

THE ANALYSIS OF THE WASTE PROBLEM IN TOURIST DESTINATIONS ON THE EXAMPLE OF CARPATHIAN REGION IN UKRAINE

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ABSTRACT

The aim of the study is to identify waste generated within the territories of tourist destinations in Carpathian Mountains in Ukraine and to classify it for the use of effective waste management methods. The dynamics of municipal waste generation in tourist destinations in Carpathian region has been analyzed. The sources of waste generation in tourist activities have been identified and classified by the criterion of their further use. The methods of waste management within the tourist destinations in Carpathian region have been proposed. The problem of tourist destinations waste has been identified as one of the significant environmental aspects of tourism industry. Recommendations for implementation of the waste management methods can form the basis of waste management programs within the tourist destinations in the Carpathians. To achieve the goal and to solve the identified tasks a range of research methods have been used in the study: praximetric method (analysis of research experience) and summarizing the information of printed sources on environmental aspects of the tourism industry and the problems of waste management within tourist destinations; comparative analysis has been used for identification of quantitative indicators and dynamics of municipal waste generation; specific search method has been used for identifying, selecting, theoretical analysis, classification of the waste generated in tourist destinations and calculation of their generated amount.

Keywords: municipal waste, tourist destination, tourist flows, waste management, waste management methods.

INTRODUCTION

The increase of tourist flows and the rapid development of tourism infrastructure lead to an increase of the amount of waste in tourist destinations that has a negative impact on the environment. That is why the problem of sustainable waste management is becoming increasingly relevant in many tourist destinations.

Life-support systems of recreational centers in Ukrainian Carpathians were usually formed without taking into account a significant number of tourists that aggravated the problems of water supply, sewage and waste management in tourist destinations. Lack of waste management programs within tourist destinations leads to illegal dumping of the majority of generated solid

waste, thereby creating a threat to human safety, disrupting habitat and reducing recreational value of destinations. These effects threaten the economic welfare and destination as a natural and technogenic system. Therefore, there is an urgent need for identification of the waste problem in tourist destinations in Ukrainian Carpathians and formation of waste management system in order to meet the growing demand of customers for environmentally friendly conditions of recreation.

Environmental aspects of the tourism industry are studied by Ukrainian scientists in the context of sustainable tourism development [Karavan 2014, Korobeinykova 2011, Kuchynska 2014, Tkachenko 2009]. The main directions of environmental safety in the tourism industry development as a part of its sustainable development are

outlined in the works of Vorobiova O.A., Holod A.P., Korzh N.V., Kutsenko V.I., Myronova T.L., Sharko V.V. [Holod et al. 2012, Korobeinykova et al. 2015, Vorobiova 2011]. Scientific problem of practical implementation of environmental safety within the territories of tourist destinations remains relevant as most published works have a common theoretical character.

The works of Fedorenko O.I., Isaieva O.S., Skorokhod I.S., Bilyk H.S. and others concern the problems of waste and landfills operation, but waste problems within tourist destinations are not studied enough.

Traditionally, tourism industry is considered to be environmentally safe industry that can become an ecological alternative to industrial development. Statistical data of recent years shows that, unlike other industries, tourism industry continues to grow despite the overall economic crisis, and therefore, it has great prospects. However, the increase in tourist flows, building and development of tourism infrastructure objects create environmental threats. These problems are considered in Ukrainian scientific literature only partly in the context of sustainable tourism development management systems. In general, tourism infrastructure facilities are not considered as objects that have a negative impact on the environment.

The aim of the study is to identify waste generated within the territories of tourist destinations and to classify it for the use of effective waste management methods.

MATERIAL AND METHODS

Waste is a significant anthropogenic factor of environmental changes. According to the Law “On Waste” in Ukraine, wastes mean any substances,

materials and objects that were generated in the process of production or consumption, as well as goods (products) that wholly or partially have lost their consumer properties and have no further use at the site of their generation or exposure and from which the owner gets, intends to or must get rid of by utilization or disposal [Law of Ukraine “On Waste” 2015].

The problem of waste in Ukraine is still relevant. The analyses of statistical indicators of waste generation in Ukraine in 2000–2013 showed that its amount was almost always increasing and during 2010–2013 it was consistently the highest and the average was about 442 Mt (Figure 1) [State Statistics Service of Ukraine 2015]. A significant increase in the amount of waste in 2010 appeared also due to the fact that State Statistics Service began to include municipal waste generated by households. Identification of waste generated by tourism industry was not considered (Figure 1).

