of coastal tourism	0.10	4	0.40
4. As a special interest tour for beach sports	0.10	4	0.40
5. The involvement of local communities is good	0.10	5	0.50
6. The number of visitors is already a lot	0.10	4'	0.40
7. Conducting snorkeling and diving national level competition	0.15	5	0.75
Total			**4.50**
Threat	Weight	Rating	Score
1. There are no investors yet	0.20	3	0.60
2. The threat of garbage from the river mouth and TPI during the rainy season	0.25	5	1.25
3. Collection of mangrove wood for fuel	0.20	4	0.80
4. Attraction of other beaches with easier access	0.15	4	0.60
5. Lack of awareness of visitors to do conservation	0.20	4	0.80
Total			**4.05**
Y=Opportunities-Threats			**0.45**

Author: *Sumarmi*
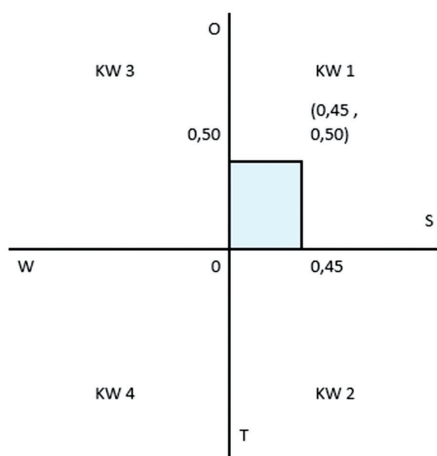
Fig. 2
Quadrant Results of SWOT Analysis
Author: Sumarmi

for developing existing potential. The strategy that must be applied in this condition is to support an aggressive growth policy (Growth-oriented strategy). Based on these conditions, the CMC of Tiga Warna beach must carry out a development strategy with a good conservation strategy for the CMC (Tiga Warna beach, Gatra beach, and Clungup beach).

**Ecotourism Development in the CMC of Tiga Warna Beach
for Conservation and Education**

In addition to providing natural view, the Tiga Warna beach also has conservative and educative regulations for tourists. The regulation educated tourists to maintain cleanliness and nature conservation was a crucial and mandatory thing to do. The beach is included in the rehabilitation and conservation area of Mangroves, Coral Reefs and Protection Forest of Sitiarjo Village, Sumber Manjing Wetan District, Malang Regency. The beach has 15 characteristics, which are (1) has 3 colors of seawater, (2) coral reefs and marine life are maintained, (3) beautiful snorkeling areas, (4) must use floats when snorkeling, (5) has white clean sand (6) can only be visited by 100 people per day, (7) must book before visiting, (8) every visitor must be accompanied by a guide, (9) discipline was rigorous relating to waste, (10) the visit time is only 2 hours, (11) only walking distance from the parking location, (12) no camping, (13) surrounded by forest, 14) no public transportation, (15) being in an area with another beach (Tiga Warna beach, Gatra beach, Clungup beach).

(1)   (2)

Fig. 3
Activities Mangrove Conservation on the Clungup Beach
Author: Sumarmi

Mangrove conservation has succeeded in changing land cover from year to year, as shown in the map of 2010, 2015, and 2020.
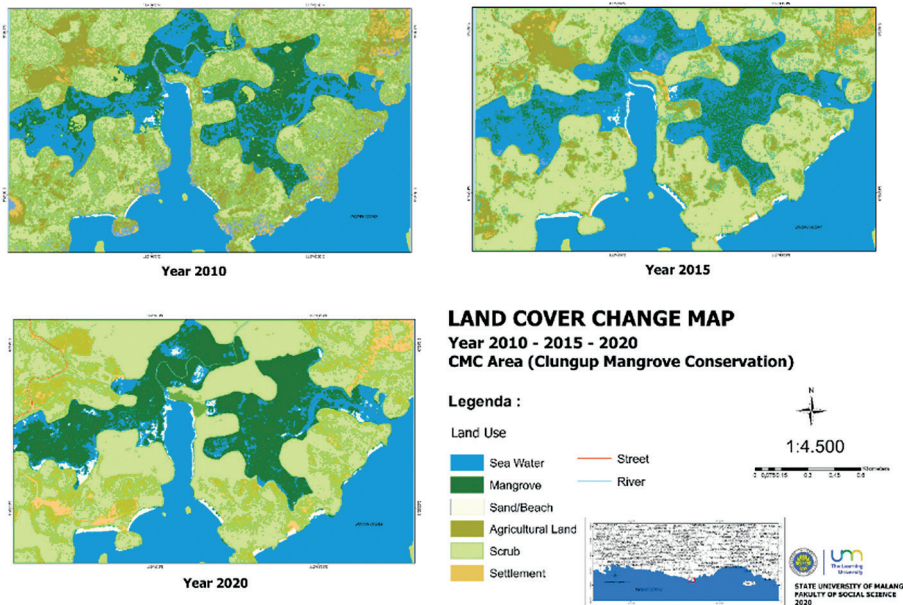
Fig. 4
Map of Tiga Warna Beach, Clungup Beach and Gatra Beach
Author: Sumarmi

Besides the conservation of mangroves, this area also transplants coral reefs.

| (1) | (2) |

Fig. 5
Coral Reefs Transplantation on the Tiga Warna Beach
Author: Sumarmi

The management of Tiga Warna Beach applied a reservation system for only 100 visitors per session or 10 groups per day. The tourists are required to make reservations in advance through social media application and or by phone before visiting. Also, visitors must use a local tour guide service to accompany and at the same time, be an example while in the Tiga Warna beach. The tour guide will also remind if tourists do things that can damage the preservation of nature in Tiga Warna Beach. The manager checked travelers' bag, especially packaged food and drinks that can cause trash. All items will be rechecked when tourists leave the location. It is done to ensure the cleanliness and sustainability of the beach.

Also, visitors were required to pay an entrance ticket worth 1 mangrove tree of Rp. 10,000 and Rp 100,000 for tour guide services. Since the beginning of September 2015, the management has implemented a system of one day a week off every Thursday. This holiday is used by managers and residents around to clean the village in the tourist area. Each group is only given 2 hours to enjoy all the view at Tiga Warna Beach, and the tour guide will remind when the time is up.

Though sacrificing economic value, the decision was taken in order to maintain the balance of the ecosystem. During the long holiday, such as at the new year or Eid al-Fitr, CMC Tiga Warna will close entirely from tourist visits. According to the management, human intervention during the peak season will be dangerous to the ecology in the surrounding area. For the ongoing rehabilitation process, the manager of the CMC of Tiga Warna beach provided an opportunity for nature to 'rest' from tourist visits. Not only economic value is prioritized, but also the sustainability of a natural tourist attraction (Odum, 2018). So, during the pandemic of COVID-19 and after, this tourist area remains closed to visitors.

Gatra Beach is also included in the Clungup Mangrove Conservation Area. The trip to the beach through the hills that are not too high with a very charming and

beautiful view. Gatra Beach is included in the conservation area so that not just anyone can enter the beach. Tourists who want to enter the Tiga Warna beach must obtain a permit from the Clungup Mangrove Conservation as the manager. It is done to maintain the cleanliness and view of the beach. Therefore, the beach remains clean from trash and beautiful view.

The Community Role in Community-Based Tourism to Make Sustainable Conservation Activities

Community participation in the existing tourism system is closely related to 2 main organizations that have a significant role in the South Malang tourist destination, that are Perhutani (a government-owned corporation that manages forest in Indonesia) Malang and the Malang District Tourism Office. Based on the interviews with the Head of Promotion of PD Jasa Yasa, it is known that there are a management agreement and a tourism partnership between the community and the organizations. The partnership is divided into 2, between the community in collaboration with the Government of Malang Regency through the POKDARWIS (Tourism Awareness Group) and the community in partnership with Perhutani Malang through LMDH (Forest Village Community Institution). The majority of tourism destination management is carried out by LMDH under Perhutani, while POKDARWIS functioned when there are events held by the Malang Regency Tourism Office. Some of them are the Clungup Mangroove Conservation (CMC) group which oversees several beach destinations (Ramanda, Hakim and Pangestuti, 2020). Coastal Forest Conservation Unit and MPA were doing plantations, mangrove planting, care of protected plants and mangroves, coral transplantation, maintenance of coral reefs, floating net cages, construction and management of fish apartments, community service in CMC conservation areas every Thursday, socializing to the encroachers the forest about the importance of coastal conservation.

DISCUSSION

Since 1990, three-color CMC has undergone many changes. In 1998-2003, there was a shift function of the protected forest to a pond and plantation area which was motivated by the monetary crisis in Indonesia. The year 2005 was the start of the movement by Mr P. Saptoyo and friends to plant mangroves on Clungup Beach, and the POKMASWAS was established with the chairman of Mr Praminto to expand the Protection and Conservation Areas to the Tiga Warna beach.

In 2012, the Gatra Olah Alam Lestari Supervisory Community Group (GOAL POKMASWAS) was formed to map identification of mangrove damage, replant mangroves, approach farmers and pond owners, provide information on Law No. 27 of 2007 about Coastal and Small Islands Management and outreach rehabilitation/restoration of the land. Also, strengthening supervision of natural resources

by banning bird hunters, bombers and fish scavengers, fishermen who dump oil into the sea, poachers of wildlife and illegal loggers.

In 2013 there was a change in cropping patterns for annual crops such as corn, cassava, sugar cane into banana plants. The manager also made a donation system of IDR 6,000 for the mangrove tree. The tour guide income was given a maximum of Rp 300,000 per month, which was named "Salary from Nature for us". Also, checking the visitor trash constantly so it will not damage the mangroves. In 2015 community empowerment became wider so that people who previously disa-greed now understood. Some groups are involved in plantings, such as the Santri Masjid group, the GKJW Youth Group, and Conservation Education activities that can rehabilitate 8 hectares of land per year.

