

Jelena Matijašević-Obradović¹
Jelena Lukavac²
Ljiljana Miletić³
Milica Ničić⁴
Nenad Mitrović⁵

JEL: Q15, Q16, Q53; Q57
DOI:10.5937/industrija45-15003
UDC: 338.48-53:63(497.11)
005.332:628.4.045(497.11)"2011/2015"

Case research

The Impact of the Consumption of Hazardous Chemicals on the Development of Agritourism in Serbia

Article history:

Received:13 July 2017

Sent for revision:28 July 2017

Received in revised form: 1 September 2017

Accepted: 1 September 2017

Available online 10 October 2017

Abstract: *The primary attention in considering the fact that the percentage of hazardous chemicals consumption is inversely proportionate to the quality of ecological potential as one of the basic principles of rural development, which has direct implications for the development of agritourism, the research into the consumption of hazardous chemicals covering the period from 2011 to 2015 in the Republic of Serbia in comparison to EU 28 was conducted. The research was focused on the consumption of hazardous chemicals by divisions of Classification of activities, the consumption of hazardous chemicals by toxicity classes (A-E), and the analysis of the hazardous chemicals consumption by regions in the Republic of Serbia. The results obtained reveal the consumption of all hazardous chemicals classes per capita in Serbia is significantly lower than in the EU, and that the share of the most toxic classes is lower. Additionally, the trend of hazardous chemicals consumption is decreasing in Serbia, and stagnates in the EU. Particularly low consumption is registered in Southern and Eastern region as well as Sumadía and Western region, pointing out at the potential of these regions for development of agritourism based on this fact.*

¹University Business Academy, Faculty of Law for Commerce and Judiciary, Novi Sad; jela_sup@yahoo.com

²University Business Academy, Faculty of Law for Commerce and Judiciary, Novi Sad

³Educons University, Faculty of Project and Innovation Management, Belgrade

⁴Novi Sad School of Business, Novi Sad

⁵High Economic School of Profesional Studies, Leposavić

Keywords: Agritourism, Rural development, Hazardous chemical

Uticaj potrošnje opasnih hemikalija na razvoj agroturizma u Srbiji

Apstrakt: Primarna pažnja u razmatranju činjenice da je procenat potrošnje opasnih hemikalija obrnuto srazmeran kvalitetu ekološkog potencijala, koji je pak jedan od osnovnih principa ruralnog razvoja i ima direktne implikacije u oblasti razvoja agroturizma, sprovedeno je istraživanje potrošnje opasnih hemikalija koje je obuhvatilo period od 2011. – 2015. godine u Republici Srbiji u poređenju sa EU 28. Istraživanje je bilo usmereno na potrošnju opasnih hemikalija prema oblastima Klasifikacije delatnosti, potrošnju opasnih hemikalija prema klasama toksičnosti (A-E) i analizu potrošnje opasnih hemikalija po regionima Republike Srbije. Dobijeni rezultati otkrivaju da je potrošnja svih klasa opasnih hemikalija per capita u Srbiji značajno niža nego u EU, kao i da je udeo najtoksičnijih klasa manji. Pored toga, trend potrošnje opasnih hemikalija u Srbiji opada, dok u EU stagnira. Posebno mala potrošnja je zabeležena u Južnom i Istočnom regionu kao i u Šumadiji i Zapadnom regionu, što ukazuje na potencijal ovih regiona za razvoj agroturizma na osnovu ove činjenice.

Ključne reči: agroturizam, ruralni razvoj, opasne hemikalije.

1. Introduction

Tourism is purposeful, planned and motivated behaviour, for which the expectations of traveller play a major role in decision-making about travelling. Therefore attitudes and motives, as well as the needs of tourists are very important (Wall & Mathison, 2006). The role of tourism in local economic development is a topic of critical importance (Rogerson & Rogerson, 2014; Spilanis, Kizos & Spilanis, 2016, p. 161). Owing to these features of tourism, it can, to a certain extent, be seen as a connection point between urban and rural environments.

A considerable potential for the growth of tourism in Serbia concerns rural areas as such, where there is an additional potential for organic production of food with an authentic note of the area where it is produced. In this respect, agritourism is a new tourism section based on relatively small agricultural farms, whose activities are rooted in the local traditions.

Rural areas take about 85% of the entire territory of Serbia. More than a half of the total population (55%) of Serbia is located in the rural areas. Population density on rural areas of Serbia is 63 inhabitants per square kilometre

(according to OECD, areas with up to 150 inhabitants per km² are considered rural). Rural areas are home to the majority of natural wealth of the country (agricultural land, forests, water resources) with rich ecosystems and biodiversity. The Strategy of Agriculture and Rural Development for the period 2014-2024 (Official Gazette of RS, No. 85/2014), emphasises the positive shift made in the recent years in organic production, wine production, production of products with geographical indication of origin and agritourism. The guiding principle of the rural development in general, rural development in Serbia included, is the fact that sustainable rural tourism development must be economically viable while preserving the natural, social and cultural characteristics of tourist destinations. In the context of the previously stated, among other things, significant impact on the development of rural areas has also the consumption of hazardous chemicals in individual areas of the country. According to the official definition, a chemical is any element, chemical compound or mixture of its elements and/or compounds (Bulletin, 2016, p. 11), while hazardous chemicals differ by their toxicity level.