According to the literary sources the most common type of solid waste within the tourist destinations are municipal and similar waste. They can be divided according to three criteria: hazardous, biodegradable and non-biodegradable, and combustible and non-combustible waste [A Manual for Water and Waste Management... 2003]. As there is no classification of municipal waste generated by the tourism industry in Ukraine and tourism conditions and technology are the same we believe that this classification is suitable for Ukraine too.

Hazardous waste contains harmful chemicals and produces harmful by-products when burned or placed in a landfill site. Common hazardous wastes at tourism facilities include paints, cleaners, oils, batteries and pesticides, all of which can have a severe impact on the environment if left untreated. Hazardous waste requires special treat-

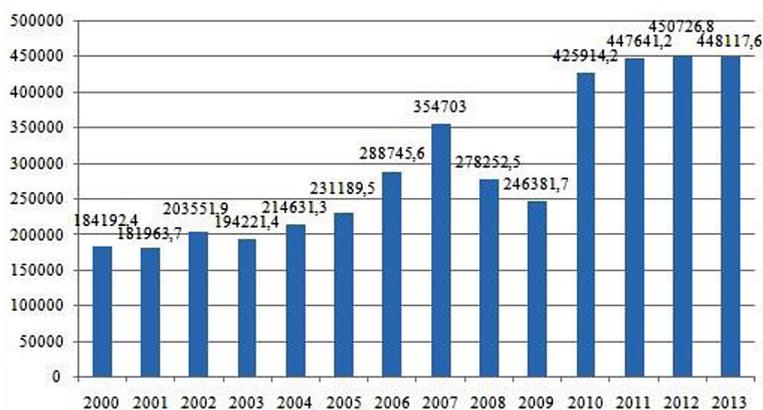


Figure 1. Dynamics of waste generation in Ukraine in 2000–2013 (Kt)

ment procedures before disposal and is not appropriate for ordinary on-site treatment, placement in open landfill sites or burned in an uncontrolled manner. While some instances hazardous waste disposal is regulated (fines are imposed for improper practices); however, in many countries, especially in more remote areas, there is often little government regulation or inspection of hazardous waste treatment.

Biodegradable waste contains organic substances which can be broken down over time, treated and recycled into useful by-products such as biogas and compost; non-biodegradable waste (textiles, chemicals, rubber and plastics) do not. Biodegradation time depends on the type and nature of the substance and can range from a few weeks to many years.

Combustible waste such as paper, used oils, rubber and leather, has a high heat value, burns easily and releases heat energy when combusted. Non-combustible waste such as glass, aluminum and most organic waste (e.g. food scraps and garden trimmings) has a lower heat value and cannot be easily burned. So, each type of waste should be assessed individually since the nature of its char-

acteristics leads to different types of waste management methods [A Manual for Water and Waste Management... 2003].

Since 2011 gathering of statistical data concerning municipal and similar waste began in Ukraine. The average amount of such waste in Ukraine is 12370 Kt. They constitute about 3% of all generated waste in Ukraine [State Statistics Service of Ukraine 2015].

Depending on the method of waste management State Statistics Service of Ukraine divides waste into disposed, burned and utilized municipal and similar waste. Thus, the amount of disposed waste in Ukraine has been gradually increasing until 2013 but then sharply declined in 2014 by 38% (Figure 2). The amount of waste disposed on specially engineered landfills was approximately 57% during these years (Figure 3) [State Statistics Service of Ukraine 2015].

The amount of municipal and similar waste in Ukraine burned for energy generation was almost identical during 2011–2014. There has been a steady decline in the amount of waste burned without energy generation. In particular, in 2014 there were only 3.8 Kt of them which is about

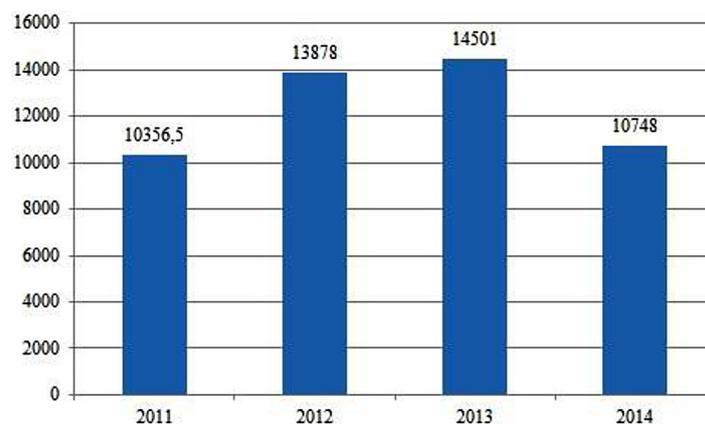


Figure 2. Amount of collected municipal and similar waste in Ukraine in 2011–2014 (Kt)