Also, in 2015, the mangrove donation system was eliminated into a ticket system for IDR 5,000 per person. The system rises because of the lack of visitor awareness to engage in mangrove recovery. On 21 September 2015, it was agreed as the birth of a shared passion for rehabilitating and conserving mangroves and coral reefs by GOAL POKMASWAS. The activity marked by an offering ceremony with the theme "Ngupadi Tirta Wening" (preserving clear water). The theme was taken to provide awareness to the entire community to protect clean water so that the coral reefs in the CMC of Tiga Warna area can be well preserved.

Furthermore, the change of the Clungup Mangrove Conservation branding becomes CMC Tiga Warna consisting of 8 beaches, which are Clungup beach, Gatra beach, Bangsong beach, Asmoro beach, Sapana beach, Mini beach, Batu Pecah beach, Tiga Warna Beach, and Floating House. In 2016, ecotourism guide certification was carried out for the CMC Tiga Warna Crew to improve the quality of services in collaboration with the Department of Maritime Affairs and Fisheries (DKP) of Malang Regency, as well as access to mining boats that usually transport guests to Sempu Island began to be used to transport guests to Tiga Warna beach.

The coastal area of Malang Regency is one of the regions in East Java that has a lot of marine and fisheries potential. The potential resources in Malang Regency are still not optimally documented. It is due to several obstacles such as equipment and competent personnel to manage the damage, prevention and repair. So, the Technical Implementation Unit of the Port and the Management of Marine and Fisheries Resources 'Pondok Dadap' carried out ecosystem monitoring to manage the potential and richness of coral reef ecosystems in Malang Regency. The purpose is to build a database of coral reef potentials, varying from areas to species distribution as a basis for determining the direction of community-based coral reef development and management. The method of monitoring used the direct obser-vation method. The data taken include data on the coral growth and types of coral fish and another biota that live around the Kondang Buntung reef area. Monitoring equipment is underwater cameras, scuba sets, boats, and Google earth.

The results obtained showed that the bottom waters in the location are rocky. In shallow areas, the bottom of sandy waters is mixed with clay whereas, in deeper areas, the contours of the bottom waters are slightly steep. The Coral Reef area has a depth of 2-8 m contained coral in the large size. At depths of > 8 m with a sandy substrate, there are artificial coral reefs and fish houses. Observation obtained showed 7 dominants of coral growth in the Tiga Warna beach of the Sempu strait, which are (a) branching, (b) foliose (sheet), (c) tabulate Acropora, (d) Fungi, (e) massive (solid), (f) encrusting, (g) soft coral. Directions for management of coral reef areas include (a) prevention of destruction of coral reefs, (b) utilization of marine resources that do not damage coral reefs, (c) rehabilitation of damaged coral reefs, (d) research and tourism development, and (e) expansion of artificial coral reefs (Fandeli, 2002; Dahuri, 2003; Yulianda, 2007).

In addition to providing natural view, the CMC of Tiga Warna also has educative regulations for tourists to maintain the cleanliness and preservation of nature. The CMC of Tiga Warna area is included in the rehabilitation and conservation area of Mangrove, Coral Reef and Protection Forest of Sitiarjo Village, Sumber Manjing Wetan District, Malang Regency. The management of Tiga Warna beach applied a reservation system, and there are visitor restrictions.

The characteristics of the CMC of Tiga Warna ecotourism were beaches with soft white sand, clear seawater with 3 colors, coral reefs and surrounded by protected forests. There is protected forest conservation managed by the Bhakti Alam Foundation and managed directly by residents around the coast. Management of CMC ecotourism managed the development of tourist objects consisting of 1) tourist objects and attractions 2) existing facilities and infrastructure in tourism 3) marketing and tourism promotion 4) human resources around the CMC of Tiga Warna (Yachya, Wilopo and Mawardi, 2016; Darmawan, 2017).

The CMC management of Tiga Warna involves the surrounding community to protect the environment so that the tourism area can stay and be enjoy by the next generation. Also, regional tourism management will improve the economy of the surrounding community. Bakti Alam Foundation implements a conservation system in the management. It showed from the income from ticket sales used for planting trees around the beach tourism area. Besides, it also maintains the cleanliness of tourist objects and sets a limit on the number of visitors each day. Bakti Alam Foundation also manages the coastal area with the help of non-governmental organizations to increase income and create jobs for the surrounding community.

The results showed that the application of CBT in the TCMC of Tiga Warna area was very well, seen from the participation of group members in all aspects, such as improving the quality of life of group members and environmental sustainability. Also, the economic impact felt by the surrounding community has been well seen

from the funds for groups, job creation, increased income of local communities, and the distribution of profits fairly.

The results showed that in general the 5 principles of community-based ecotourism had been implemented well in the management of the CMC of Tiga Warna area, although current conditions still needed to be improved. The principle of nature conservation has been taken seriously in management considerations. The principle of cultural conservation still needs to be maximized. The principle of community participation is good and needs to be maximized through collaboration with all levels of the local community (Asmit and Syahza, 2020). Economic principles in management have provided economic improvement from ecotourism activities so that welfare has increased (Kurniawati, Sumarmi and Aliman, 2020). The principle of education has been going well, one of which is creating creations from waste management, conserving mangroves, and conserving coral reefs and popularizing regional uniqueness and local wisdom (Sumarmi et al., 2020; Sumarmi, Kurniawati and Aliman, 2020). The provision of supporting facilities needs to be improved by making standard operating procedures (Pendit, 1986; Demartoto, 2009; Husamah and Hudha, 2018).

There are three alternative strategies to develop these attractions, which are (1) optimizing all available potentials, to realize sustainable tourism management, (2) involving various parties to collaborate in efforts to improve, maintain and optimize ecotourism, (3) increase the existing tourist attraction by increasing the quality of integrated facilities and infrastructure to increase competitiveness in attracting tourist visits, and (4) building tourism partnerships to increase the acceleration of economic growth in supporting regional income (Yoety, 1997; Senoaji, 2009; Domo, Zulkarnaini and Yoswaty, 2017; Insani et al., 2019).

CONCLUSIONS

Based on the results of the Three-Color CMC analysis, it has high potential and prospective opportunities for the development of existing potential. The management of Tiga Warna Beach applies a reservation system, and there are visitor restrictions. The quota for admission to tourist sites may not exceed 100 people per wave, and the maximum quota per group is 10 people. Prospective Three-Color Beach tourists are required to make a reservation in advance using the application of social media and telephone before visiting this beach. When visiting, a tour guide must be accompanied by a rubbish checklist. Activities are undertaken by the Coastal Forest Conservation Unit and MPA Nurseries: Mangrove Planting, Care of protected plants and Mangroves, Coral reef transplantation, Care of coral reefs, Floating Net Cages, Making and managing Fish Apartments, Community Service in CMC conservation areas every Thursday, socializing to the forest encroachers. All activities are carried out for the sustainability of the CMC Tiga Warna Ecotourism.

The management of the Three-Color CMC can be used as a model for managing coastal ecotourism that promotes sustainability.

Acknowledgement

REFERENCES

ALI, D. (2004). *Pemanfaatan Potensi Sumberdaya Pantai sebagai Obyek Wisata dan Tingkat Kesejahteraan Masyarakat Sekitar Lokasi Wisata (Shull Kamm di Kawasan Wisata Pantai Kartini Jepara)* [Coastel Resource as a Tourism Site and Increasing Social Welfare for The People Nearby]. Masters. Program Pascasarjana Universitas Diponegoro. http://eprints.undip.ac.id/12728/

ANDRONICUS, A., YULIANDA, F. and FAHRUDIN, A. (2016). Kajian Keberlanjutan Pengelolaan Ekowisata Berbasis Daerah Perlindungan Laut (DPL) di Pesisir Desa Bahoi, Minahasa Utara, Sulawesi Utara. [The Sustainability of Marine Protected Area Based Ecotourism Management (DPL) in the Coastal Areas of Bahoi Village, North Minahasa, North Sulawesi]. *Journal of Engineering and Management in Industrial System*, 4(1), pp. 1–10. https://doi.org/10.21776/ub.jemis.2016.004.01.1

ASMIT, B. and SYAHZA, A. (2020). Opportunities and Prospect for Tourism Deveopmnet on Rupat Island, Indonesia. *Folia Geographica*, 62(2).

BORLIDO, T. and COROMINA, L. (2018). Social Capital as Cause and Consequence of Rural Touristic Development: The Case of Lindoso (Portugal). *European Journal of Tourism Research*, 19, pp. 71–85.

DAHURI, R. (2003). Paradigma Baru Pembangunan Indonesia Berbasis Kelautan [A New Paradigm for Marine-Based Indonesian Development]. [Online] Available from: http://repository.ipb.ac.id/handle/123456789/43952 [Accessed 18/07/2020].

DAMANIK, J. and WEBER, H.F. (2006). *Perencanaan Ekowisata: Dari Teori ke Aplikasi* [Ecotourism Planning: Theory to Applications]. Yogyakarta: Penerbit Andi.

DARMAWAN, A.N. (2017). *Analisis Kesesuaian Prinsip dan Kriteria Ekowisata Pantai Tiga Warna Desa Tambakrejo Kabupaten Malang* [Conformity of Principles Analysis and Criteria for Tri-Color Beach Ecotourism in Tambakrejo Village, Malang Regency]. Sarjana. Universitas Brawijaya. http://repository.ub.ac.id/493/

DEMARTOTO, A. (2009). Pembangunan Pariwisata Berbasis Masyarakat [Community-Based Tourism Development]. Surakarta: Sebelas Maret University Press. http://catalog.hathitrust.org/api/volumes/oclc/494995588.html

DOMO, A.M., ZULKARNAINI, Z. and YOSWATY, D. (2017). Analisis Kesesuaian dan Daya Dukung Kawasan Wisata Pantai (Studi Pantai Indah Sergang Laut di Pulau Singkep) [Analysis of Suitability and Supporting Capacity of Coastal Tourism Areas (Study of Pantai Indah Sergang Laut in Singkep Island)]. *Dinamika Lingkungan Indonesia*, 4(2), pp. 109–116. https://doi.org/10.31258/dli.4.2. p.109-116

DOWLING, R. (2003). *Community Attitudes: Tourism Development in Natural Environments*.