In addition to the relevant theoretical definitions, the study will include an analysis of the hazardous chemicals consumption in Serbia in comparison to EU in order to assess the potential for development of agrotourism promoted on the basis of low toxic chemicals consumption. However, due to long lasting economic crisis in Serbia the level of industrial processing in Serbia was quite low in comparison to developed countries. This fact implies also lower consumption of hazardous chemicals that can be an element of competitive advantage for development of agrotourism in Serbia. The aim of this investigation is to compare the consumption of hazardous chemicals in Serbia and EU as the target market for agrotourism services from Serbia. The comparison was conducted for five years period (2011-2015) and includes analysis by toxicity classes and by the regions of Serbia.

2. Literature review

Understanding any phenomenon requires a basic understanding of its fundamental defining characteristics (Philip, Hunter & Blackstock, 2010, p. 754). Agritourism is not a new phenomenon, it has been recognized worldwide since early twentieth century (Gil Arroyo, Barbiery & Rozier Rich, 2013, p. 39). Essential issues for agritourism, as a component for integral sustainable development of agriculture, are healthy diet of tourists accompanied with spending of time in a healthy environment (Pejanović and Vujović, 2008, p. 6). According to Wilson, Thilmany & Sullins (2006, p. 1), agritourism includes all activities that connect visitors with the natural resources, heritage and unique culinary experiences from the local agricultural industry. There is a number of definitions of agritourism utilized by

scholars and practitioners. Sometimes it is called also farm-based tourism, or farm tourism., Most definitions include different services, educational or leisure activity that take place on a farm (Tew & Barbieri, 2012). The very term agritourism indicates the inextricable interdependence of tourism and agriculture, focusing more and more on a type of tourism that provides tourists with healthy organic food and an opportunity to spend time in a healthy environment, thus offering support to sustainable development (Vujovic, 2007).

General tourism was initially thought of as an industry “capable of promoting both growth and equity because of its intensive use of local inputs and unskilled labor” (Mansury & Hara, 2007, p. 213). It was later discovered, however, that “the inability of the local community to fully participate in tourism activities results in a highly-unequal distribution of the gains” (Mansury & Hara, 2007, p. 213). According to Zhenhua (2003, pp. 465-466) “in less developed countries in particular, poverty and social desperation necessitate a great need for the local community to benefit from tourism development, but the inability of the host population to fully participate in the development process results in the lion’s share of tourism income being taken away or ‘leaked’ out from the destination”. In studies of agritourism, scholars have found that “incorporating agritourism activities into the overall profit structure can bring a number of economic and noneconomic benefits to farmers” (Kline, Barbieri & La Pan, 2016, p. 644).

Considering the lack of a uniform definition of agritourism in both national and international literature, the Organisation for Economic Co-operation and Development defines agritourism as part of rural tourism divided into: agritourism, ecotourism, adventure and excursion tourism. More narrowly, agritourism is defined as a tourist activity that is conducted by farms owned by the families, i.e. agricultural producers, while other mentioned forms of rural tourism are not as often organised by farms, although they can be (Brščić et al., 2010). Agritourism can also be defined as the visit for pleasure, education or active involvement in specific activities to the farm or any other enterprise being involved in agribusiness, agricultural or horticultural activities (Petroman & Petroman, 2010). It can also be defined as attraction of the visitors or travellers to the areas with primarily agricultural purposes (Blacka et al., 2009).

Agritourism in Serbia is defined as offering “rural surroundings” to a tourist through provision of unique experience of people, culture and nature and enabling him to enjoy in an authentic way of rural life. Agritourism is based on the principles of sustainability. It includes a number of services and activities that characterize the given rural area and the way of life of the inhabitants of the particular rural area (Đorđević-Milošević and Milovanović, 2012). According to Babović (2008), agritourism is an additional profession and

supplementary source of income in the rural areas, By purchase of food and other products tourists provide work for the population in the rural areas and thus create basis for rural development from the economic point of view. As for tourism in general, positive economic impacts of agritourism can be direct, including supplementing individual earnings, community income and non-financial elements such as improved infrastructure; indirect or secondary, including increased earnings from non-tourism sectors linked to tourist activities; and dynamic or induced, e.g., tourism workers' consumption (Butler & Rogerson, 2016; Spilanis et al., 2016).