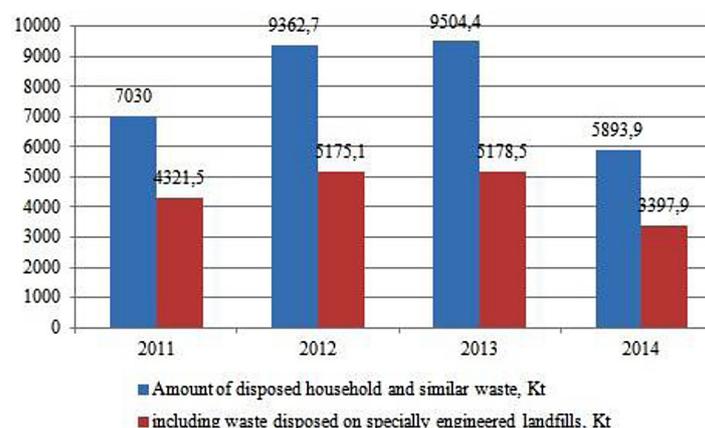


Figure 3. Dynamics of disposed municipal and similar waste in Ukraine in 2011–2014 (Kt)

2% of all burned waste (Figure 4) [State Statistics Service of Ukraine 2015].

The amount of utilized municipal and similar waste in Ukraine has been constantly decreasing and in 2014 was only 3.8 Kt (Figure 5) [State Statistics Service of Ukraine 2015].

The data on waste treatment shows the absence of an effective environmental policy on municipal waste. We should consider that the total amount of municipal waste includes waste generated by the objects of tourism infrastructure and its amount is constantly increasing. We have analyzed quantitative indicators of municipal solid waste in Carpathian region, which is the most popular Ukrainian tourist region. It includes Lviv, Ivano-Frankivsk, Zakarpattia and Chernivtsi regions. The analysis of generated amount of this waste type in the region showed that the amount of waste generated in 2013 in Lviv region was the highest and almost twice higher than in other areas of Carpathian region. Its lowest amount was in the Chernivtsi region (Figure 6) [Waste management in Ukraine... 2014].

We have calculated the potential amount of generated solid waste within the tourist

destinations in Carpathian region in Ukraine. According to the World Tourism Organization every tourist in Europe generates at least one kilogram of solid waste per day. Thus, in 2013 in Carpathian region 133 082 tourists (Figure 7) [Tourist flows in Chernivtsi region 2015, Tourist flows in Ivano-Frankivsk region 2015, Tourist flows in Lviv region 2015, Tourist flows in Zakarpattia region 2015] with an average length of stay 3 days have generated at least 399246 tonnes of solid waste, and excursionist have generated 364 179 tonnes, and that is together 763 425 tonnes and almost 69% of all generated municipal solid waste. These numbers of tourists and generated waste are approximate and can only show an imperfect system of data collection on the amounts of waste and their actual collection and lack of effective waste collection within tourist destinations. Thus, the need of developing an effective waste management system within tourist destinations, where the number of people in the tourist season peaks can exceed ten times the number of local people, is becoming more relevant. It should be also noted that not all settlements in Carpathian region are covered by

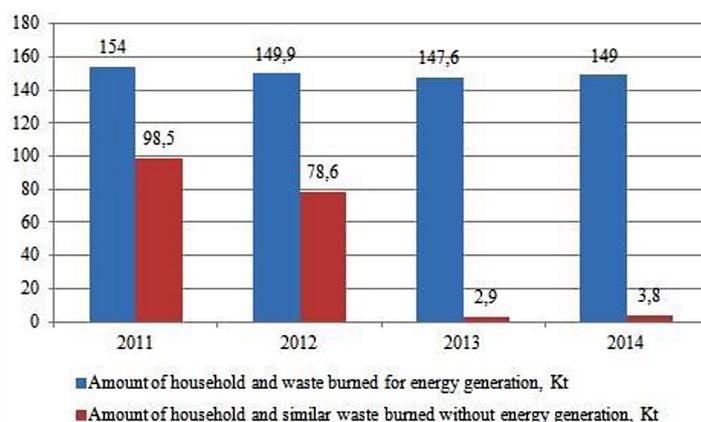


Figure 4. Amount of burned municipal and similar waste in Ukraine in 2011–2014 (Kt)

