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Review

METHODOLOGICAL BACKGROUNDS OF ESTIMATION OF ENVIRONMENTAL DAMAGES CAUSED BY TOURISM

Within conditions of increased environmental degradation caused by growth of production, transport, population and tourist activities, balance of the environment has deteriorated.

In this essay we analyse typology of environmental damages caused by tourism - air, sea, water and soil pollution, noise and waste, traffic congestion, spatial deviations, deteriorating of cultural-historical values, loss of domicile population, increasing of crime, etc.

The following methods of estimation of environmental damages caused by tourism have been specially presented: economic (monetary) estimations, indirect assessment, global evaluations, as well as possibilities of internalization of external environmental costs.

Key words: environmental damages caused by tourism, methods of environmental damages estimations, tourism.

1. INTRODUCTION

Current global environmental crisis has been conditioned by uncontrolled and irresponsible exploitation of natural resources, too extensive industrialization and urbanization, intensive growth of technical progress, and by neglecting and insufficient care taken by states and international community.

Environmental degradations have been expressed in continual increasing deficit of certain raw materials and energy, in public health, endangering threatening and extinction of some flora and fauna species, in air and water poisoning, erosion and other forms of soil degradation, damaging and underestimating of natural landscapes and cultural-historical heritage, increasing of radioactivity levels, etc.

All this has induced highly developed countries to introduce even stricter control measures, as well as to monitor, calculate/measure and estimate damages of environmental pollution and natural resources degradation. By objective monitoring and measuring of various types of emissions, natural and technical sciences study and

determine natural (physical) damages caused by pollution, while economic sciences mostly deal with estimations of economic (monetary) damages. Natural measurements are often not comprehensive, and due to it estimations of indirect pollution effects are necessary, too. Results of measuring and estimating much depend on the applied methods, used instruments and procedures.

Main polluters are industries, transport and households, then agriculture, international trade and transboundary pollutions, while tourist activities have been more and more included in basic polluters. Tourism threatens environmental quality in many ways, and at the same time it depends on sustainability of high environmental quality.

Damages, which are results of tourist activities in certain regions, appear in form of classic environmental damages, but also in form of other, typical for tourism, degradations of natural and human environment. These damages have been more and more noticed, monitored and estimated, and measures for their alleviating have been also taken.

Methods of estimation of environmental damages caused by tourism are numerous, but the main ones are: economic (monetary) estimations, indirect and global estimates.

Methodological basics of estimations of environmental damages caused by tourism have been presented in this work, while needs and possibilities of internalization of external environmental costs have been pointed out, too.

2. TYPOLOGY OF ENVIRONMENTAL DAMAGES CAUSED BY TOURISM

It is paradoxical that tourism, regardless its all positive economic, cultural and environmental moments, threatens quality of environment more than any other sector (OECD The state of the environment 1991). Alfier has stressed that since tourism has taken an extensive form, it has become, besides industrialization and urbanization, one of the strongest factors which make pressures on space (Alfier 1994). Using the same language, Cohen points out that mass or large-scale tourism represents a new and frequent risk for environment, while its long-term and determined impacts can make larger and more frequent damages than it can ensure short-term interests.

It influences environment in an increasingly damaging way and its effects are often similar to negative industrial impacts on environment (Cohen 1978).

Environmental impacts of tourism are indeed very important and have positive and negative aspects. Positive environmental aspects of tourism include: stimulation of measures for physical protection of environment, landscape, historical places and game, and by using of environment and by building of its own infrastructure, it also improves the level of local infrastructure. Among negative environmental aspects of tourism one should include significant air pollution and

rising level of noise caused by vehicle transport, water pollution caused by high concentration of tourists in shorter time periods, throwing bits of rubbish around, degradation of natural landscapes done by uncontrolled building and constructing or caused by public access limitations, damages done to flora and fauna, historical-cultural monuments, as well as congestion and inadequate infrastructure which cannot be amortized in a short period, etc.

World literature does not present in details, but only fragmentary, either research of environmental damages caused by tourism or damages which result from tourist degradation of environment. Partial estimations of pollution damages caused by tourism and recreation have been made in Italy at the end of 1960s. Although these damages comprise only smaller part of total environmental damages, they have, nevertheless, demonstrated complexity of procedures and methods of their estimating.