There is a growing list of agritourism activities. It includes a variety experiences of a tourist as a participant, student, and spectator. These activities can consist of diverse outdoor recreation activities like hunting, fishing, horseback riding, wildlife photography, educational activities like farm tours and help on the farm, cooking classes and wine tasting and entertainment including diverse festivals or guided tours and enjoying in hospitality services. From the agritourism activities benefit also the on-farm direct sales and, off-the-farm direct sales that generate additional income for the population (Wilson, Thilmany & Sullins, 2006). The main attractions of agritourism are the experience of life and work on a farm and authentic products, together with the supporting services (Ramiro et al., 1999), that offers the experience of a real agricultural environment (Mansury & Hara, 2007) Agritourism is increasingly being viewed as a 'desirable diversifier' in this context for local and regional economies, not least because one positive externality of tourism growth is its role in increasing the supply of local services as well as the less obvious social contribution of tourism to expanding local leisure spaces, especially in marginalized, peripheral regions (Butler & Rogerson, 2016).

Rural tourism is one of the main priorities of touristic development in many European countries (Darau, Corneliu, Brad & Avram, 2010). The development of agritourism comprises from a multi-functional rural area development. It includes healthy food production based on the available resources, demographic revival, diverse non-agricultural activities, infrastructure development, enhancement of education, culture, and preservation of ecological environment. The development not only of the farms, but also the small and medium enterprises boosting agricultural production and advisory services is crucial for the success of the concept. The creation of economic, social and cultural conditions for rural development is also necessary (Veselinović and Ignjatijević, 2013, p. 146).

In this context, it is important to note the basic principles of rural development (Table 1). For successful development of agritourism on farms it is necessary to fulfil both: the tourists' requirements and the expectations of attitudes of providers of agritourism services. According to Darau et al. (2010, p. 41) "agro

tourism is performed in the rural environment, using local resources (natural, cultural and human)", as well touristic equipments and provisions, including boarding houses and agritouristic farms.

Agritourism is seen as a "regenerate factor of rural economies and, at the same time, as an element for preserving the rural environment" (Pirnea, Lanfranchi & Giannetto, 2012, p. 176). Therefore, besides adequate transport infrastructure, ethno-traditional and cultural objects and facilities, and controlled sanitary conditions (Veselinović and Ignjatijević, 2013, p. 146), the main condition for the development and improvement of agritourism is healthy environment in all its segments.

Table 1: *Basic principles of rural development*

Sustainable rural development			
Environmental principles	Social principles	Cultural principles (heritage)	Economic principles
- respect natural diversity of the destination - take measures for controlling the main capacity of the destination along with the development of rural tourism	- ensure that the development of tourism will not have negative impact on cultural diversity and local community - avoid activities that might cause or contribute to the social problems	- develop tourism that is typical for the area - promote unique features of the culture and heritage of the area	- boost employment opportunities in order to prevent migration of the population - prevent the disappearance of traditional occupations - local food products promotion and sale

Source: Popesku, 2011, p. 4-6.

Agritourism is seen as a "regenerate factor of rural economies and, at the same time, as an element for preserving the rural environment" (Pirnea, Lanfranchi & Giannetto, 2012, p. 176). Therefore, besides adequate transport infrastructure, ethno-traditional and cultural objects and facilities, and controlled sanitary conditions (Veselinović and Ignjatijević, 2013, p. 146), the main condition for the development and improvement of agritourism is healthy environment in all its segments.

In this context, it is important to analyse hazardous chemicals consumption in individual regions of the Republic of Serbia, and analyse the existing ecological conditions for the development and improvement of rural tourism in the given parts of the country, because many chemical risks are related to agriculture. According to Selin (2009, p. 3) "while some important progress in addressing problems of hazardous chemicals can be noted at the international level and in specific countries, a large number of chemicals still pose unacceptable environmental and human health risks around the globe" because "many hazardous chemicals management issues are linked with

expanding industrialization and growing consumption” (Geiser, 2001; Selin, 2009, p. 7).

For additional clarification, in accordance with the official data (Bulletin, 2016, pp. 11-12), hazardous chemicals are divided into five toxicity classes by the degree of toxicity: Class A – carcinogenic, mutagenic and toxic for reproduction (CMR), Class B – chronically toxic, Class C – very toxic, Class D – toxic, and Class E – harmful. Hazardous chemicals are characterized with the features presented in Table 2.

Table 2. Important characteristics of hazardous chemicals

No	Characteristics	Description
1	Persistence	The period of time during which the chemical remains in the environment before it biodegrades, measured half-life (time needed for degradation to the half of initial concentration in soil, air, water, and sediment. Presence of highly persistent chemical is particularly dangerous in combination with high toxicity, bioaccumulation, and biomagnification.
2	Toxicity	The effect that the chemical has on an organism or part of an organism, organ, tissue or cell including different kinds of cancer, act as endocrine disrupters, and negative effects in the early stages of human development. The same dose of a toxic chemical may exhibit different responses by different organisms.
3	Bioaccumulation	Accumulation of hazardous substances that have been released into the environment through the same mechanism as the nutrients in the living organisms over time. It is characterized with higher expression in older member of a than a younger member that was exposed for shorter time.
4	Biomagnification	Biological process of passing of the accumulated hazardous chemicals through the food web and the magnification of their accumulation in higher trophic level species including humans.

