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Proposal centre of sustainable tourism from unused buildings in Zádiel

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Abstract: Not only around the world are many nice places which fascinate visitors, but also in our small country, in Slovakia. We have many rare human works, historical monuments, animals, plants, or minerals, which help us to make sense about nature, which is around us. It is very sad, that sometimes people know world better than their own country. In this context, it is necessary to know that all of places, not only around the world, but also at home have only limited traffic rate, which should be the base stone of sustainable development of tourism. To these areas belongs also National Park Slovak Karst, with one of the most visited part Zádiel gorge. It is famous region with many caves, ravines and limestones formations. All of mentioned should help to region be world known, what suppose many tourists here, who used to burden environment. Currently analyze does not show abnormal burden nature through tourism, but now is time thinking about protection this area and ways how to use existing options. This is the main reason why article describe analysis of burden of tourism in Zádiel area and using of existing objects to sustainable tourism.

Keywords: sustainable development of tourism, Zádiel area, tourism burden

Introduction

Burden of tourism is currently very hot topic. On the one side we have to think about ongoing tourism promotion, on the other side we have rational considerations, because of environmental burden. This is caused by huge invitation of tourists, mainly in nature protected areas (Herman et al., 2016; Ilieş et al., 2018). Data from analysis describe Zádiel village where is impact of tourism constantly increasing. Therefore, there was utilized analysis of impact of tourism in terms of transport,

accommodation, also noise. During this evaluation it is possible to take further measures and actions that lead to reducing the burden on the environment. The various calculations and evaluations were made based on the number of tourists in the area (calculated through one day during holiday season) and based on the limits of the EU. Based on analysis of tourism impact and number of tourists who come here, we can reduce and control the environmental burdens to not reach even higher values in future. Just these facts are also expected to draft a timeless center of sustainable tourism in the area.

Location of described area

Described Zádiel village is located in the southeastern part of Slovakia, near the Slovak-Hungarian border. The area is built upon the geological site by generical, which is built by limestone, National Park Slovak Karst. This is the main reason why this area is very famous for tourists, because of many opportunities for excursions, hiking or exploring the interesting flora and fauna, also a number of precious cultural monuments. National Park Slovak Karst with Aggtelek National Park creates a single territory that is one of the largest karst areas in Central Europe. It is also one of the most beautiful and interesting areas in Slovakia. The area was in 2002 declared as a national park, but it is interesting that already in 1977 it was the first area included in the international network of biosphere reserves under the UNESCO Man and Biosphere (National Park Slovenský kras, 2015).

Evaluation of burden of tourism

In terms of tourism and its burden, we can talk about influence of local transports, accommodation facilities, which are the second home for tourists during their stay out of their residences, but also noise that often visitors can produce. When we think about increasing development and impact of tourism, it is very important to evaluate just these basic factors, which are often a basis of secondary tourism supply.

Evaluating these factors is not simple, mainly because we have not enough needed information about these areas. In the National Park Slovak Karst were counted tourists first time in May 1 in 2007 in the most visited area Zádiel gorge. There were 792 tourists. During our analysis in Zádiel area, which was made last year, September 1 (public holiday) there were counted 264 tourists during two hours. Mainly during public holiday there are the largest numbers of tourists, so there used to park about 100 – 105 vehicles. Basic values for the bearing capacity of the burden are defined from limits and we can evaluate them from known amounts of consumed energy. Water and waste produced are not known, but we can estimate them. These facts are included in analytical section, which takes into account the main underlying variables of existing capacity of accommodation facilities, their 50% visit rate and the main tourist season, which lasts six months (April - September), also that the basic market segment is family with one child.

Transport and European emission limits EURO

Emissions caused by transport, must be considered that there are different thresholds for different types of engines and also may be a difference even for exactly

the same vehicles. The impact of transport is well known, so many states began to assert control emissions which are produced by vehicles. This way began the emission limits known by the acronym Euro X.

Diesel and petrol engines produce a large variety of gases, compounds and elements. Standards define the maximum permitted levels only in the most serious situations: carbon monoxide (CO), nitrogen oxides (NO_x), unburned hydrocarbons (HC), particulate matter (PM), carbon dioxide (CO₂) (Prísňovanie emisných limitov cestných motorových vozidiel, 2015).