DOWLING, R.K. (1998). Tourism and Sustainability: Principles to Practice. *Tourism Management*, 19(4), pp. 396–398.

FANDELI, C. (2002). *Perencanaan Kepariwisataan Alam* [Natural Tourism Planning]. Fakultas Kehutanan, Universitas Gajah Mada.

HUSAMAH, H. and HUDHA, A.M. (2018). Evaluasi Implementasi Prinsip Ekowisata Berbasis Masyarakat dalam Pengelolaan Clungup Mangrove Conservation Sumbermanjing Wetan, Malang [Evaluation of the Community-Based Ecotourism Principles Implementation in Mangrove Conservation Management, Clungup Sumbermanjing Wetan, Malang]. *Journal of Natural Resources and Environmental Management*, 8(1), pp. 86–95. https://doi.org/10.29244/jpsl.8.1.86-95

INSANI, N., A'RACHMAN, F.R., SANJIWANI, P.K., IMAMUDDIN, F. (2019). Studi Kesesuaian dan Strategi Pengelolaan Ekowisata Pantai Ungapan, Kabupaten Malang untuk Pengembangan Pariwisata Berkelanjutan [Suitability and Management Strategy of Ecotourism in Ungapan Beach, Malang Regency for Sustainable Tourism Development]. *Jurnal Teori dan Praksis Pembelajaran IPS*, 4(1), pp. 49–58. https://doi.org/10.17977/um022v4i12019p049

KURNIAWATI, E., SUMARMI, S., ALIMAN, M. (2020). Participation of Green Environmental Group and Ulur-ulur Local Wisdom on Buret Lake Ecotourism Management in Karst Area of Tulungagung, Indonesia. *GeoJournal of Tourism and Geosites*, 30(2 supplement), pp. 889–895. https://doi.org/10.30892/gtg.302spl15-519

MATLOVIČ, R., and MATLOVIČOVÁ, K. (2016) The Position of Tourism and Territorial Marketing in the Context of Paradigmatic Change to Tertiary Geography Education in Slovakia. *GeoJournal of Tourism and Geosites*, 9, 2(18), pp 133-144.

MATLOVIČOVÁ, K., KOLESÁROVÁ, J., MATLOVIČ, R. (2016): Selected Theoretical Aspects of the Destination Marketing Based on Participation of Marginalized Communities (Vybrané teoretické aspekty destinacneho marketingu založeného na participácii marginalizovanych komunit.) In: *Hotelnictvi, turizmus a vzdelavani: sborník recenzovaných prispevku z 8. rocniku mezinarodni vedecke konference*, Praha: Vysoká škola hotelová, ISBN 978-80-87411-75-9. - S. 128-143

MCINTYRE, G., HETHERINGTON, A. and INSKEEP, E. (1993). *Sustainable Tourism Development: Guide for Local Planners*. 1st edition. Madrid, Spain: Unipub.

ODUM, C. (2018). Evaluation of Potential Ecotourism Attractions for Sustainable Tourism Development in Anambra State, Nigeria: Supervisors: Associate Pro-

fessor Elizabeth Andrew-Essien Dr. Eja Iwara Eja. Institution awarding the Ph. D. Degree: University of Calabar, Calabar, Cross River State, Nigeria. Date of defence: 20/07/ 2017. *European Journal of Tourism Research*, 20, pp. 134–136.

ORGANIZATION, W.T. (1998). *Guide for Local Authorities on Developing Sustainable Tourism*. Madrid: World Tourism Organization.

OŤAHEĽ, J., MATLOVIČ, R., MATLOVIČOVÁ, K., MICHAELI, E., & VILČEK, J. (2019). Critical Approaches, Integration of Research and Relevance of Geography. *Geografický Časopis*, 71(4), pp 341-361. https://doi.org/10.31577/geogrcas.2019.71.4.18

PENDIT, N.S. (1986). Ilmu Pariwisata: Sebuah Pengantar Perdana [Tourism Science: An Introduction]. Pradnya Paramita.

RAMANDA, P., HAKIM, L. and PANGESTUTI, E. (2020). Partisipasi Masyarakat dalam Pengelolaan Objek dan Daya Tarik Wisata Koridor Jalur Lintas Selatan Kabupaten Malang [Community Participation in Management of Objects and Tourist Attractions of the Southern Cross Route Corridor in Malang Regency]. Profit: *Jurnal Administrasi Bisnis*, 14(1), pp. 22–31. https://doi.org/10.21776/ub.profit.2020.014.01.3

SENOAJI, G. (2009). Daya Dukung Lingkungan dan Kesesuaian Lahan dalam Pengembangan Pulau Enggano Bengkulu [Environmental Supporting Capacity and Land Suitability in Enggano Island Development, Bengkulu]. *Bumi Lestari Journal of Environment*, 9(2), pp. 159–166.

SUGIAMA, A.G. (2014). *Kerangka Kerja Konseptual Pengembangan Aset Desa Wisata* [The Conceptual Framework of Tourism Village Asset Development].

SUMARMI., BACHRI, S., IRAWAN, L.Y., et al. (2020a) Cultural Ecology of Osing in Development of Kemiren Tourist Village as International Tourist Attraction. *IOP Conference Series: Earth and Environmental Science*, 485, p. 012017.

SUMARMI, S., KURNIAWATI, E., ALIMAN, M. (2020b) Community Based Tourism (CBT) to Establish Blue Economy and Improve Public Welfare for Fishing Tourism Development in Klatak Beach, Tulungagung, Indonesia. *GeoJournal of Tourism and Geosites*, 31(3), pp. 979–986. https://doi.org/10.30892/gtg.31307-530

THE INTERNATIONAL ECOTOURIM SOCIETY. (2020). What Is Ecotourism. [Online] The International Ecotourism Society. Available from: https://ecotourism.org/what-is-ecotourism/ [Accessed 18/07/20].

UNTARI, S., SUHARTO, Y. (2020). The Development of Youth and Woman Entrepreneurship Program in Village Tourism Through Partnership. *GeoJournal of Tourism and Geosites*, 33(4spl), 1538–1544. https://doi.org/10.30892/gtg.334spl14-605

YACHYA, A.N., WILOPO and MAWARDI, M.K. (2016). Pengelolaan Kawasan Wisata sebagai Upaya Peningkatan Ekonomi Masyarakat Berbasis CBT (Community Based Tourism) (Studi pada Kawasan Wisata Pantai Clungup Kabupaten Malang) [Management of Tourism Areas to Improve Community Economy Based on CBT (Community Based Tourism) (Study on the Clungup Beach Tourism Area, Malang Regency)]. *Jurnal Administrasi Bisnis*, 39(2), pp. 107-116–116.

YOETY, O.A. (1997). *Perencanaan & Pengembangan Pariwisata* [Tourism planning & development]. Pradnya Paramita.

YULIANDA, F. (2007). Ekowisata Bahari sebagai Alternatif Pemanfaatan Sumber-daya Pesisir berbasis Konservasi [Marine Ecotourism as an Alternative of Conservation-Based Coastal Resources]. In: *Makalah Seminar Sains*.

YULIUS., RAHMANIA, R., KADARWATI, U.R., RAMDHAN, M., et al. (2018) *Kriteria Penetapan Zona Ekowisata Bahari* [Criteria for Establishing Marine Ecotourism Zones]. Marine Research Center, Marine and Fisheries Research and Human Resources Agency. Marine and Fisheries Ministry.

ACCEPT OR AGAINST THE CHANGE:
THE ADAPTATION OF THE *LOR BRANTAS* SOCIETY
TOWARDS THE DEVELOPMENT OF BATU CITY

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Abstract

The Batu City is a dynamic region located in East Java Province, Indonesia. Since the Majapahit era, the city has given a significant contribution to the area development. The contribution has become more remarkable since the city's appointment is becoming an autonomous area in 2001, resulting in the city's significant regional income. The economic development of Batu City is above the average of national growth. One of the essential factors that support rapid development is the city's ability to explore local potentials that have been improved long before the city became an autonomous region. The exploration has become a significant improvement in Batu. The social changes in Batu city are also supported by the achievement of the people of the Lor Brantas area, such as cultivation and plantation activities that finally becomes the icon of the city, the city of apples. As the local product of Batu City, apple plants have taken the people to achieve prosperity as more farmers continue to grow the plants. The achievement has a significant effect on the pride of a particular community.The people's attachment to the villages and the potential within supports the area pride, especially regarding the natural resources represented by a motto called tirto (water), giri (mountain), and wono (forest). This research aims at describing the social changes that occur within the people of the Lor Brantas area in Batu City. The problems of the study consist of what are the changes that occur in Batu? How do the people of the Lor Brantas (North Brantas) area react towards the city changes? And at which adaptation context does the change of the Lor Brantas area occur? This research method is the qualitative model with an ethnography approach. The data collection was done by interview, participatory and non-participatory observation, and document study. Simultaneously, the data analysis is by the interactive model of analysis that consists of several stages: data collection, data reduction, data presentation, and conclusion drawing. The researcher will treat the stages as a cycle flow.

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INTRODUCTION

The Batu City is a dynamic place located in East Java Province. Since the Majapahit era, the city has given a significant contribution to the area development. The contribution has become more remarkable since the city's appointment is becoming an autonomous area in 2001, resulting in the city's significant regional income. The economic development of Batu city is above the average of national growth. One of the essential factors that support rapid development is the city's ability to explore local potentials that have been improved long before the city became an autonomous region. The exploration has become a significant improvement in Batu.