Source: Selin, 2009, p. 8

A carcinogenic chemical is a chemical which if inhaled, swallowed or absorbed through the skin may cause cancer or increase its incidence. A mutagenic chemical is a chemical which if inhaled, swallowed or absorbed through the skin may induce heritable genetic damage or increase its incidence. A chemical toxic for reproduction, a reprotoxicant, is a chemical which if inhaled, swallowed or absorbed through the skin may induce heritable harmful effects in offspring and/or impair male or female reproductive functions and/or decrease their capacities or increase incidence thereof. A chemical that causes sensitization is a chemical that, if inhaled or absorbed through the skin, can cause a hypersensitivity reaction, while prolonged exposure to such a chemical can cause characteristic harmful effects. A very toxic chemical is a chemical that in very small quantities, if it is inhaled, swallowed or absorbed through the skin, causes death, acute or chronic health damage. A toxic chemical is a chemical that in small quantities, if it is

inhaled, swallowed or absorbed through the skin, causes death, acute or chronic health damage. A harmful chemical is a chemical that, if it is inhaled, swallowed or absorbed through the skin, causes death, acute or chronic health damage.

Many hazardous chemicals are persistent and remain in the environment and human bodies for a long time. Scientific studies show that persistent organic pollutants may remain in the natural environment for decades (Rodan, Pennington, Eckley & Boethling, 1999; Selin, 2009).

3. Methodology and data sources used

The study analyses the consumption of hazardous chemicals in individual regions on the Republic of Serbia (RS) compared to the European Union (28 countries - EU28). The research section focuses on the Consumption of hazardous chemicals, by divisions of Classification of activities and Consumption of hazardous chemicals, by toxicity classes (A-E). The research covers a five-year period – from 2011 to 2015. For the purposes of enabling comparison between the results of consumption (on average and by regions), the consumption was calculated per capita by dividing the absolute values of consumption in the period 2009-2015 by the number of people in the given years. The research was based on the official statistical data of the Statistical Office of the Republic of Serbia and European statistics data – Eurostat (<http://ec.europa.eu/eurostat/web/environment/hazardous-substances/database>)

4. Research results and discussion

Table 3 shows the data on the total consumption of hazardous chemicals in the RS and the EU28 in absolute values (t), as well as relative values (kg/ per capita). The data reveal that the total consumption of hazardous chemicals (kg/per capita) in the Republic of Serbia ranges from 61.6 (2009) to 113.4 (2015), while the consumption in 28 countries of the European Union (EU 28) ranges from 435.6 (2009) to 472.2 (2015). This points to the fact that the consumption of hazardous chemicals in the period 2009 – 2015 in the RS is significantly lower than the consumption in the EU 28. This fact is of a great importance for the development of agritourism and rural tourism and attracting potential tourists from the developed countries. This is further contributed by maximal values of consumption, which are significantly lower in the RS (118.5) in comparison to the EU28 (472.2). Additionally, the toxic material consumption in the RS, after a peak reached in 2013, maintains a declining trend, while in the economically developed countries of the EU, with already

high values of total toxic material consumption, show an almost constant level of consumption during the observed period. Based on the values obtained and the trends observed in total toxic chemicals consumption per capita, the Republic of Serbia in comparison to the EU28 countries has a good potential and comparative advantage for the development of agritourism and rural tourism as important segments of ecological tourism.

Table 3. Consumption of total hazardous chemicals in RS and EU 28

Year	Total consumption (kg)		Number of inhabitants		Total consumption (kg/capita)	
	RS	EU (28)	RS	EU (28)	RS	EU (28)
2009	447 856 800	218 700 000 000	7 274 0076	502 090 235	61.6	435.6
2010	613 947 500	246 100 000 000	7 259456	503 170 618	84.6	489.1
2011	683 666 000	235 000 000 000	7 186 862	502 964 837	95.1	467.3
2012	778 978 000	236 000 000 000	7 185 020	504 060 345	109	468.2
2013	851 368 000	231 000 000 000	7 183 041	505 166 839	118.5	457.3
2014	820 680 000	238 300 000 000	7 169 833	506 973 868	114.4	470.1
2015	808 649 000	240 100 000 000	7 130 943	508 504 320	113.4	472.2