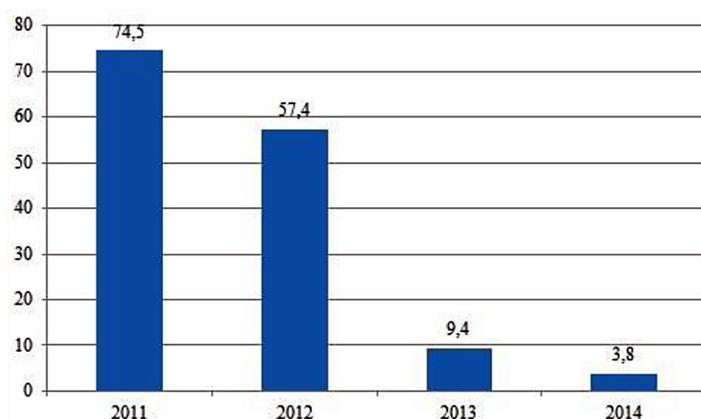


Figure 5. Amount of utilized municipal and similar waste in Ukraine in 2011–2014 (Kt)

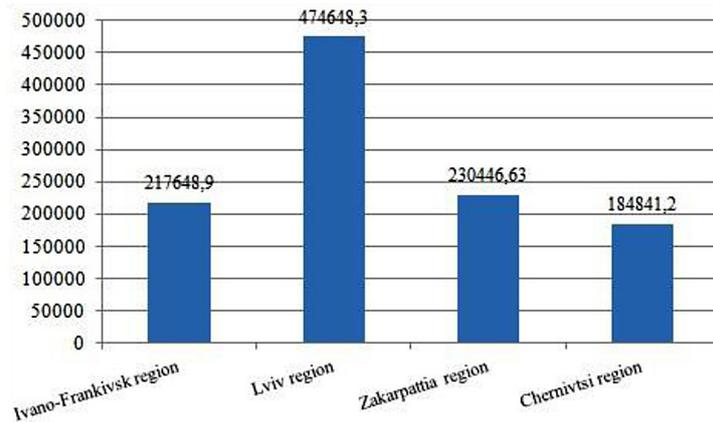


Figure 6. Amount of collected municipal solid waste in Carpathian region in 2013, t

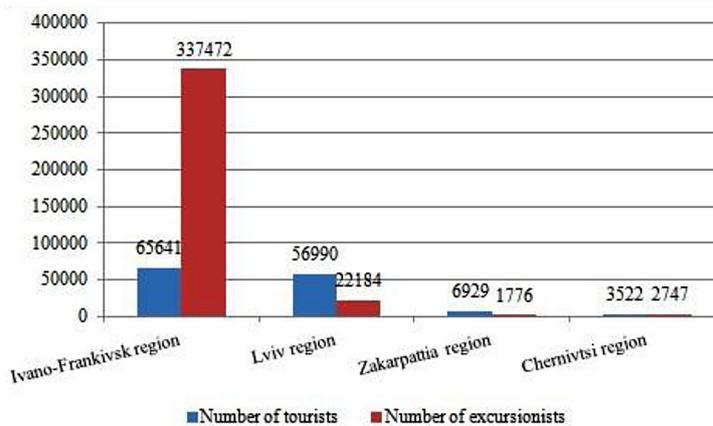


Figure 7. Tourist flows in Carpathian region in 2013, persons

the centralized collection of municipal waste, which complicates the estimation of waste generation. This primarily relates to remote mountainous settlements, however, there is a rapid development of tourism infrastructure and increase of tourist flows within these new tourist destinations.