The social changes in Batu City are also supported by the achievement of the people of the *Lor Brantas* area, such as cultivation and plantation activities that finally becomes the icon of the city, the city of apples. As the local product of Batu City, apple plants have taken the people to achieve prosperity as more farmers continue to grow the plants. The achievement has a significant effect on the pride of a particular community. The people's attachment to the villages and the potential within supports the area pride, especially regarding the natural resources represented by a motto called *tirto (water), giri (mountain),* and *wono (forest)*.

Referring to the term, *Lor Brantas* (North *Brantas*), it shows the area division based on the *Brantas* River. For the local people, the river has ecological, economical and social functions; one of them is as a remark. In general, Javanese people make remarks based on the closest environment, including natural resources such as rivers. In Yogyakarta (401 Kilometres form Batu City), for instance, the Progo River holds a significant function for the local people; eventually, they split their territory based on the river; now, there are *Kulon Progo* and *Wetan Progo* areas. In the end, the *Lor Brantas* does not only serve as territorial remark but also as the diversifying factor of the livelihood and culture of a particular group of people.

This study does not merely consider community term as the taken for granted issue or has become viral among the Batu people. Moreover, to view the social change that occurs in the community. The researcher considers that the *Lor Brantas* (North *Brantas*) has become a determinant group for significant changes in Batu City.

Based on the previous explanation, the researcher aims at elaborating the existence of the *Lor Brantas* (North *Brantas*) by considering two main reasons: (a) the term tracing is essential as a contribution towards the history of Batu City, where the original character of the people is as farmers. These people are creative in developing seeds. The *Lor Brantas* (North *Brantas*) has been a home for many public figures in the agricultural field from the local to the national level; (b) the significant role of the *Lor Brantas* (North *Brantas*) in contributing to the social change in

the Batu City.There are two protests and significant movements initiated by the *Lor Brantas* (North *Brantas*) community; they are the rejection to sell water to the Local Government of Malang in the year 2004 and the hotel building's rejection at Bulukerto village, which was located near to the water sources in the year 2011-2015. Both movements were one of the massive movement after the establishment of the administrative City of Batu. In considering the massive effect of the movements initiated by the *Lor Brantas* (North *Brantas*) people, it can be said that analyzing the social changes of the *Lor Brantas* (North *Brantas*) community can represent the description of the people of Batu City in general.

Another curiousness that appears is that the Batu City has improved in becoming the city tourism of Batu (KWB/ *Kota Wisata Batu*). the topic is interesting because there have not been any similar studies on the community of the Batu people that can explain the territory based on the river landscape. The existing studies tend to focus more on the term usage of *Lor Brantas* (North *Brantas*) and *Kidul Brantas* (South *Brantas*) without connection to society's dynamic. Besides, the community's study has become a need considering that the repeated social order becomes an essential lesson to learn about a particular region.

Social change and innovation were initiated by the discourse between innovation and social change (Reeler, 2007, Ramella, 2018). In this event, innovation focuses more on the change within the social system brought by an innovator. During this discourse the change is considered significant and has positive values, while in point two, the social system emphasizes more on the pattern based on culture, economical process, or political process that hampers the innovation growth resulting in the rise of negative result; or in other words, it restricts the change to from occurring (Damanik, 2010).

The above statement is also supported by which spotted several innovations within society growth, resulting in disruptive effect towards the existing social change (Christensen et al, 2007). The unexpected direction of change can have negative impacts on society itself.

To understand the social change, it is necessary to embed the values and goals because values can reveal the individual's quality that must support the process and have purposes. (Sztompka, 2004), (Practice, Holmes, 2007). In this context, a process of value is implementing existing values in the daily life of the society that might cause social change; this supports the subsistence theory from Scott (2019).

Also views the effect of social change towards the development of an individual, the social change as it is, and how an individual with good self-development will form and affect his/her social environment heading to the desired social change (Trommsdorff, 2010). Haferkamp and Smelser (1950) divide three main components of social change concept that must exist; they are structural determinant, social change process and mechanism, and social change purposes. The interrelationship among these three components, with the aid from the cultural

situation, will produce different views on how the social change in a particular area has run well or not. Healy (1998) also explains the planned social change and the community change about how the community grows in a region and becomes an exclusive group over other newcomers in Batu City. As Wagemans (2013) stated by means here, the exclusive group is a settled group that can dominate the majority of the commodity market.) gives the detail of the primary explanation related to the densest concept and factor in the social change components (Anderson, 2012). In the context of social change, the change is due to the physical and abiotic environment, while the demography factor also becomes the benchmark and supporting system for the actor of social change to reach the purposes. It is best to have support also from the adequate human resources (Salim, 2002)

Welzel et al (2001) also provide a statement related to how the factor of demography, economy, social, and culture become the primary factors in social change. Lauer (1993), Hallinan (1997) and Breman (2004) also states that the change can face a logical consideration on risks; this reflects that the farmers' risks change as the city develops, representing that the subsistence concept still becomes the primary aspect of social adaptation. Based on the logical concept, Batu's social change is considered radical towards people's life, especially in Batu City. Nevertheless, the research will conduct a study on the critical change review in Batu City. the social change is expected to benefit all parties, not only for the investors or capital owners (Sugihardjo, 2013). As Bimbi (2017) stated, tourism development is believed to bring another social change that might provide benefits for all levels of society. Similarly, Fitari (2016) the development process to finalize the concept of social change requires collective synergy from all parties states that the synergy does not only from the local society, but also from the government, private sectors, and educational institution (higher education).the relationship among stakeholders must be clear and directed, both in terms of roles and responsibility of each party. A similar opinion by stated that social change requires harmony among related sectors. The synergy aims at eliminating society's inhibitors in the future (Lewin, 2016).

Based on the literature analysis, related to the gap analysis as the focus of the research, Cahyono et al (2011) explained the history of Batu City from the socio-cultural characteristics and figures from time to time, the series of social and cultural events from the pre-historic era to the establishment of Batu as an autonomous region. The researcher also describes the agriculture and tourism as an economy basis of the Batu City.A similar situation occurs in the historical background of the tourism sector in Batu since the Dutch colonialism. The researcher explained that the ecological potential had become positive support to the tourism sector. The approach used is the historical approach. The dynamic of the Dutch colonialism in Batu City is explained in detail; nevertheless, there is no explanation on the social change in the regional autonomy era. The determinant actors and the characteristics of the change are not explained in detail.

Besides, there is an additional analysis on the book written by Sukrisman et.al (2014) that explains on the tourism and agricultural trace of Batu City based on time-zone, namely pre-colonialism, the Dutch East Indies era, the Old Sibling era, the era of administrative city, to the era of an autonomous region.This research is a data-base that learns about the potentials of the city, such as Dutch heritage buildings, during the New Order, there were buildings that also support the city as tourism city. In this book, there is an explanation of the creative characteristics of farmers in Batu. explains that acculturation is understanding this phenomenon which results when groups of individuals have different cultures that enter the first continous that enter the first continous contact, with subsequent changes in the original or other cultural patterns or even the two groups, the midway between confrontation and fusion (Bakker, 1984). there is a strategy by the mayor of the city to promote Batu to the investors in the form of organic agricultural product.The weakness of this book is that it does not explain the causes of social changes in Batu City,Instead, it makes the state to become the main actor of social change.

Debora Sulistyo, (2014) explains the origin of the village names, urban village, and places in the City that are based on legends and myth that developed in the words of mouth tradition in the society. Unfortunately, it does not describe social change since the establishment of Batu City as the autonomous region. The data source is from direct information besides the accountable documentation The creation of more liveable cities was one of the most important objectives of projects. (Kecskés and Kozma, 2020).

The gap between a theoretical concept and field finding encourages the re-searcher to conduct a research entitled to accept or against the change: the adapta-tion of the *Lor Brantas* society towards the development of Batu City. This research aims at describing the social changes that occur within the people of the *Lor Brantas* area in Batu City. The problems of the study consist of what are the changes that occur in Batu? How do the people of the *Lor Brantas* area react towards the city changes? And at which adaptation context does the change of the *Lor Brantas* area occur? The contribution of this manuscript, it will be develop about knowledge of Batu City and how dynamics the social change it happen on Batu City.

METHODS

This research is an ethnography study that describes the actors living in the sur-rounding of natural resources where they interact with the environment to notice the signs of natural disasters. The sites of the research include three villages, namely Bumiaji, Sidomulyo, and Bulukerto. Based on information and the people's knowl-edge, the three villages are within the *Lor Brantas*. Administratively, the Bumiaji and Bulukerto villages are located in the Bumiaji sub-district while the Sidomulyo village is in the Batu sub-district. Despite the different administrative boundaries,

the three villages'cultural characteristics have become the basis for choosing the *Lor Brantas* society areas.

An in-depth interview is a primary instrument where the researcher is trying to observe the ' actors 'perception and point of view in responding to social changes related to the general issue of society. Nevertheless, most observation was done through discussion to consider that the researcher could approach the actors well

In completing the above data, the researchers also conducted a document study. The documents included the village monographs and several private documents of the research subject(s). Fortunately, the subject(s) of the research has collected various documentation of life his/ her life events concerning the research theme. Besides, the researcher also observed villages in Batu City through mass media monitoring. Adding to that, some fellows from the movement provided documents to monitor the development gradually.