Source: Analysis of authors

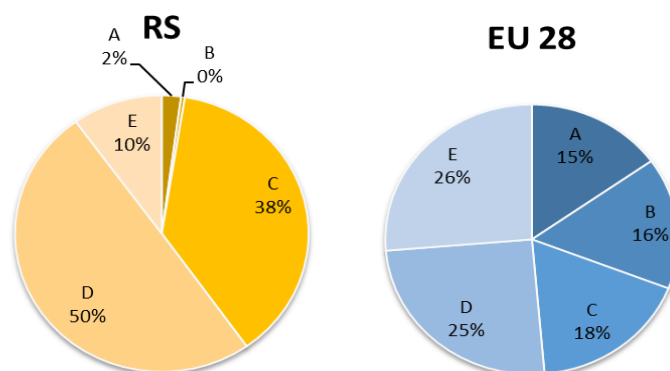
For the purposes of comparison of the data on the consumption of hazardous chemicals by Classification of Activities (CA), Figure 1 offers a comparative overview of the consumption of toxic materials by Toxicity Classes (A-E) for the RS i EU28 in the period 2011 – 2015.

The comparison of the consumption values obtained leads to the conclusion that compared to the technologically developed countries EU28, the consumption of toxic materials in Sections A and B in the RS takes a considerably lower share in the total consumption of toxic materials (2% against 15% for Class A and 0% against 16% for Class B). This is a positive factor for changing the poor eco image Serbia received after the NATO bombing of 1999 and for creating conditions for healthy eco-tourism, considering the fact that it is known that these Classes - Carcinogenic mutagenic and chemicals toxic for reproduction (A) and Chronically toxic chemicals (B) in accordance with the official data (Bulletin, 2016, pp. 11-12) – can cause cancer, heritable genetic damage and/or cause heritable harmful effects in offspring (damaged or diminished reproductive functions) if inhaled, swallowed or absorbed through the skin by potential tourists.

The graphs in Figure 1 show that in the RS the largest share in the total toxic material consumption is taken by Section D – Toxic chemicals (50%), followed

by the consumption of the hazardous chemicals belonging to Section C - Very toxic chemicals (30%), which supports the claim that the largest share in the consumption of hazardous chemicals by toxicity classes refers to Toxic chemicals and Very toxic chemicals (Bulletin, 2016, p. 29). Considering the fact that the shares of these toxic materials are smaller in the EU28, ways should be explored for decreasing their consumption in the RS, especially because a prolonged exposure to such chemicals can cause harmful effects on health, and in the case of Very toxic chemicals, even a small quantity can cause acute and chronic damage to health, even death.

Figure 1. Consumption of hazardous chemicals by (CA) sections in RS and EU 28



Source: Graphic analysis of authors

The graphs in Figure 1 show that in the RS the largest share in the total toxic material consumption is taken by Section D – Toxic chemicals (50%), followed by the consumption of the hazardous chemicals belonging to Section C - Very toxic chemicals (30%), which supports the claim that the largest share in the consumption of hazardous chemicals by toxicity classes refers to Toxic chemicals and Very toxic chemicals (Bulletin, 2016, p. 29). Considering the fact that the shares of these toxic materials are smaller in the EU28, ways should be explored for decreasing their consumption in the RS, especially because a prolonged exposure to such chemicals can cause harmful effects on health, and in the case of Very toxic chemicals, even a small quantity can cause acute and chronic damage to health, even death.

On the contrary to the foregoing, the share in the consumption of the toxic chemicals belonging to Section E– Harmful chemicals, compared to the EU28 (26%) is considerably smaller in the RS (10%), which suggests that measures should be taken to substitute the consumption of Toxic and Very toxic

chemicals with this less harmful chemicals, which would lead to Serbia's comparative advantage in regard to the development of agritourism.

For the purposes of gaining a perspective of the sources of toxic chemicals consumption in Serbia, as one of the starting points in the analysis of its potential influence on the agritourism and identification of opportunities for a further improvement in this field by decreasing their consumption, an analysis of the toxic chemicals consumption in the RS by industry sectors was carried out.

Table 4 shows the data on the total consumption of hazardous chemicals by Classification of Activities (CA) sections in the RS in absolute values (tonnes), and as percentage of toxic chemicals consumption per year in total and for given industry sectors in the RS for the period 2011 – 2015.