When evaluating emissions from transport it is necessary to consider CO₂ emissions that cause global warming and the greenhouse effect, which are currently the most discussed issues of the environment. The various means of transport occur following CO₂ production: vehicle 160 g/km, bus 40 - 80 g/km, the train 40 - 160 g/km (Veverka and Lešisnký, 2015). Average vehicle that consumes seven liters of petrol/diesel per 100 km per year can produce about 750 kilograms of carbon dioxide per year, which depends on the number of kilometers.

Table 1. Emission limits for vehicles [g/l]

(Data source: Prísňovanie emisných limitov cestných motorových vozidiel, 2015)

| Standard | Date of introduce | CO | HC | HC+ NO _x | NO _x | PM |
|---------------|-------------------|------|------|---------------------|-----------------|-------|
| Deisel | | | | | | |
| Euro 1 | 07/1992 | 2,72 | - | 0,97 | - | 0,14 |
| Euro 2 | 01/1996 | 1,00 | - | 0,70 | - | 0,08 |
| Euro 3 | 01/2000 | 0,64 | - | - | - | - |
| Euro 4 | 01/2005 | 0,50 | - | 0,30 | 0,25 | 0,025 |
| Euro 5 | 01/2011 | 0,50 | - | 0,25 | 0,20 | 0,005 |
| Euro 6 | 09/2014 | 0,50 | - | 0,17 | 0,08 | 0,005 |
| Petrol | | | | | | |
| Euro 1 | 07/1992 | 2,72 | - | 0,97 | - | - |
| Euro 2 | 01/1996 | 2,20 | - | 0,50 | - | - |
| Euro 3 | 01/2000 | 2,30 | 0,20 | - | 0,15 | - |
| Euro 4 | 01/2005 | 1,00 | 0,10 | - | 0,08 | - |
| Euro5 | 01/2011 | 1,00 | 0,10 | - | 0,06 | 0,005 |
| Euro 6 | 09/2014 | 1,00 | 0,10 | - | 0,06 | 0,005 |

Table 2. Emission limits for trucks and bus [g/kWh]

(Data source: Prísňovanie emisných limitov cestných motorových vozidiel, 2015)

| Standard | CO | HC | NO _x | PM |
|---------------|-----|------|-----------------|------------|
| Euro 1 | 4,5 | 1,10 | 8,0 | 0,36-0,612 |
| Euro 2 | 4,0 | 1,10 | 7,0 | 0,15 |
| Euro 3 | 2,1 | 0,66 | 5,0 | 0,1 |
| Euro 4 | 1,5 | 0,46 | 3,5 | 0,02 |
| Euro 5 | 1,5 | 0,46 | 2,0 | 0,02 |
| EEV | 1,5 | 0,25 | 2,0 | 0,02 |
| Euro 6 | 1,5 | 0,13 | 0,4 | 0,01 |

Burden made by accommodation facilities

In this part of the analysis was evaluated by consumption of media such as electricity, gas and water. In accommodation facilities water is used mainly for (consumption of water per person per day): showering and bathing 40 l, laundry 40 l, WC 40 l, personal hygiene (no swimming) 15 l, cleaning 10 l, dishwashing 7 l,

drinking and cooking 6 l, the share of government consumption, for example swimming 150 l. We can say that consumption of this facility is about 308 l water for 1 person per day (Pavolová et al., 2012).

Electricity consumption in accommodation depends of various electrical appliances. Each property has other appliances, but almost each has a washing machine, refrigerator, vacuum cleaner, TV or radio. Weekly theoretical household consumption of electricity is 133,625 kWh. Monthly theoretical consumption is 534,5 kWh. Therefore, we can say that electricity consumption in main season, from April to September (than main tourist season) is about 3 207 kWh.

Accommodation facilities also produce waste generated from the operation of both operators themselves or by persons using the service equipment. Unfortunately, tourism is the largest producer of waste of products of daily consumption in the form of various types of packing. They are thrown into the bins and continue to landfills, but often accumulate in landfills and unsuitable environments that producers are often themselves residents of communities or tourists. Production packaging, however, has a positive downward trend. Most packaging is produced in the form of paper and glass, that of the substances which are currently recycled, as from January 1, 2010 is the responsibility of each municipality to introduce waste recycling.