The research subjects were the local people who understood the social changes that occurred within their community; therefore, the samples were of those who were actively involved in community activities. The choice is based on considering that only the appointed ones have adequate knowledge of what is happening in their villages. Therefore, the actors appointed are (1) Formal leaders; it includes village government leaders who work for the government. In the authority concept of Max Weber, these people work with the legally rational legitimation. (2) Community activists. These people come both from permanent and non-permanent organizations. The permanent organization includes the village institutions, while the non-permanent are temporary committees of events conducted by the villages. (3) Farmers whose jobs is apple plantation or other agricultural commodities. (4) the Villages tourist activist who participated to the village's tourism activities, both the significant capital-base tourism activities and those of the village community tourism activities. The sampling technique for this research was purposive sampling, where the sample was chosen based on the research criteria; the people involved in the movements experienced and understood the social change, both as a process and result.

Data analysis was by the interactive model of analysis (Brewer, 2000). The stages for data analysis include data collection, data reduction, data presentation, dan conclusion drawing. The researcher will treat the stages as a cycle flow.

RESULTS AND DISCUSSIONS

Theoritical Framework

Through a study of a city, Modjokuto, Geertz (1986) explain that social change is determined by political conditions. Urbanization in Modjokuto is due to the integration of outside groups into a cosmpletely new pattern of socio-cultural organ-

ization. This research explains the interrelationship between social structure and also changes in human thought (cultural symbols) to an analysis of an interesting series of changes in the fundamental political economy over 100 years and culminating in a tangled thread of ideology.

Similar to Geertz, Andreasen (2002), Fatchan (2004), Soemardjan (2009), and Rahmayanti (2018) stated that change is determined by political institutions. the structural and cultural perspective of the causes of change are not the same. The structural characteristics of these changes such as formalization, centralization, and stratification are related to the degree of change both to change and to changes in attitudes. Soemardjan, (2009) study in Yogyakarta explains this change from Dutch colonialism (1775-1942), Japanese occupation (1942-1945) and the struggle for independence. Soemardjan (2009) states that social change occurs due to the pioneers of change as a leader in social institutions and social repression.

Scott's, study in Sendaka describes a peasent community that objected to resistance in a symbolic way. The green revolution gave birth to ideological social conflicts between the rich and the poor. Poor groups carry out boycotts, strikes, silent acts, they, spreading malicious gossip (Scott,2000) Scott stated that the peasants' resistance was tacit and disorganized. This acceptance is not easy, because there is alos resistance and resistance, but local leaders play important role.The aim of resistance is not overthrowing but simply running the system for the sake of minimal harm to him. This symbolic / ideological resistance is daily resistance that lasts in terms of resilience, persistence, tactical policies and flexibility (Muhammad,2019). Peasant resistance arises because subsistence ethics is threatened (Scott, 1993), (Siahaan, 1999) and (Scott, 2019).

In urban development, spatial conditions, autonomy of local and regional communities that affect studies on social change investigations, glocalization, territorial approaches, local economies, become the attention of critical geography (Ira and Matlovič, 2020) then, the study related to the development of social groups (harmony between individual and community interest), preservation of local cultural values, community stability and local economy (Nagy, 2005).

Spatial is not the determinant. According to post-positivistic spatial geography cannot solve social problems. The post positivistic discontinuity states that there has been a transition from substantial to a constructivist way of thinking (Matlovič and Matlovičová, 2020) In a situation where we see a situation of resistance and disagreement likely to arise from local residents and local stakeholder (Klamár et al, 2019). Geographical thought is still relevant to apply to cities in Indonesia, which on average have not experienced postmodern and post structuralism conditions.

UNDERSTANDING THE *LOR BRANTAS*

The *Lor Brantas* as a part of Javanese Society

Related to this journal's research, the first question to address is what the changes in Batu City are? *Brantas* River serves a significant function to support villages within its flow. The river can function to water the rice field and provide water for its surroundings, resulting in the more fertile soil in Batu City. One interesting fact is that the *Brantas* River has branches consisting of smaller rivers, such as *Lanang* River, (*Lanang* is Javanesse Language and in English means male) that runs across Pandanrejo village. As the significant function of *Brantas* River, the flow of this river is also used for the area remark. Therefore, there is a very close relationship between society and the river. There is a big possibility that the intelligent of Javanese people enable them to connect the environment with the human

The prominent characteristic is occupation differentiation. To consider that not all *Kidul Brantas* (Southern *Brantas*) areas are suitable for agriculture, some people decided not to work in the agricultural sector. Adding to the situation that most people in the area are not native people therefore, they do not have a close attachment to the area. Meanwhile, the culture of southern *Brantas* shows a contradictive fact (Susilo, 2018).

Villages of the *Lor Brantas*; a case at Bumiaji, Bulukerto, and Sidomulyo villages

Creative farmers were born from the development of the agriculture field that has become their primary profession. The farmers' culture creates social institutions that believe an area to be mystic or non-mystic. The changes in non-material aspects are affected significantly by the Islamic and Javanese cultures rooted in the area for a long time. As a result, cultural acculturation is seen in the daily life of the people. As a saying that states Islam in Batu is the right kind of Javanese Islam, supported by the fact that there is a combination of modern and traditional cultures by the agents of change through stages of knowledge, belief decision, implementation, and confirmation (Fatchan,2004). The social institution is still prominent and has power at Tlogorejo; a situation that shows the characteristics of hamlet people that supports the kinship and neighbourliness as essential local institutions. Despite being attached by similar villages, the hamlets (smaller size villages) have different characteristics. Soemardjan, (2009) states that the changing parts in social change include the social system, values, attitude, and behaviour among groups in society (Rogers, 1971) and (Soemardjan, 2009) Thus, the stable social system and structure changed, both by evolution and revolution.

The village's most prominent achievement is to receive the best standard for a community-based water management organization, known as HIPPAM *Himpunan Penduduk Pemakai Air Minum* (the cooperative association of water) in Malang and

Batu area. The organization has strong power that it has become a social institution that binds the community for years. The organization's strength is shown by the strong institutionalized social relationship among the people. Therefore, environmental changes may trigger the sensitivity of local people. This village is one of the supporters of the conservation 2011-2015 movement (Susilo, 2010).

Figures in the community have strong characteristics, such as richness, nurturing, and multi-tasking. The strong characteristics of the leader resulted in a strong bond between the society and their formal and informal leaders, in line with an analysis by Geertz (1986), Soemardjan (2009) that believe social change depends on the political situation.

Meanwhile, the Tlogorejo hamlet aims at developing the region into a tourism village. The plan has been established by the Bumiaji sub-district government and the village local government of Bumiaji. The field survey shows that the hamlet head did not understand the purpose and how to achieve it by conducting the tourism village project (Susilo, 2020).

Bulukerto Village

This village consists of various occupations, such as Kliran hamlet, that most of its people become flower farmers, while Cangar hamlet as rabbit breeder. As for the farmers of Kliran hamlet, they usually use their own land for the cultivation activities.

Each village is different from one another in terms of a structural model. There arestill negative stereotypes among hamlet due to different characteristics. The situation is also supported by the change's structural characteristics, such as formalization, centralization, and stratification concerning the stages of change, both towards physical and attitude change (Fatchan, 2004).

Bulukerto village had the village head terminated due to a lack of ability to interact with the people. Kliran people initiated the request for termination. The event is called rebellion (Merton's, 1968),. The existence of Sumber Gemulo (Gemulo Water Source) turns out to be an iconic attraction for Bulukerto Village. There where several planning to take advantage of the area, yet the local people strictly rejected it. For the first case, all people were solid to reject the policy; nevertheless, the second occurrence in the form of piping and hotel building construction was not supported by the agreement of cangar hamlets in Bulukerto Village. However the other hamlets were ignorant.

Sidomulyo Village

The Sidomulyo village is different from Bumiaji and Bulukerto; it has a unique character as the *Brantas* River runs across the village and the existence of provincial road that connects Batu City and Mojokerto regency in East Java. The two advantages give benefits to the village that is causing fertile soil and strategic place to sell farming products.

Another advantage taken from the river is that people in the village can also bathein it. People also built public bathrooms along the river for anyone who needs to use the facility. At the same time, the provincial main road has made the village hosts many traffics resulting in more people pass by the area and open the opportunity for the local people to sell their products, especially on the sides of the main road.

Sidomulyo village consists of three hamlets, Tonggolari, Sukorembug, and Tinjumoyo. The settlement in Tonggolsari is quite dense and shows the city settlement characteristics. At the same time,the Sukorembug hamlet allows the natural village of the mountain area to remain still. On the other hand, Tinjumoyo tends to resemble Tonggolari than Sukorembug. It has more alleys, like in big cities.

It can clearly be seen that Sukorembug hamlet does not share a similar system like the other two.The only similarity between the three hamlets is that most of the people's profession is ornamental flowers farmers. These flowers are one of the changes that occur in the field of agriculture. At first, the people only planted rice, but now has changed into vegetables, then turned to apple, and eventually now the people focus more on growing flowers.

It can be said that the economic sector of the people depends significantly on flowers cultivation by both serving the incoming guests and also selling the product to foreign countries. Sidomulyo village is known for its flowers product, not only in East Java but also in the international markets.

The village always full of attraction, for example, the *bantengan* traditional that is often performed by the village youth. This activity is to build social solidarity. They do not run after financial profit, yet the regular performance is to bond the people of the village by participating in the events.

Besides the dynamic and conflict due to piping and water exploitation to the local government of Malang City,around 1997 to 1998 (an interview result with Basuki, August 28, 2020) there was a conflict in relation to the respond of the people of Batu that rejected the plan of establishing administrative city; the rejection that was ended up with the resignation of the village secretary of Sidomulyo village. There are achievements of the village that is quite significant. For example, the village won first place as the trusted village management of standardized administration by BPMD (*Balai Pemberdayaan Masyarakat Desa*) Indonesian Village Comunity Empowerment Agency. According to Basuki (interview on August 22, 2020), a functionary of BPD (*Badan Permasyarakatan Desa*)/Village Consultative Council) of Sidomulyo, what made the village won the prize is that the village's administration record become a reference for other villages throughout Indonesia, especially Central and Eastern parts of Indonesia (from 2008 to 2018). The village became the pilot project of Center for Rural Empowerment of Indonesia.