Table 4. Consumption of hazardous chemicals by CA sections in RS in tonnes

2011	2012	2013	2014	2015
Total consumption (tonnes/year)				
683 666	778 978	851 368	820 680	808 649
Consumption of hazardous chemicals by CA sections tonnes/year				
1. Mining and quarrying				
1 463	1 545	3 575	3 584	1 716
0.21%	0.2 %	0.42%	0.44%	0.21%
2. Manufacturing				
666 542	762 827	833 412	802 457	790 678
97.50%	97.93%	97.89%	97.78%	97.78%
3. Electricity, gas, steam and airconditioning supply				
7 105	6 565	5 803	4 779	6 309
1.04%	0.84%	0.68%	0.58%	0.78%
4. Water supply, sewerage, wastemanagement and remediationactivities				
8 555	8 041	8 579	9 859	9 947
1.25%	1.03%	1.01%	1.20%	1.23%

Source: Analysis of authors based on *Bulletin*, 2016, p. 28

Many hazardous chemicals management issues are linked with expanding industrialization and growing consumption (Geiser, 2001; Selin, 2009, p. 7). From the presented data in Table 4, it can be noted that the highest consumption of hazardous chemicals by Classification of Activities (CA) sections in the RS was in Manufacturing Sector with a share in the total

consumption about 97.8%, the consumption in this sector peaked in 2013, followed by a declining trend. The data for the section of Water supply, sewerage, waste management and remediation activities, which takes the second place in the share in the total consumption of hazardous chemicals, reveal that the consumption in this section show a slight increasing trend, but considering the very small share in the total consumption (about 1.1%), this has no significant influence on the increase of total consumption. Therefore, it can be concluded that toxic materials are mainly used in processing industry, and this has no bearing on agritourism, since the processing capacities are concentrated in industrial zones of urban areas, so that this has no significant impact on lowering the quality of areas suitable for the development of agritourism and rural tourism in the RS.

The main condition for the development and improvement of agritourism is healthy environment in all its segments. In this context, it is important to analyse hazardous chemicals consumption in individual regions of the Republic of Serbia, and analyse the existing ecological conditions for the development and improvement of rural tourism in the given parts of the country, because many chemical risks are related to agriculture. According to Selin (2009, p. 3). Total consumption of hazardous chemicals, by toxicity classes (A-E), by regions of the Republic of Serbia and total consumption of hazardous chemicals by regions in kg/per capita (2011-2015) is provided in table 6.

The data from Table 5 further offer an overview of the shares of each region in the Republic of Serbia in the consumption of hazardous chemicals per capita classified by toxicity classes for the period 2011-2015. The referential data on the total number of inhabitants at the level of the entire country and by regions are based on the results of the 2011 census (Demographic Yearbook. 2015. p. 35).

The data from Table 5 in the first place show that in the period 2011-2015 the consumption of hazardous chemicals was lower in the Region of Belgrade, and as it is the region with a high population density, its analysis bears a small relevance in regard to the development of agritourism and rural tourism. Considering the consumption of toxic materials from Sections D (Toxic chemicals) and C (Very toxic chemicals), whose share in the total consumption in the RS is high (88%), the regions that stand out as particularly suitable are the Regions of Šumadija and Western Serbia with the consumption of 11.5 and 26.1 kg/capita of Classes C and D respectively, as well as Southern and Eastern Serbia with the consumption of 30.71 and 37.3kg/capita of Classes C and D respectively, which, compared to the consumption in the Region of Vojvodina (150.8+90.0), highlights the importance of these regions for the development of eco-tourism.

From Table 5 it can be noted that based on the total average consumption including chemicals from all toxicity classes in the period 2011 – 2015, the RS regions can be ranked by their suitability for eco-tourism in the following order: 1 Regions of Šumadija and Western Serbia (48.7); 2. Southern and Eastern Region (70.1) and the Region of Vojvodina (280.5).

Table 5. The consumption of hazardous chemicals (kg/per capita) by toxicity classes (A-E), by regions of the Republic of Serbia, for the period 2011-2015

Regions / The Republic of Serbia		Belgrade region	Vojvodina region	Sumadija and Western region	Southern and Eastern region
Participation of population in region of RS		23%	26.8%	28.2%	22%
Toxicity class	Year				
A – Carcinogenic, mutagenic and chemicals toxic for reproduction	2011	0.5	9.1	0.1	0.0
	2012	0.6	8.9	0.0	0.0
	2013	0.1	7.9	0.0	0.0
	2014	0.0	6.9	0.0	0.0
	2015	0.0	7.7	0.0	0.0
Average consumption kg/per capita		0.3	8.1	0.0	0.0
B – Chronically toxic chemicals	2011	0.1	1.2	0.0	0.4
	2012	0.0	0.9	0.2	0.4
	2013	0.2	0.9	0.3	0.3
	2014	0.0	1.2	0.4	0.1
	2015	0.0	1.0	0.5	0.0
Average consumption kg/per capita		0.0	1.0	0.3	0.3
C – Very toxic chemicals	2011	4.2	75.3	5.9	3.6
	2012	4.0	111.6	5.9	3.2
	2013	6.0	117.2	15.6	2.8
	2014	20.0	81.8	46.0	70.4
	2015	22.1	64.3	58.0	106.4
Average consumption kg/per capita		11.3	90.0	26.1	37.3
D – Toxic chemicals	2011	6.0	117.2	2.8	36.2
	2012	6.5	180.2	2.8	34.1
	2013	5.2	196.6	11.8	42.0
	2014	5.6	133.6	17.1	37.1
	2015	6.2	126.5	21.9	4.4
Average consumption kg/per capita		5.9	150.8	11.5	30.7
E – Harmful chemicals	2011	4.3	41.8	8.7	1.7
	2012	1.8	47.4	8.7	2.3
	2013	3.5	25.4	11.3	1.8
	2014	4.0	19.4	13.0	1.9
	2015	3.9	19.0	13.5	1.1
Average consumption kg/per capita		3.5	30.6	11.0	1.8
Total average consumption (2011-015)		21	280.5	48.7	70.1

Sources: by authors.