Burden of tourism in Zádiel village

The impact of transport in the village Zádiel is most felt by tourists who come here to see Zádiel gorge. After analysis it was found that in Zádiel area used to change about 45 vehicles daily, 72 vehicles over the weekend and about 100 - 105 vehicles during the public holiday. As it was mentioned, in the analysis of traffic on Zádiel, there were counted 264 visitors in two hours (in this way were analyses also villages around, mentioned in table 1 and 2).

When we suppose that the most visited time in Zádiel is from 9.00 - 15.00 hours, at this time about 1 056 visitors could be located there. If we suppose that key market segment which travels there is a family with one child on the one vehicle, we can suppose that in Zádiel area is during 422 vehicles per one day. If we consider the six-month season (suitable for hiking), when we know during these months, 47 times reported rainfall, showers or thunderstorms, so the weather was not suitable for hiking (including 16 times on the weekend). This way we can consider 136 days suitable for hiking (including 10 times on weekends and 7 times public holiday). So, if we assume the approximate number of vehicles that were here during the week and over the weekend, we assume that during the last year there were about 16 940 tourists for the entire season, which is about 6 776 vehicles. If we know that the path from the main road (from Košice to Rožňava) to the parking before the Zádiel gorge is 2,13 kilometers long (4,26 kilometers in total), so by given number of vehicles with an average consumption of seven liters of gasoline a conventional vehicle/diesel per 100 kilometers, load assumptions (Z) caused by transport as follows: $Z = (4,26 * 7 / 100 * \text{emission limits (CO, NO}_x, \text{PM)}) * \text{number of vehicles}$.

CO₂ values in this area are also higher overall, it's about 4 618 kilograms during the mentioned number of vehicles, at the route to the village from the main road (4,26 km). Transport by bus and train is not take into account. In general, we can say that the largest environmental burden brings by vehicular traffic.

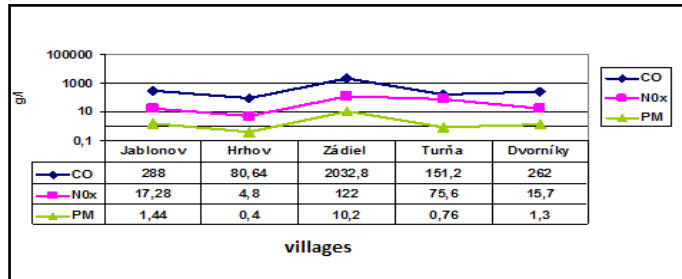


Figure 1. Evaluation of the burden in the villages of road transport by vehicles using diesel
(Source: own processing, 2015)

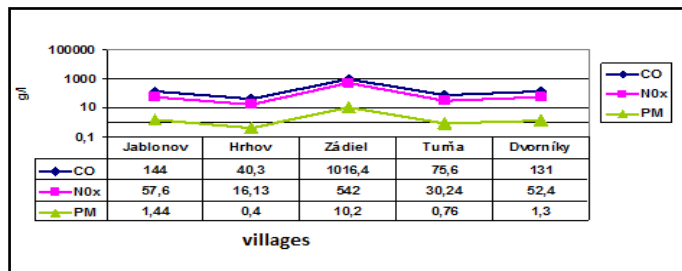


Figure 2. Evaluation of the burden in the villages of road transport by vehicles using gas
(Source: own processing, 2015)

Since there is no model of tourists and its impact on the environment, our measurements were evaluated by the Directive of European Parliament 2001/81/EC and 2006/944/EC, which defines the upper limit of emissions for each year for the whole territory of Slovakia (Council directive 2006/105/EC).

Based on mentioned Directive we can interpreted impact to environment by vehicles. It was calculated based on proportional to the size of the Slovakia territory (49 036 km²), the size of individual land registers nearby villages (10 089 ha) and the emissions threshold in areas with fixed dimensions (Fig. 3).