Table 1 Processed source of the interview and observation result

Bumiaji village	Bulukerto village	Sidomulyo village
The strong mystical situation and tight practice of the traditional and Islamic values	Strong dynamic village	The geographical situation and the existence of main provincial road has improved the economy of the people
Strong social Institutions	Familiar political issues	the characteristics of the people more resembling the city, it is easier to conduct a social change within this society
The strong management of HIPPAM because of involvement with respected figures.	The strong similarity of society to resist of disadvantageous	The economy condition becomes better due to planting flowers and agricultural products
Strong community figures	Strong community figures, Various people job	Strong community figures, The main street creates economy stability
Tourism becomes the alternative sector	After apple planting does not bring economic growth, there is the emergence of local rejection in some places	Flowers business becomes the alternative after the decreasing agricultural sector
The conflict between the people (formal in informal leaders) and local government of Batu City	The characteristics of social change are initiated by local leaders and area ssumed to accept the change especially relating to the development that gives benefit to local people	The quick adaptation of social changes
The rejection is in the form switching the agricultural commodity	Ambiguity towards the change that resulted in the split of people based on their preference	The people demand the government to provide clean water as support for flower commodities
The rejection is based on the environmental knowledge	The pragmatism is considered to weaken the water sources that will be utilized by hotel	Water is very important for the villagers. Therefore, the people protested to the local government of Batu City'plan selling the water sources to the government of Malang City near Batu City (2004)

The Differences, Similarities, and Connection among the Three Villages

The similarity as a Javanese village with various social institutions, such as *slametan* (customary cumunal meal) and *gotong royong* (Mutual help). One of the factors that cause similarity is the distance between neighbouring villages, which ultimately contributes to the communication between the three members of the community. It is not surprising that kinship ties characterize the relations of the three villages.

Another interest that makes the three villages become bonded is the need for clean water, both for agriculture and daily need. Agricultural water is used in rotation, while the need for drinking water is sufficed from the source of Gemulo Water Source. For the fulfilment of agricultural water, they use water from the *Brantas* river tillers that enter their villages. Therefore, when there where a pipeline and construction plan that threatened the existence of the Gemulo water sources, the three villages refused. Actors emerged from these three villages.

Islamic culture is stronger in Banaran Hamlet, Bumiaji Village. This hamlet has a religious atmosphere. Mean while, the people of Bulukerto Village seem to be a mixture of Javanese and Islam. The call as "*abah*" or *kaji* is often attributed to community leaders from this village, but the village does not only represent the Islamic symbols, yet its Javanese tradition is also growing rapidly.

The difference between the three villages is that the dominant culture is not the same between one hamlet and another. In terms of quantity, the number of hamlets in Bumiaji Village and Sidomulyo Village is the same, namely three hamlets, while Bulukerto Village has six hamlets with a very high diversity of characters.

The relationship between the three villages is due to their kinship as neighbouring villages. They develop a visiting relationship with each other and build a marriage bond. Meanwhile, in the hamlets that utilize Gemulo water sources, their relationship is tied by the use of the sources. This common-sense makes them coordinated informally

CHANGE ACTIVATOR

Agriculture as the Economy Basis of the People

The livelihoods of the main characters of the *Lor Brantas* community are agriculture and plantations. Agriculture includes rice fields, major vegetables, and fruits. This livelihood is pursued because of the possibility of being supported by fertile soil, the existence of volcanoes, and an abundant supply of water. The volcanic ash brought by the mountain eruption causing fertile lands in Batu City. Meanwhile, the water supply is due to the support of the *Brantas* River, which flows through most cities regencies in East Java. The arboretum which is located in Sumber *Brantas* Village is upstream of this river.

Batu City never experiences water shortages even during the dry season, but inequalities happen repeatedly.For example, areas that are close to water sources receive abundant water, while areas that are far from sourcess suffer from drought.

When did agricultural activities start in *Lor Brantas* area?The journey of farmers has started since ancient times, went through colonial times and even the era of regional autonomy. Having the land to cultivate, farmers have always cultivated agricultural products. However, the capitalization of agricultural products has remained unavoidable since the Dutch East Indies colonial era. At that time important lands in the Sumber *Brantas* area were developed for the cultivation of export crops

Historically, the character of agriculture in Batu City is varied; there are rice fields, export and fruit plantations. Agriculture has a characteristic that changes from time to time; from rice fields, vegetables and fruits. Sidomulyo Village, for example, initially the community engaged in rice farming. Then they changed to vegetables, turned to apple plantation, and finally they cultivate flower farmers.

Likewise, the agricultural pattern in Bumiaji and Bulukerto Villages in the 1990s relied on apples as their main commodity, but when apples did not grow anymore, they started to pursue other fruits. The farmers in Bulukerto Village worked on flowers, oranges and guava, meanwhile, farmers in Sidomulyo Village have been working on flowers until now. Several farmers in Bumiaji Village are pursuing crystal guava.

Despite many decreases from this agricultural achievement to the establishment of the Batu City government, agriculture remains the favourite commodity. The models are dedicated for spatial analysis of ecological factors distribution, such as distribution of contaminant concentration on researched territory (Safarov et al, 2020).

At least government officials still acknowledge that the original character of Batu City is an agricultural City. The industrialization of tourism is growing rapidly, but revitalizing agriculture is done by combining tourism with agriculture. Social and technological modernization has affected almost all areas of the rural life (Hanušin et al, 2020).

Tourism as the Activator of Social Change in Agricultural Society

Tourism has been an inherent character of Batu people for years because this City has natural potentials, such as mountains, rivers and forests. Therefore, people are accustomed to using it for tourism purposes. Traces of tourism can be seen since the era of the independence revolution. The most obvious example is the hot sourcess, *Selecta*, which has been developed since the Dutch colonialism about 1928 This tourism object was favoured by Ir. Soekarno, the first President of the Republic Indonesia so that it can be said that the events of the birth and the greatness of this nation cannot be separated from important moments in this tourism object.

Then, during the government of ER, the second mayor of Batu City, tourism development was boosted by giving permits for artificial tourism objects. He collaborated with the Jatim Park Group (JPG) to open artificial tourism object, Finally, the capitalization was carried out on a large scale. The development of this tourism object brought pragmatism by the mayor. The steps taken are providing easy permit, a guarantee of return on capital and easier access to transportation at tourist sites

The development actors were handed over to one investor, namely the East Java Park Group (JPG); thus the village of Oro-Oro Ombo became the target development and resulted in the establishment of tourist destination, such as the *Angkot* Museum (Transportation Museum), Eco-Green Park, BNS (Batu Night Spectacular). Starting from this area, there were other spots established aiming at artificial tourism development, such as Predator Fun Park, followed by Jatim Park 3. Jatim Park 3 is located in Beji Village and Junrejo Village, which are densely traffic areas. It seems that the lack of visitors in the Predator Fun Park made JPG looked for another strategy by choosing a location near the communities. JPG consideration is to make as much profit as possible.

This uncontrolled tourism development compared to the increasing tourist visits of Batu City, especially on weekends, brings consequences to the rapid development of the South *Brantas* area. As a consequence, the *Lor Brantas* has received little attention. It is not certain whether this was the intention of the city planners or not.

The impact of the tourism industry results in unplanned spatial changes, such as the actual land for water catchment areas being converted into buildings infrastructure. One of the reasons is because the regional head has full authority to grant investment permits.

Criticisms were addressed to these tourism practices, such as the profit of the tourism niche that the people of Batu City did not enjoy equally, so the government promoted community-based tourism as a counter to this criticism. It is likely that tourism is a blessing for policy makers, but in fact it is not for the farming community who on average live in the *Lor Brantas* area that tourism is perceived as congestion.

ACCEPT OR AGAINST THE CHANGES:
ADAPTATION METHOD OF THE THREE VILLAGES

This part will explain the adaptation methods towards the changes that occurred in the *Lor Brantas* area of Batu City by taking the three villages as a case study subject.

Bumiaji Village

In the 2000s, the community experienced the agricultural changes marked by a decline in apple production. This was because apples did not grow well in this village due to the deterioration of soil quality, and the weather was not supportive. Thus, the heyday of apples was over. Responding to this condition, farmers did not remain silent, they carried out various adaptations such as continuing to plant apples or switching to other commodities or not leaving apple cultivation but combined with other commodities.

Chamim (farmer) develops oranges and is still working on apples. Unlike Chamim, Hadi focuses on apples but grows them in Pujon, from Batu City that its distance is 15.3 kilometres., meanwhile, Supaat (Board member of HIPPAM and farmer interview on August 17, 2020) replaced commodities from apples to oranges by supplementing them with chicken livestock. Keeping apple business will obviously require a large amount of capital because the price of fertilizers is no longer subsidized.

Changes in tourism bring about environmental changes, such as utilization of spaces for tourist points, because the Batu City government invites as many investors as possible. As a result, there was an increase in land prices. Some residents welcomed this price increase, but at the same time, they are worried that the practice will narrow down the agricultural land. Wahyudi (Chairperson of the Farmer group) expressed his anxiety if at any time farmers let go of their land because they were tempted by the land buyers price who were mostly people outside the village. In conditions that are put them in the hard situation of having poor agricultural conditions, farmers will definitely give up their land, If these conditions are like this,it will be more difficult to find farmers in this village, even though Batu City is an Agricultural City.

Tourism in this village is marked by the construction of large-scale tourism supporting infrastructure such as hotel and lodging buildings which often violate regulations incoming spatial plan. Even though it has been regulated regarding places that are allowed and prohibited for infrastructure development, this rule is not fully complied with. As a result, construction is allowed at any location, including permits near water sources. As a consequence, if there is damage to the sourcess, both formal and informal village leaders will refuse to take responsibility. The conflict escalated between the Batu City government and the residents of Bumiaji Village.