This, to a certain extent, corresponds to the findings of Đorđević-Milošević and Milovanović (2012. p. 34-35) that rural areas in the RS include: 1. Northern plains of Vojvodina, which account for 28% of the total area of Serbia and 26.8% of its total population; 2. Mountains and highlands of Central Serbia, which account for 29% of the total area of Serbia with 44% of its population, and 3. Mountains and valleys of Southern Serbia, which account for 44% of the total area of Serbia, with almost 22% of the population.

It must be noted that although the values of relative consumption of hazardous chemicals from section C (Very toxic chemicals) in the Region of Vojvodina are rather high in the period 2011-2015, they have a falling trend and the values are still far under those of the economically developed EU 28 countries, which is favourable for the development of agritourism and rural tourism in this RS region.

5. Conclusion

It is evident that some progress has been made in addressing the problem of the consumption of toxic chemicals at the international level and in certain countries, but the consumption of a large number of chemicals still continues to pose a great risk to the environment and human health around the world.

Starting from the position that agritourism includes "rural enterprises which incorporate both a working farm environment and a commercial tourism component" (McGehee. 2007. p. 111), it is an undoubted fact that ecological capital – subject to, among other factors the consumption of hazardous chemicals – significantly influences the development of rural areas and consequently agritourism, as an activity that can largely contribute to the development of the potentials of rural areas. Considering the fact that the percentage of hazardous chemicals consumption is directly proportionate to the quality of ecological potential, which is in turn one of the basic principles of rural development and as such has direct implications in the field of the development of agritourism, the analysis of the hazardous chemicals consumption per regions of the Republic of Serbia has revealed that the trend of hazardous chemicals consumption both in total and by toxicity classes per capita in Serbia is significantly lower than in the developed countries of EU28. Beside that the share of the most toxic classes (A and B) is significantly lower in Serbia, while the share of classes C and D is higher pointing out that the substitution of these classes with less toxic chemicals from E class should be promoted in order to support additionally the development of agritourism. Additionally, the trend of hazardous chemicals consumption is decreasing in Serbia, and stagnates in EU28. Particularly low consumption is registered in Southern and Eastern region and Sumadia and Western region, pointing out

at their potential of these regions for development of agro-tourism based on this fact.

References

- Babović, J. (2008). *Agroekonomska i agroekološka politika EU. Multifunkcionalni razvoj - agroekoturizam*. Novi Sad: Institut za ratarstvo i povrtarstvo.
- Blacka, A., Couture, P., Coli, C., Dooley, J., Hankins, A., Lastovica, A., . . . Uysal, M. (2009). *Agri-Tourism*. Virginia: Virginia Polytechnic Institute and State University - College of Agriculture and Life Sciences.
- Brščić K., Franić. R., & Ružić.D., (2010). Why Agrotourism: Owner's opinion. *Central European Journal of Agriculture*, 11(1), 31-42.
- Butler, G., & Rogerson.C.M., (2016). Inclusive local tourism development in South Africa: Evidence from Dullstroom. *Local Economy*, 31(1-2), 264-281.
- . *Eco-Bulletin, Belgrade*, (2016). 2015, Statistical Office of the Republic of Serbia.
- . *Eco-Bulletin, Belgrade*, (2015). 2014, Statistical Office of the Republic of Serbia.
- . *Eco-Bulletin, Belgrade*, (2014). 2013, Statistical Office of the Republic of Serbia.
- . *Eco-Bulletin, Belgrade*, (2013). 2012, Statistical Office of the Republic of Serbia.
- . *Eco-Bulletin, Belgrade*, (2012). 2011, Statistical Office of the Republic of Serbia.
- Darau, A.P., Corneliu, M., Brad, M.L., & Avram.E., (2010). The concept of rural tourism and agritourism. *Studia Universitatis "vasile Goldiș" Arad*, 5(1), 39-42.
- Djordjević, M.S., & Milovanović.J., (2012). *Održivi turizam u funkciji ruralnog razvoja - mala poljoprivredna gazdinstva i ruralni turizam u Srbiji*. Beograd: Univerzitet Singidunum - Fakultet za primenjenu ekologiju Futura; Vršac: Agroznanje; Budimpešta: FAO.
- European Environment Agency. (2010). *Environmental trends and perspectives in the Western Balkans: Future production and consumption patterns*. Luxembourg: Office for Official Publications of the European Union.
- Geiser, K. (2001). *Materials Matter: Towards a Sustainable Materials Policy*. Cambridge: MIT Press.
- Arroyo. Barbieri, G.C.C., & Rich. Rozier, S. (2013). Defining agritourism: A comparative study of stakeholders' perceptions in Missouri and North Carolina. *Tourism Management*, 37, 39-47.
- . *Demographic Yearbook, Belgrade*, (2015). Statistical Office of the Republic of Serbia.
- Barbieri, K.C.C., & LaPan.C., (2016). The Influence of Agritourism on Niche Meats Loyalty and Purchasing. *Journal of Travel Research*, 55(5), 643-658.
- Mansury, Y., & Hara.T., (2007). Impacts of Organic Food Agritourism on a Small Rural Economy: A Social Accounting Matrix Approach. *The Journal of Regional Analysis & Policy (JRAP)*, 37(3), 213-222.
- McGehee, N.G. (2007). An agritourism systems model: A Weberian perspective. *Journal of Sustainable Tourism*, 15, 111-124.
- Pejanović, R., & Vujović.S., (2008). Ruralni razvoj i agroturizam. *Agroekonomika*, 37-38(37-38), 5-15.
- Petroman, I., & Petroman.C., (2010). Agritourism and its forms. *Lucrări Științifice - seria Agronomie*, 53(2), 367-369.