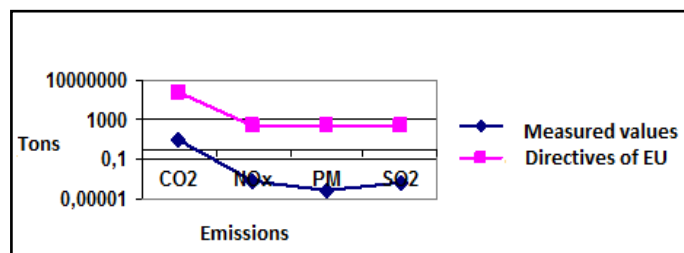


Figure 3. Comparison of the calculated values of emissions from the transport burden for Zádiel area and surrounding communities with an aliquot of emissions defined by the EU Directives
(Source: own processing, 2015)

Based on analysis we can say that in this area there is not above-average load transport emissions. Thus, produced emissions are currently in compliance with Directive 2001/81/EC. However, although the emissions were evaluated under the

critical level, it is appropriate to continue to look at the application of the newest technologies, processes, materials, information and trends in the possibility of environmental protection. In this way, it is still possible to reduce individual limits or amount of energy, what assume also reduce burden to nature. Only this way we can also protect nature not only for us but also for future generations.

Evaluation of burden of tourism in Zádiel village by accommodation facilities In Zádiel village there are two bigger accommodation facilities with a total capacity 32 bed. At about 50% of occupancy, we can think about 16 beds per day which is around 2 800 tourists in the main season. We can say based on underlying parameters for consumption of water and electricity, these parameters represent approximately 3 207kWh of electricity during the main season and 862 400 liters of water.

There is also waste produced by accommodation facilities in the village, weighing 10 800kg during the season (when we suppose 30 lie bags of waste per day).

Since we know that most waste in tourism arises from the packaging, where in 2006 about 300 000 tons of packaging waste, if we divide this number by the number of municipalities in the Slovak Republic, 2928, so it's for one community of about 102,5 tons of waste/year. Although this figure is very approximate, due to different sizes of municipalities and hence the different quantities of waste produced in this way there is at least an approximate view of these amounts. Bigger cities of Western Europe, used to produce average 415 kg of municipal waste per inhabitant/year. Based on this, waste production in Zádiel area is higher than the EU average, 569 kg/inhabitant. The waste is also dealt with EU directive No. 2150/2002 but it defines only the various types of waste (Rozhodnutie komisie, 2006).

Proposal centre of sustainable tourism in Zádiel

Based on analysis and measured values in Zádiel area, we can still improve the current situation and use many existing opportunities to make tourism sustainable.

Within the possibilities offered by the surroundings of the Zádiel village and its use was designed timeless space of active use and protection of this area, which implies minimizing the impact of tourism directly at the protected area Zádielska gorge. Proposal will underpin wider surroundings, and thereby concentration of tourism in one place.

While the current trend is the increasing volume of traffic, the main objective of proposal is gradual reduction of emission and smaller environmental burden. The proposed device can reduce the level of emissions in protected areas by regulating the number of tourists, by limiting the availability of means of transport, and increasing environmental awareness not only among tourists but also among domestic population. That is the objective of the proposed tourism center.

In this way, the proposed Sustainable Development Programme of tourism can reduce the impact to the environment, by current or higher number of tourists. Therefore, we proposed creation of so-called teaching - entertainment center in the village Dvorníky in areas currently unused by agricultural cooperative.

The main principle of the proposal is selection of tourists to specific groups according to their actual needs in this precious area:

- tourists who come to Zádiel to explore the area as a national natural monument;

- tourists who come for purposes of entertainment, rest, relax;
- tourists, for whom nature and landscape are not the primary reasons for visiting the area;
- tourists who do not know the area (they have opportunity to know the area or decide to spend their time other way).

The main objective of this section is not decrease numbers of tourist. The main precondition for the operation of the proposed project is the cooperation of surrounding communities, as well as organizations dealing with the promotion of tourism in the region.

To create the center, we propose to use the existing building cooperatives, which are currently unused. Besides this it is necessary to use a number of technologies and materials that save the environment and ultimately bring energy savings. In particular, I propose to reconstruct the building and use it as it follows (Fig. 4).

Buildings No. 1, 2, 3: Since in one of these buildings are still cows, so it can be used for agricultural tourism, which raises environmental awareness.

Buildings No. 4, 5: These two buildings we suppose to use mostly for fun, especially for tourists, whose primary goal is not to discover the nature, but spend time in a pleasant atmosphere and take full advantage of their free time. I therefore propose to redevelop the building for sports - entertainment purposes, which will be useful throughout the year. In particular, there could be built multifunctional playground for several sports.