This rejection is not driven by environmental ideological forces, but rather an expression of anxiety over the excessive tourism expansion, so it can be concluded that it did not last long. On the next occasion, the conflict and opposition was discontinued because the actors thought realistically.

Even though the resistance movement was still ongoing, both the movement leaders and the village head withdrew from the movement. As a result of the pressures, the figures become dormant in the movement, similar to Scott's statement that the peasant resistance was tacit and disorganized. The aim of resistance is not overthrowing but simply running the system for the sake of minimal harm to him. This symbolic ideological resistance is daily resistance that lasts in terms of resilience, persistence, tactical policies and flexibility. Scott, (1993) stated that Peasant resistance arises because subsistence ethics is threatened (made short solid and substantial). The spirit of the village head against the movement resulted in collaboration with the mayor was based on realistic consideration despite the fact that he once was a militant prior to becoming the village head.

Interestingly, tourism in Batu City is not all capital-based, the government also promotes community-based tourism. Villages with their uniqueness are developed into tourist centres. Similar to the average for other villages in *Lor Brantas*, community-based tourism development policies are welcomed. Village leaders sell their village as an alternative to visiting guests who will learn about all the potential of the village

Ghozali and Hardi are community leaders who are good at developing the potential of community-based tourism. By cultivating the family farm-land, this father and son-in-law developed organic farming for both vegetables and fruits. Mainstay commodities are the cultivation of crystal guava and healthy vegetables such as *kale* vegetables (*Brassica oleracea var. sabellica*) Bumiaji village is also known for its jargon *Amazing Bumiaji* which provide the opportunities for hamlets to promote their potential products.

Bulukerto Village

Similar to Bumiaji Village, Bulukerto Village is a village that produces apples which resulted in wealthy skippers. The skipper planted their apples in *Puthuk Gedhe* (over the top) a large area in Rekesan hamlet Bulukerto Village. The participation of these bosses made the village to be very dynamic. Similar to Bumiaji, now apples do not grow well in this village, the heyday of apples has passed, apples are no longer the favourite commodity. Finally, various job differentiations emerged, such as planters, farmers and ranchers.

But not all farmers leave apples, farmers from Cangar Hamlet,Harjito (interview Januari 5, 2020) keeps apples as daily work. He admitted that managing apples was not cheap, but after all that was calculated, he was ready to issue higher financing.

For average farmers who think realistically, changes in agricultural commodities are a way of adapting to changes in agricultural conditions. Agus (farmer) who previously planted and sold apples, is now replacing apples with guava. Apart from

using guava for income, he also raises rabbits. The same strategy was carried out by Anto (Chairman of the RT (*Rukun Tetangga*) (neighbourhood association) who is now focusing on vegetables (interview result with August 17 2020).

Meanwhile, tourism marks the infrastructure development that has entered this village. One of them is the construction of a hotel which is located not far (less than 2 meters) from the Gemulo source. The community is a worry that it might disrupt the water supply, therefore, there is a hamlet that uses the water source for domestic needs is now against the hotel construction.

This movement is quite sustainable in terms of the enthusiasm and duration allocated. The actions carried out varied considerably, considering that the residents had successfully allied themselves with other villages and supra village forces such as NGOs and academics.

The existence of this alliance made the success of the resistance actions that are mainly based on local culture. Activities such as the Sources Festival and the Suroan Festival were packaged in such a way as to invite a very large number of people. Even as of this writing, a collaboration between communities and NGOs is still being developed.

Meanwhile, other hamlets did not support the movement. Some stated that the other hamlets had no interest in water sources, so they were ignorant or not paying attention. The writer thinks that the character of the mobilization is determined by the figures in a particular community, while the movement is driven by the Cangar Hamlet; nevertheless, actors from other hamlets are not inspired to take part in the movement.

Even hamlet figures from the outside of Cangar, especially Glintung and Keliran who understand local politics, see it differently. Hotel development is seen pragmatically in order to bring commercial benefits to the surrounding communities. Their claim is that development will bring jobs to unemployed youth. It seems that these pragmatic groups were successfully influenced by both the village government and hotel owners

The consistency of pragmatism remains until the saving water source movement stopped; the government conducted some lobbying to Glintung hamlet to organize the village festival. To all movement actors in Cangar hamlet, this event was not only an amusement for the village people, but moreover, it acted as a counter-action for the community movement (interview result with Aris, August 20, 2020). Regarding community tourism, Batu City has declared Bulukerto Village as a rabbit centre. The government's policy has been preceded by building a rabbit statue at the village entrance that is expected to appear as a village icon; nevertheless, some residents who are critical of the city government ridicule at this government's way.

Sidomulyo Village

Agricultural changes are shown by planting flowers. Most likely, it can be said that the residents of Sidomulyo Village realize that changing them with decorative flower commodities is a step to be freed from agricultural decline. Only those who can read the situation well make a fortune and benefit out of the program.

Despite shifting commodities, dependence on water is very high. The water is not only used for domestic needs, more importantly they need water for watering their flowers. Therefore, the community ensures that there is no change in the water supply. They demand the government to carry out water management that benefits the community, so when government decision to reduce water debit, it will always be opposed. Upon any changes that impact the water supply for daily life, people will protest against any policies behind the action. For example, to consider the farmers high demand for water, one of the heads of government agencies suggested changing commodities. That opinion achieved sudden rejection by the people.

In 2004, the Kota Batu government planned to sell water from Gemulo water sources to PDAM (*Perusahaan Daerah Air Minum*/Local Government Owned Water Company) Malang City. At that time the two local governments had agreed, but the people opposed it. They protested against this policy until finally, the government policy was thwarted.

A similar case occurred in 2011, when residents refused to build a hotel which was prone to damaging water source. They were worried about the construction of a hotel that was not far from a water source located in Bulukerto Village. Coincidentally, both Sidomulyo village took water from this source, so they finally protested. Not only did the farmer groups initiate this movement, but they also received the support of the people, considering that this movement was on behalf of the community and the village. The village head played an important role, considering the 2004 movement was led by community leaders.

However, movement actors who are mostly village government activists cannot ignore the existence of the municipal government. On the one hand, they are hostile to regional heads but on the other hand, want to take advantage of this government policy. The most obvious case is the construction of a rest area that is used as a tourist market. In the village law regulation, this change would benefit the City government, but this decision was not realized, which was ultimately resolved by voting.

The rapid development of tourism in the *Lor Brantas* region is more interpreted as a bustling area that has little impact on them. Traffic congestion is considered due to local people activities. This is because Sidomulyo village is passed by the provincial road, which makes it easy to receive this insight.

Similar to other villages, tourism is two different sides. On one side, it is not profitable, but on the other side, it can provide an advantage for the local people. Tourism that brings good benefit is of community-based in the form of flower re centre and apple picking services. In addition, the arrival of tourists can be captured by utilizing rest areas that can be used to take advantage of tourism to increase the economic potential of rural communities. Adaptation is based on profession and is strengthened by the culture.

Lor Brantas main character is agriculture and natural resource support. The relationship between the two is intertwined. With these resources, people enjoy an unpretentious life, but they must respond to changes driven by the tourism industry, which have had a direct or indirect impact on tourism.

From a subject of three villages, there are similarities where the development of tourism gives rise to anxiety over environmental changes. This condition is exacerbated by the decline in agricultural production. Of course, social change must penetrate to this point so that people can feel the impact of these social changes, (Kotler,1971). Meanwhile, the adaptation method to agriculture and tourism is the same. Rejection comes from the massive capital based tourism if the change has an effect on their subsistence life, similar to what Scott (2000) stated their resistance is not overt. One time it looks stern, but on another, it seems very lenient and full of compromise. It can be said that there is still ambiguity between rejecting or accepting the tour. The refusal was carried out with lasting protests. When the City government offered certain assistance, the village government actors who had previously strongly opposed the City government policy accepted the help with open arms.

As long as these changes can be tolerated, the community will accept it. The example of the accepted change is the programs of community based tourism. On the other hand, if the capital based tourism produces a negative impact, the community will fight back. This confirms the character of Javanese society which prioritizes harmony, but will fight back if it touches subsistence. The same thing that the characteristics of society will promote social change as one of the movements they need for a better life (Andreasen, 2002).

However, internal and external challenges and opportunities of urban development also are determinant. Empirically such of the both include social transformation and political and economic power. The behavior of citizens who are limited by certain geographic areas is limited by interaction with outside forces such as the economy, technology and the environment (Ira and Matlovič, 2020). Even though geography has a complex perspective, citizens have a subjective, flexible and context-dependent character (Matlovič and Matlovičová, 2020).

CONCLUSIONS

To take a conclusion on the characteristics of the people of Batu City, especially from the three villages, including the aspect of rejection movement of the characteristics of the community against the existing changes and the rebellious attitude appears in responding to the fulfillment of some aspect.

In this case, the three villages of *Lor Brantas* have different characteristics in responding to the change. One of the impacts is the division of society, into those who accept the change and the one who reject it. This division of society becomes the thesis in this study which reveals ambiguity towards the social change.

This research can be a critical analysis for the elite stakeholder to consider the real impact on ambiguity in the society. For the real development context, the benefits can be experienced every level of society. However, the imbalance that occurs in ambiguity will result in the social injustice. It is hoped that in the future this research can be used as a basis for observers and village developers and also for Batu City government so that they can be aligned in increasing the sustainable development of Batu City.

The limitation of this research lies in the research content which is only limited to three villages. To find out about social change as a whole, it is expected that it can relate to the problems that are close to the village. Hopefully the findings of this research data can become an additional reference for further studies, especially those related to social change in Batu City and the second limitation. Has not studied yet Batu City as Tourist City with a complex economics sector and the expansion and diversification (Herman et al, 2020).