- Lanfranchi, P.I.C.M., & Giannetto.C., (2012). Study on the performance of Agritourism sector in Romania. *Annals of the „Constantin Brâncuși” University of Târgu Jiu. Economy Series*, 2, 176-182.
- Hunter. Philip, S.C., & Blackstock.K., (2010). A tipology for defining agritourism. *Tourism management*, 31, 754-758.
- Popesku, J. (2011). *Održivi razvoj ruralnog turizma*. Beograd: Taiex / Privredna komora Beograda. Retrieved from <http://www.kombeg.org.rs/Slike/UdrTurizam/2011/novembar/TAIEX/Prezentacije/Beograd.pdf> 2017 May 3.
- Press release. *National Account Statistics, Belgrade*, (2016). 66(260), Statistical Office of the Republic of Serbia.
- Ramiro, E.L., Goldman, E.G., Jolly, A.D., Wallace, B.D., Schrader, L.W., & Parker, A.S. (1999). *Agricultural Tourism: Agritourism benefits agriculture in San Diego County*. California: University of California.
- Rogerson, C.M., & Rogerson, J.M. (2014). Agritourism and local economic development in South Africa. *Bulletin of Geography (Socio-economic Series)*, 26(26), 93-106.
- Rodan, B., Pennington, D.W., Eckley, N., & Boethling, R.S. (1999). Screening for Persistent Organic Pollutants: Techniques to Provide a Scientific Basis for POPs Criteria in International Negotiations. *Environmental Science and Technology*, 33(20), 3482-3488.
- Selin, H. (2009). Managing Hazardous Chemicals: Longer-Range Challenges. *The Pardee Papers series*, 5, Boston: The Frederick S. Pardee Center for the Study of the Longer-Range Future. Boston University.
- Spilanis, K., Kizos, T., & Spilanis, I. (2016). Evaluating the impact of agritourism on local development in small islands. *Island Studies Journal*, 11(1), 161-176.
- Strategy for Agriculture and Rural Development of the Republic of Serbia for the period 2014-2024. *Official Gazette of RS*, (2014). 85,
- Tew, C., & Barbieri.C., (2012). The Perceived Benefits of Agritourism: The Provider's Perspective. *Tourism Management*, 33(1), 215-224.
- Veselinović, J., & Ignjatijević.S., (2013). Pravni okvir i ekonomske mere za unapređenje agroturizma. In M. Milančić, D. Filipović, V. Šećerov, & M. Marić (Eds.), *Planska i normativna zaštićena prostora i životne sredine*. (pp. 145-150). Palić: Asocijacija prostornih planera Srbije. Knjiga I..
- Vujović, S. (2007). Agroturizam kao podsticajni faktor ekonomskog razvoja Vojvodine. *Agroekonomika*, 36(36), 125-136.
- Wall, G., & Mathison.A., (2006). *Tourism: Change, impacts and opportunities*. Harlow: Pearson Education Limited.
- Wilson, J., Thilmany, D., & Sullins, M. (2006). *Agritourism: A Potential Economic Driver in the Rural West. Economic Development Report No. EDR 06-01. Cooperative extension*. USA: Colorado State University. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.522.4328&rep=rep1&type=pdf> 2017 May 3.
- Zhenhua, L.M. (2003). Sustainable tourism development: A critique. *Journal of Sustainable Tourism*, 11(6), 459-475.