Sanitary cleaning of cities and other settlements from hazardous municipal waste and its disposal remains unsolved environmental problem in Ukraine and Carpathian region in particular. Most of it is stored and gathered in landfills, the area of which in the most popular Carpathian region in 2013 was 1235,46 ha (Figure 8). The total number of landfills and dumps in the region in 2013 was 1326 (Figure 9). Most of them are concentrated in Lviv region, namely 671, but 657 of them, ie 98%, are overloaded. The situation in other regions is a little better. Thus, 24% of landfills and dumps in Zakarpattia region, 2% in Ivano-Frankivsk region and 1% in Chernivtsi region are overloaded (Figure 10) [Waste management in Ukraine... 2014]. Considering the fact that the terms of use of landfills that are used for municipal solid waste disposal are

about 30 years, and now most of them are filled as an average for 90% or are completely exhausted, there is an urgent need for the formation of new waste management approaches. The main sources of waste generation within tourist destinations are tourist facilities such as hotels and other accommodation facilities, food establishments, automobile industry and etc.

A manual for water and waste management within tourist destinations which described such methods of waste management as reuse, recycling, recovery (composting, incineration) and disposal was developed as a part of the UNEP. Let us consider the recommendations and methods from this manual that are suitable for tourist destinations in Carpathian region [A Manual for Water and Waste Management...2003].

To effectively reuse and recycle waste, segregation is essential in sustainable waste management practices. If paper becomes mixed with food waste, for example, it is difficult to reuse food waste either for animal feed or composting. If glass bottles or feces are mixed with food, it is difficult to recycle the material without health risks.

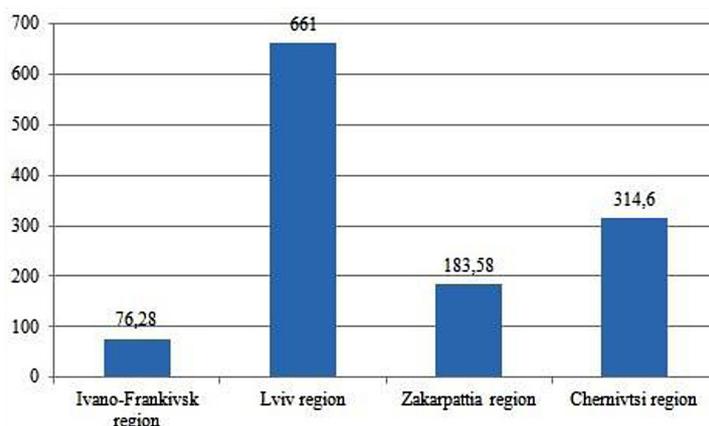


Figure 8. The total area of landfills and dumps in Carpathian region in 2013, ha

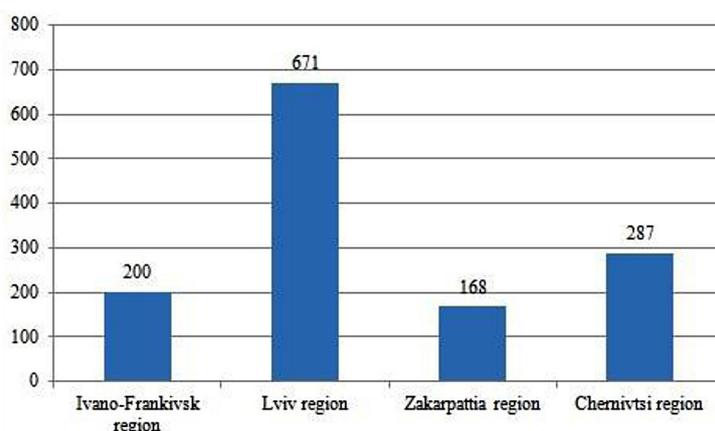


Figure 9. The total number of landfills and dumps in Carpathian region in 2013



Figure 10. Total number of overloaded landfills and dumps in Carpathian region in 2013

Reuse is preferable to recycling since the item does not need to be reprocessed. Reusing items by repairing, selling or donating these to charity and community groups reduces waste. In addition to environmental considerations, sensitive reuse schemes can have important social and cultural benefits. Here are a number of ways a tourist facility can reuse items:

Accommodation facilities:

- collection of used flowers from guest rooms for composting or (if appropriate) donating to local hospitals, schools or charitable organizations;
- donation of used linens, towels and blankets to local charities;
- installation of a dispensing system for prod-

- ucts such as shampoo, soap and lotions;
- donation of used soap and toiletries to local charities;
- dyeing stained towels a dark color for reuse as cleaning rags;
- donation of the old furniture and equipment to charities;
- reuse of waste paper as telephone answering pads or notes.