REFERENCES

ANDREASEN, A.R., (2002). Marketing social marketing in the social change marketplace. *Journal of Public Policy & Marketing*, *21*(1), pp.3-13.

ANDERSON S (2012). *Unit 4 Social Change : Concept and Factors Involved in Social*.

BAKKER SJ, J.W.M., (1984). *Filsafat Kebudayaan: sebuah pengantar*. Yayasan Kanisius.

BIMBI, B., SUPROJO, A., CHORNELIA, W. AND MERRY, R., (2017). Pengaruh Wisata Petik Jambu (Agrowisata) terhadap Pemberdayaan dan Perubahan Sosial Masyarakat di Desa Bumiaji Kecamatan Bumiaji Kota Batu. *Jurnal Ilmu Sosial dan Ilmu Politik Universitas Tribhuwana Tunggadewi*, *6*(2), p.102773.

BREMAN, J.C. AND WIRADI, G., (2004). Masa Cerah dan Masa Suram di Pedesaan Jawa. Jakarta, LP3ES

BREWER, J.D., (2000). Ethnography: John D. Brewer. *Ethnography. Buckingham. Philadelphia, PA: Open University Press*.

CAHYONO, M.D., (2011). *Sejarah daerah Batu: rekonstruksi sosio-budaya lintas masa*. Kota Batu., Jejak Kata Kita.

CHRISTENSEN, C.M., BAUMANN, H., RUGGLES, R. AND SADTLER, T.M., (2007). Disruptive innovation for social change. *Harvard business review*, *84*(12), p.94.

DAMANIK, K.I., LUBIS, E., SIREGAR, T.R., NILASARI, I., KHAIRUDDIN, A., MUFTI, N., SISWOYO, G. AND NINGSIH, S., (2010). *Otonomi Daerah, Etnonasionalisme, dan Masa Depan Indonesia: Berapa Persen Lagi Tanah dan Air Nusantara Milik Rakyat*. Yayasan Pustaka Obor Indonesia.

DEBORA SULISTYO, (2014). Asal Usul Nama Desa, Kelurahan dan Tempat di Kota Batu (sebuah ensiklopedi dongeng yang beredar di Kota Batu), Kota Batu: Kantor Perpustakaan dan Kearsipan Pemerintah Kota Batu.

FATCHAN, A., (2004). Teori-teori Perubahan Sosial: Dalam Kajian Perspektif dan Empirik Pada Proses Pembangunan Pertanian. *Surabaya: Lutfansah Mediatama*.

FITARI, Y. AND TYAS, W.P., (2016). *Manfaat Pengembangan Desa Wisata Wonolopo terhadap Kondisi Sosial, Ekonomi dan Lingkungan Masyarakat Lokal* (Doctoral dissertation, UNIVERSITAS DIPONEGORO).

GEERTZ, C. AND MARZALI, A., (1986). *Mojokuto: dinamika sosial sebuah kota di Jawa*. Grafiti Pers..

HAFERKAMP, H., SMELSER, N. J., HAFERKAMP, H., & SMELSER, N. J. (1950). British journal of sociology. *Nature*, *165*(4204), 83

HALLINAN, M.T., (1997). The Sociological Study of Social Change: (1996) Presidential Address. *American sociological review*, *62*(1).

HANUŠIN, J., HUBA, M. and IRA, V., (2020). Changes of Dispersed Settlements in Rural Cultural Landscape From The Strategic Perspective (With Special Attention To The Village Hrušov In Central Slovakia). *Folia Geographica*, *62*(2), pp.106-132.

HEALY, K., (1998). Social change: mechanisms and metaphors. *Princeton: Princeton University*.

HERMAN, G.V., BANTO, N., CACIORA, T., GRAMA, V., UNGUREANU, M., FURDUI, S., BUHAŞ, R. and BUHAŞ, S., (2020). Tourism in Bihor County, Romania. Trends and Prospects. *Folia Geographica*, *62*(2), pp.87-105.

IRA, V. AND MATLOVIČ, R., (2020). Challenges and Opportunities for Human Geography: A Few Remarks. *Geographia Polonica*, *93*(4), pp.525-537.

KECSKÉS, T. and KOZMA, G., (2020). City Centre Residents'opinion On Inner Quarter Renewal: A Central European Case Study. *Folia Geographica*, *62*(1), pp.95-111.

KLAMÁR, R., MATLOVIČ, R., IVANOVÁ, M., IŠTOK, R., & KOZOŇ, J. (2019). Local Action Group as a Tool of Inter-Municipal Cooperation: Case Study of Slovakia. *Folia Geographica*, *61*(1), 36-67.

KOTLER, P. AND ZALTMAN, G., (1971). Social marketing: an approach to planned social change. *Journal of marketing*, *35*(3), pp.3-12.

KRISTIONO, D.S.R., (2018). *A Sociological Study on the Grassroots Environmental Movement after Reformation in Indonesia: A Case Study of Water Source Conservation Movement in Batu, East Java* (Doctoral dissertation, 法政大学 (Hosei University)).

LAUER, R. H. (1993). Perspektif tentang perubahan sosial. *Jakarta: Rineka Cipta*.

LEWIN, K., (2016). Frontiers in group dynamics: Concept, method and reality in social science; social equilibria and social change. *Human relations*.

MATLOVIČ, R. and MATLOVIČOVÁ, K., (2020). First and second order discontinuities in world geographical thought and their primary reception in Slovak geography. *Folia Geographica*, *62*(1), pp.52-76.

MERTON, R.K. AND MERTON, R.C., (1968). *Social theory and social structure*. Simon and Schuster.

MUHAMMAD., (2019), *Perubahan Sosial: Pergeseran Paradigma Masyarakat Tradisional dalam Perkembangan Modernitas*, Yogyakarta: Pustaka Pelajar

NAGY, E, (2005). Urban development in Post-transition Hungary: Emerging social conflicts as constraints for a locality. *Geographia Polonica*, *78*(1), p.23.

PRACTICE, I., & HOLMES, O. W. (2007). *A Three-fold Theory of Social Change*.

RAHMAYANTI, Y.D. AND PINASTI, V.I.S., (2018). Dampak Keberadaan Objek Wisata Waduk Sermo Terhadap Perubahan Sosial Ekonomi Masyarakat di Sremo, Kulon Progo, Daerah Istimewa Yogyakarta. *Jurnal Pendidikan Sosiologi*.

RAMELLA, F., (2015). *Sociology of economic innovation*. Routledge.

REELER, D., (2007). A three-fold theory of social change. *The Community Development Resource Association*.

ROGERS, E.M., (1971). Social structure and social change. *American Behavioral Scientist*, *14*(5), pp.767-782.

SAFAROV, R.Z., SHOMANOVA, Z.K., NOSSENKO, Y.G., BERDENOV, Z.G., BEXEITOVA, Z.B., SHOMANOV, A.S. and MANSUROVA, M., (2020). Solving of Classification Problem in Spatial Analysis Applying the Technology of Gradient Boosting Catboost. *Folia Geographica*, *62*(1), pp.112-126.

SALIM, A., (2002). *Perubahan sosial: sketsa teori dan refleksi metodologi kasus Indonesia*. Tiara Wacana Yogya.

SCOTT, J.C. (2019). *Moral ekonomi petani: Pergolakan dan subsistensi di Asia Tenggara*. Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial.

SCOTT, J.C. (1993). *Perlawanan kaum tani*. Yayasan Obor Indonesia.

SCOTT, J.C., (2000). *Senjatanya Orang-orang yang Kalah: Bentuk-bentuk perlawanan sehari-hari kaum tani*. Yayasan Obor Indonesia.

SOEMARDJAN, S., (2009). Perubahan Sosial di Yogyakarta. *Jakarta: Penerbit Komunitas Bambu*.

SIAHAAN, H.M., (1999). Anarki Sebagai Upaya Mempertahankan Subsistensi Di Pedesaan. *Jurnal Ilmu Sosial dan Ilmu Politik*, *2*(3), pp.60-70.

SUGIHARDJO, ENY LESTARI DANAGUNG WIBOWO. (2013).Perubahan Sosial Masyarakat di Kaki Pegunungan Kendeng: Strategi Pelestarian Lingkungan, Surakarta: UNS Press

SUKRISMAN dkk, (2014), Jejak Pariwisata dan Pertanian Kota Batu: Sebuah Inspirasi dan Realisasi Visi Misi Walikota Eddy Rumpoko, Dinas Pariwisata dan Kebudayaan Kota Batu. Kota Batu: Dinas Pariwisata dan Kebudayaan

SUSILO, RACHMAD K DWI, (2010), Co-management Air Minum untuk Kesejahteraan Masyarakat Sekitar, Yogyakarta: Samudra Biru

SUSILO, R. K. D. (2020). Konstruksi Pengetahuan dan Kesadaran Aktor Untuk Wisata Budaya Berbasis Komunitas (Studi Pada Dusun Wisata Budaya Tlogorejo, Desa Bumiaji, Kecamatan Bumiaji, Kota Batu). *Equilibrium: Jurnal Pendidikan*, *8*(1), 65-74.

SZTOMPKA, P., (2004). *Sosiologi perubahan sosial*. Prenada Media.

TROMMSDORFF, G., (2010). Effects of social change on individual development: The role of social and personal factors and the timing of events. *Negotiating adolescence in times of social change*, pp.58-68.

WAGEMANS, F.A., KOPPEN, C.K.V. AND MOL, A.P., (2013). The effectiveness of socially responsible investment: a review. *Journal of Integrative Environmental Sciences*, *10*(3-4), pp.235-252.

WELZEL, C., INGLEHART, R. AND KLINGEMANN, H.D., (2001). *Human development as a general theory of social change: A multi-level and cross-cultural perspective* (No. FS III 01-201). WZB Discussion Paper.