Environmental damages caused by tourism can be classified into several groups. First group comprises classical damages done to the environment: air, water, sea and soil pollution, increased noise, larger quantities of waste, etc.; then damages which appear because of specific forms of degradation of natural and human environment: traffic jams and catering crowds, deforming of landscapes and coastal areas, spatial deviations, deteriorating of cultural-historical values and higher level of some types of criminal activities (Žuvela a 1996).

2.1 Classical Damages

Specifying of effects and damages caused by pollution is done on the basis of available data on concentration of harmful substances in air, water, sea and soil: this job is very complex as one should find out and prove cause-effect connection between these effects and damages and sources of pollution, measure them quantitatively in physical units and then present them in monetary units, by using adequate methods and procedures. This specifying can be successfully done only by multidisciplinary co-operation of more experts of various profiles, and based on collected experimental and scientific foundation (Žuvela d 1994).

Air pollution are harmful to health and physical mood of people, cause mechanical and chemical degradation of materials and buildings, degradation of cultural riches and values, make harmful impacts on plants and animals, reduce aerial visibility and enlarge level of smog (Žuvela c 1994). This air pollution, which is conditioned by tourist activity, has been mainly connected with considerably increased level of traffic and appear in form of gas emissions from cars, buses, ships, vessels and airplanes. However, tourism also pollutes air by increased use of stoves and various fireboxes which serve for food preparing and as energy sources. According to their number and level of using, one can estimate the mass of emitted gases in certain space, and consequently assess damages done by this pollution.

Current state of air pollution in developed countries is most frequently monitored by determining of emissions of sulphur dioxide, carbon dioxide, nitrogen oxides, carbon monoxide and other gases, as well as suspended particulates. In

comparisons, one often uses ratio between quantity of pollution and Gross Domestic Product (GDP) or the quantity of air pollution per capita or per square kilometre (km²).

Water pollution appears through all forms of use of water. Tourism can be large source of pollution of water (basins), notably at local level, because of high population level and tourists' concentration in shorter time spans and in regions which do not possess sufficient or adequate waste water treatment facilities. Lack of adequate infrastructure for protection of sources and waste water treatment is both consequence of a necessity for construction of larger capacities, which can be used at larger scale only during shorter period of year, i.e. in tourist season, and large costs which cannot be covered by the tourist service price.

Harmful consequences can arise from appearance of contagious and other human diseases, from devastating of flora and fauna, pollution of drinking water, reduced utilization of waters used for recreational and sports purposes, etc.

Water conditions in developed countries is monitored through indicators such as: water consumption per capita, water quality, concentrations of oxygen and polluters, waste water treatment, etc. (Blažević 1994).

Marine pollution is caused by disposal of household and other waste materials or junk, oil and other waste substances from ships and vessels, by lack of faeces treatment, etc. Various diseases and poisoning of humans, fish and shells, sea blooming, reduced usability of beaches for bathing and recreation, etc. are some of the consequences of marine pollution.

Development of tourism, particularly nautical tourism, imposes problems of using of small harbours, marinas and tourist vessels. These are problems of guarding and servicing, then posing risks for traffic courses in vicinity of harbours and marinas, and specially threats for bathers, as well as pollution of the sea, air and beaches caused by driving of motor vessels near shores and bathing zones (Pašalić 1997).

Soil pollution, conditioned by tourism, is caused by solid waste discharging, throwing of various garbages and litter next to the roads, on public areas, in woods, water currents and into the sea. Quantity of solid waste is measured in weight units.

Means of transportation and concentration of tourist activities (noise caused by means of transportation, noise in restaurants, entertaining shows and similar) make people feel uncomfortably and awkwardly because of noise. Noise intensity is measured most frequently at its sources and is expressed in decibels. Direct harmful effects of too intensive noise and vibrations are manifested both in human health (loss of sleep and hearing, nervous strain, working productivity fall, etc.) and on buildings.

Noise can be measured, but it is impossible to specify a measure of cumulative effect or a limit at which noise appears (Šestić 1998). Nevertheless, some estimations of noise environmental impacts have been made at global level. In 1978, for instance, according to data of Ministry of the Environment, approximately 3.4% of

GDP was spent in France for compensation of damages caused by pollution and for taking measures against it, whereas 1/4 of that paying out went for pollution conditioned by noise.

Tourism often influences environment in negative way by too extensive agglomeration of people in coastal areas, in woods and marinas, and by increased discharging of waste materials, waste waters and throwing litter (garbage, household refuse) around, higher level of criminal deeds, by forbidden transport, etc. (Žuvela c 1994). According to some ideas and attitudes, mass tourism has got in many cases destructive impact (i.e., acts in adverse, devastating way) on culture and natural resources (Furze et al 1996).