Food establishments:

- donation of empty buckets to schools or employees for storage;
- donation of old utensils and kitchenware to employees or charities;
- reparation and rebuiltment of old refrigerators/appliances.

Administrations and offices:

- reduction of paper use, e.g. by double-sided photocopying;
- donation of old computers and equipment to schools or charities;
- use of refillable, reusable toner cartridges for laser printers.

Recycling turns materials that would otherwise become waste into valuable resources with environmental, financial and social benefits. Recycling diverts waste from landfills, saves energy and water and creates less air pollution. Simple techniques can be implemented as part of a successful recycling program:

- contact with local recyclers to identify items/areas in which they are interested;
- collection of used flowers in guestrooms for composting;
- putting recycling containers in guestrooms;
- providing recycling bins in kitchen/bar areas for glass, aluminum and plastic containers;
- collection and separation of cans, bottles, glass and cardboard for recycling;
- recycling of motor oils, antifreeze, paint, etc. used by grounds-keeping and maintenance staff;
- recycling of all office paper and cardboard boxes;
- recycling of office materials, e.g. copier and printer cartridges.

Much of the waste generated from food and beverage departments is biodegradable and can be composted rather than sent to a landfill. "Composting" can be defined as managing natural pro-

cesses in a deliberate and organized way. Within the composting process bacteria helps convert complex organic matter into carbon dioxide, water, plant nutrient and humus. Experience has shown that plants grown using compost are less prone to pest attack and disease.

Composted solid waste has great potential since it:

- reduces the amount of waste sent to landfill;
- reduces organic materials in the effluent treatment process;
- produces rich material for gardens and grounds;
- enhances the environmental profile of a tourism destination.

When all other options have been considered, combustion or burning waste at high temperatures can be an effective way to deal with certain types of solid waste, especially where land is at a premium for land fill or composting purposes. Small-scale or non-professionally managed combustion operations are not recommended since hazardous gases can be produced if wrong type of waste material is burned.

In any combustion situation, non-combustible material such as metals and glass must be removed to reduce the size of the treatment system and increase the system's energy efficiency. The combustion system should be designed to hinder, where possible, the formation of pollutants, especially organic compounds, e.g. dioxins.

If possible, combustion process should consider an energy recovery system with the possibility of reusing waste as fuel for energy production, while heat can be recovered in a boiler system and converted to hot water, steam or electricity.

There will always be residual waste which cannot be reduced, recycled or reused. The major disposal option for this waste is in a municipally or privately managed facility or in the case of remote and small island states on the facility's site itself. Operators of these facilities must ensure that the waste does not damage the environment or harm area residents by using accepted solid waste management landfill procedures.

In the conditions of Carpathian region, where the facilities that generate waste are remote from each other, it is appropriate to consider the implementation of waste pressing system on local areas and subsequent storage of this pressed waste at landfills.

CONCLUSIONS

Results of the research allowed making a number of conclusions.

1. Including municipal waste to the statistical data of waste generation is one of the reasons for the increase in the amount of waste in Ukraine in recent years.
2. Statistical data on municipal solid waste in Ukraine allowed making the conclusion about a threatening trend towards a reduction of recycled municipal solid waste, which is bad for the environment. The problem is compounded by the fact that most municipal solid waste landfills are in late operation stage.
3. Among the places where there is a significant accumulation of municipal solid waste are recreation and resort areas called tourist destinations. This problem is relevant in recent years due to the rapid development of tourism and recreation industry in the Ukrainian Carpathians and increase in tourist flows.
4. Calculation of potential amount of generated by the tourism industry waste in the Ukrainian Carpathians showed the imperfection of collection system for such a waste type.
5. Main solutions to the problem of accumulation of municipal solid waste within the tourist destinations are the formation of the unified information system on the indicators of generation and use of municipal solid waste, obligatory total waste collection, implementation of separate collection of municipal solid waste, improvement of environmental legislation that has gaps in the field of regulatory support of waste management processes, development of waste management strategy for the main tourist regions in Ukraine, development of waste pressing methods as a way to save space at landfills and to save money in the process of transportation, development of waste management programs at individual facilities of tourism infrastructure.

Thus, the problems of municipal solid waste accumulation and management within the tourist destinations are among the major unstudied and unsolved environmental problems in the tourist and recreational industry in Ukraine, especially in Carpathian region which is particularly vulnerable to anthropogenic impact. They can be solved only through activation of the implementation of sustainable solutions to environmental protection.

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