Buildings No. 6, 7: Will be used for permanent presentation of a given area by big screen. I propose to process the whole nature trail that leads through Zádiel gorge in 3D, but also rare and interesting area of Slovak Karst National Park, which will be presented here. This area should be the most important for environmental burden. Here should tourists make decision if visit the area or stay at proposed center. These buildings can also be used for various seminars, trainings, meeting entities operating in tourism as a center of rural and ecotourism.

Building No. 8: We suppose to use this building as a centre of proposal. At the same time there will be presented the whole proposed center, there will be focused stalls and small shops for snacks, tasting of local specialties and products that will be produced not only on site but also products that are also currently produced in the surrounding villages.

Outdoor area: Outdoor area includes toilets, also space for children, small greenhouses with flora typical for karst area.

Outdoors we also suppose parking spaces. These places will be created underground, with subsequently filtered air. This reduces the burden on transport emissions directly at the Gorge. In the above-ground parts were supposed to create space for parked electric minibuses that will be used to transport tourists from the center to Zádiel gorge. These vehicles used electricity for their power, which are the most environmentally friendly mode of passenger transport. This will again eliminate the emissions in the field. For further operations and efficient using of proposal space it is necessary to draw up a calendar of events and actions that will take place during the year here. Each month will be known in advance and thus easily publicized program within the center.

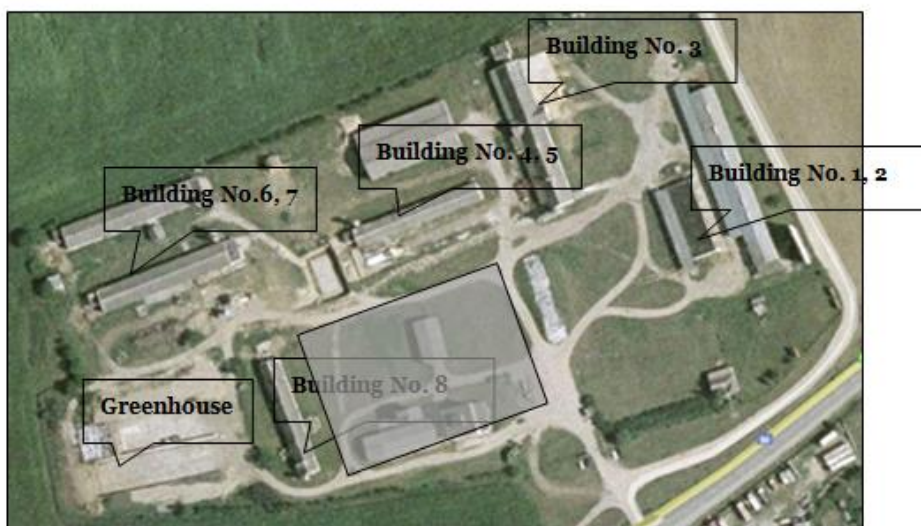


Figure 4. Agricultural cooperative in the village Dvorníky,
place for proposal of centre of sustainable tourism
(Source: own processing, 2015)

Conclusion

When we assume that proposal centre will be visited by tourist form around villages and their accommodation facilities up to 50% occupancy (11 facilities with capacity 123 beds), so overall this center during the high season, will use about 25 000 tourists. Maybe 30 000 tourists, if we are counting also other visitors. The basic composition of the market segment is family with at least one child, we can count with about 12 000 vehicles in the Zádiel area. We suppose absolute reduction of vehicles in the immediate vicinity of the Zádiel gorge, through the noise and traffic reducing of their burden of 100%. In addition to the above-mentioned environmental benefits of the proposed center, one of the other advantage is also extension of the active tourist season to more than though six months. Proposal envisages as the main sources of financing using EU funds for the promotion and development of tourism, but also self-financing from different activities. Perhaps proposal currently looks more like science fiction than reality, but it is only a matter of time when we will have to do maximum of possible for as important places within our protected natural heritage, as Zádiel gorge is. As it used to be obvisosity abroad, here in Slovakia it is some news, which, however, brings many new innovations and positive thinking in the spirit of sustainable development of tourism.

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