However, tourism, as an economic activity, is equally endangered for the same reasons, i.e. by air, water, marine and noise pollution, and by devastation of natural beauties. It depends, first of all, on preserving of high environmental quality, which is, simultaneously, basic "raw material" of tourist industry (OECD The state of the environment 1991).

2.2 Traffic Jams and Catering Crowds

Traffic jams (congestions) can be conditioned by many causes. Arrival of large number of tourists by own cars can cause traffic jams mostly in small places, where there is no need for high-speed traffic roads. Such congestions slow down and, at the same time, increase necessary driving time, causing discontent of tourists and domicile population, enlarge fuel consumption and generate higher levels of air pollution by exhausting gases. Traffic problems along coastal settlements are of particular importance. They deserve special attention, as around 70% of total traffic problems accounts for inhabited places (Pašalić 1997). Among them, the most important are problems of roads, ways of their connecting and functionality.

Air traffic causes pollution by occupying of space (areas), through possible accidents, then by making noise, notably during takeoff and landing of airplanes and by air pollution. Within this, even smaller airports which are aimed for tourist development bring about environmental pollution of smaller extent.

Tourist crowds are caused by traffic jams on the roads and in tourist resorts. They appear at road and railway stations, airports and harbours, in public means of transportation, stopping-places, halts and terminuses, health institutions, in hotels because of overbooking, etc. It makes people nervous and irritated, slows traffic down and dissuades tourists from visiting particular destinations, but makes domicile population dissatisfied, too.

Crowds in catering sector, during tourist season, can bring about pollutions of various kinds, particularly in critical zones with vulnerable ecosystems.

Multitude of tourists at the same place and time, as well as concentration of mass tourism, represent one of the main reasons which cause environmental damages. More than 40 percent of all European tourist visitors is concentrated around

Mediterranean. They enlarge risks of overloading of some tourist locations in that region. At time of peak season in certain places, concentration is much higher than in development industrial areas, and that create situations of large tension.

Levels of environmental damages caused by tourism depend largely on the limits of destination capacity, i.e., on certain entering threshold, beyond which physical worsening of the sources or damages to natural ecosystems occur (OECD The state of the environment 1991).

2.3 Defacing of Landscapes and Coastal Regions

Defacing (spoiling the appearance) is primarily caused by building of summer or weekend houses and development of tourist capacities in broader environment and in coastal regions. This implies shift in use of agricultural and forest lands, defacing or deforming of landscape amenities by different forms of illegal building which cannot fit into existing spaces, various expanding and dredging of coastal areas, lost visual effects, erosion of soil and shores.

2.4 Spatial Deviations

Spatial deviations are conditioned, first of all, by overcrowding of buildings or facilities in certain spaces, as possible physical and aesthetic capacity of specific areas and locations are not taken into account. All that is exacerbated by wild and illegal completing (of building) and constructing, which most often do not fit into the existing spaces. Coastal space, that connects marine and land areas, belongs to the most valuable treasures for successful tourist development, while littoralization through industrialisation, urbanisation and touristization has led to extensive degradation of that space (Žuvela 1996). It has been followed by construction on the very coast, whereas houses on consoles have been bent over the sea water, piers and parts of the shore being set in concrete, fences built in the sea, gravel driven away from strands. Boat warehouses have been also built, shores and the sea areas are parcelled out, faeces are discharged into the sea, and maritime property is usurped, thus preventing access to and passing at the sea (Kušen 1987). Misuse of maritime property by various types of fencing and preventing of free access to the sea can create additional hostility within domicile population. Spatial concentrations of tourists can make further threatening to particular areas, and specially to environmentally vulnerable ones, such as national parks, parks of nature, protected landscapes, strict and special nature reserves and monuments.

2.5 Deterioration of Cultural-Historical Values

Negative impacts on local cultural legacy are imputed, at considerable scope, to tourism, too. This inheritance has got cultural and valuable norms and it regulates, in some sense, human behaviour. Culture represents "the soul" of a society or a community, together with their cultural sensibility and aesthetic communication.

When a cultural good is in the service of tourism, it will be automatically transformed into a commodity, and it leads to vulgarisation of culture, provoking some cultural problems among which the most important are (Furze et al 1996):

- various cultural norms and presumptions may cause shocks and have negative impacts on tourists and local population,
- local economy and inhabitants can be, in certain sense, disturbed by tourists, because of abandoning of some traditional activities and due to reorientation to some more lucrative tourist businesses. Local people can also be annoyed by loss of some traditional values which disappear through searching for easier tourist profit,
- prices of goods and services can rise significantly because of arriving of larger number of tourists, while local population cannot follow that price level,
- showing of luxury may negatively act on local people, as they are not able to achieve that level of abundance.

Under the pressures of mass tourism in our country, many demographic, property, physical and cultural changes have occurred. All of them have partially endangered the identity of coastal and island towns, by construction of houses and weekend (seasonal) cottages, neglecting of wine and olive growing and traditional crafts (Kečkemet 1990).

This form of degradation becomes indisputably more and more important, as it is underestimated and because domicile people and tourist workers have not got enough awareness, being mainly occupied by short-term interests and profit.

2.6 Rise of Crime Level

Arrival of large number of tourists is unavoidably accompanied by higher rate of crime, prostitution and other types of deviant behaviour. There are different forms of criminal activities, ranging from poor treatment of the guests and frauding, various stealings and prostitution up to blood offences.

3. METHODS OF ESTIMATION OF ENVIRONMENTAL DAMAGES CAUSED BY TOURISM

Environmental damages may be direct ones as they directly threaten nature and human beings, as well as indirect ones, too, as they are reflected in losses shown through degradation of the environment or in additional costs, paid for preventing or removing of environmental pollution damaging effects.

Some damages can be naturally expressed, while the others cannot. Some of them are visible (on natural sources, public goods and humans) and can be naturally and economically expressed, in a more realistic way, while invisible damages are liable to estimations.

Diversity of pollution forms and consequences request application of various methods for their specifying. There are two basic approaches in applying of these methods: natural and economic. Monitoring and specifying of natural damages is necessary for their revealing and eliminating. Natural approach is used by natural sciences, and is mainly applied before making decisions on construction of facilities or on environmental protection programme. Economic approach focuses on specifying the amount of monetary expressed damages and economic losses caused by environmental degradation.

3.1 Economic (Monetary) Estimations

Environmental damages caused by tourism can be, more or less, precisely measured or estimated in natural or monetary units. Methods of environmental damages estimation in monetary units represent complex procedures that necessitate finding out and confirming of common links among caused damages and pollution sources in natural units, as well as applying of adequate methods and procedures for their expressing in monetary terms.

Monetary estimations of environmental damages basically enable appropriate decision making on rational investment in environmental quality improving (Pearce, Turner 1990).

Economic estimations of damages depend on possibilities of natural damages expressing, availability of requested documentation (that is base for monetary estimations) organising and professional abilities of services and individuals for collecting, processing and estimating of damages, as well as on availability of modern equipment.

There are different methods of economic (monetary) estimations on impacts of various procedures and objects on environment, of which the most usual are: direct estimation methods, method of econometric models, Cost-Benefit Analysis and Cost Effectiveness Analysis. Risk Analysis, survey methods, methods of court estimations and other methods and techniques (Črnjar b 1997) belong to indirect estimations.

There is no common method which could be applied to all types of pollution and which could comprise all cases. Yet, there are basically two different approaches which prefer various method choosing techniques. Some plead for quantitative approach that measures all environmental effects of an object or activity which can be defined and quantified in monetary terms.

Others are more inclined to qualitative approach, as the starting point is inability of objective quantification. Therefore, some combination of the two is usually applied (Methodes et techniques de prevision de l'impact sur l'environnement 1992).

Direct estimation method is used for actually done damages which have been already determined in different firms, institutions, statistics and other sources of data.

By this method one can estimate losses and expenditures caused by environmental damages and by taken protective measures for the cleaning up purposes.

Basic problem of this method is the fact that all damages cannot be measured, estimated and expressed in natural units, and because one cannot usually comprise all costs and expenditures which appear in cleaning up of the current state.

Method of econometric models enables functional expressing of relation among more polluters and their negative effects. By that, one actually shows dynamic and structural relations between various harmful effects and type of pollution, and determines corresponding variables and relationships. Thus damages caused by pollution can be calculated. In order to establish relations in econometric model, one should know damage natural indicators. However, these methods of estimating cannot determined either psychological, subjective damage or aggravating of living standard, etc.

Cost-Benefit Analysis is based on estimation on costs and benefits which result from an investment decision. This method is commonly used in defining of policies and programmes which are not fully market oriented, such as improving of environmental quality protection. The base of this method is economic rationality, whereas by using it a decision maker can weigh all the for-and-against arguments and consequently make his (or her) decision. In application of this analysis it is essential to specify, in the most precise way, all costs and benefits, and to identify the users in order to determine cost bearers, in an easier way. In spite of falls and rises of this method development today, it has today become the main tool for economic estimation of various natural resources management programmes. It is an integral part of environmental impacts analysis, by which one estimates impacts of state and private sector development programmes on the natural environment (Field 1994).

In applying of this method one has to:

- define clearly the project or the programme,
- describe quantitatively the project or the programme inputs and outputs,
- estimate social costs and benefits of the project or the programme.

This method can be used for assessment of concrete projects (waste management, protection against noise, etc.), programmes by which the state wants to force all the subjects on environmental protection (defining of environmental standards, introducing of new environmental technologies, limiting of land uses, etc.). It comprises concrete time period and has dynamic character as it includes current and future costs and benefits.

Cost Effectiveness Analysis

By this method, costs for various solutions and alternatives can be calculated, taking into account the set goal. Through carrying out of more or less strict provisions, introducing of different technologies and looking for alternative solutions - various costs, by help of which the set goal is realised, appear. Thus, for instance, for carrying

out of waste water treatment measures, there are different solutions and efficiency levels, as well as different costs, too. By this method one can choose more favourable solutions as the it takes into account the set goal. After that, the costs which should be paid in order to realise that goal will be calculated.

3.2 Indirect Methods of Estimation

Indirect methods of environmental damages estimation are made in indirect way when it is quite difficult to express estimations in natural or monetary units. These methods consist of collecting of prevailing opinions of experts, then in examining of individual decisions on loss of environmental quality value or of individual willingness to pay certain amounts for preventing of such loss. Indirect estimations serve for presenting of landscape deterioration, reducing of pleasure because of various actors, degradation of environment, feeling of uneasiness caused by damages done to monument heritage and similar. They include risk and survey methods, court estimates, etc.

Risk Analysis

It includes risk estimation and management. By this method one estimates individual willingness to bear consequences of the risk to which they have been exposed. Environmental economics makes estimations of these risks. Thus it tries to reveal how people value different situations which contain risks of various level. Risk management relies to the state policy, the aim of which is to reduce risks to which humans or Nature are exposed. When risk level and significance are estimated, one looks for different control options and reducing of the risk scope. This analysis includes Cost-Benefit Analysis, whereas the cost is expressed in form of risk.

Survey Method

This method is based on questioning (through surveys) physical and legal persons to express their willingness to pay certain amount of money for preventing harmful effects caused by pollution or for preserving of natural resources values. This is an auxiliary method, and its results depend on environmental consciousness of people and their living standard.

Court Estimation Method

It is applied in disputes (court procedures) where the damaged parties claim compensation from various polluters for the loss suffered, and as a way for defining benefits from environmental protection expenditures which have improved the situation. Damages are estimated by authorised court appraisers on the basis of performed expertise.

3.3 Global Estimations

Global estimations of environmental damages can be made for tourist destinations, within regional and national areas. These global estimations comprise all damages and are made on the basis of certain parameters and relations, taking into account natural estimations of damages and expressing of their value.

Global estimations of damages, caused by air pollution, can be made on the basis of estimations of levels of air pollutants which are discharged (released) from motor vehicles and vessels on rivers, lakes and seas, and according to assessments of harmful impacts of these pollutants on the environment. Estimation of air pollutant emissions of tourist motor vehicles can be made according to number and structure of the vehicles, and on the basis of estimated driving distance, time and speed, i.e. of used fuel. Based on it, and by using of emission factors for certain types of vehicles and fuels, driving speed (Šverko 1994), and by implementation of recommended value ratios for gaseous pollutants, in milligrams per cubic metre of space - one can get the ratio which can be translated, by use of various methods, into monetary damages caused by tourist vehicles.

Damages done by vessels on rivers, lakes and seas can be estimated in similar way, but with using of other emission factors including driving engine size, type of fuel and driving time period.

Water and marine pollution can be primarily estimated on the basis of discharged water quantities, then according to share of (un)treated waste water and costs incurred by waste water treatment.

Quantity of waste can be estimated through parameters on daily quantity of waste materials per one tourist, separately for quantities which are managed in an organized way and for quantities that are thrown around environment, depending on amount of costs paid for waste collecting and management.

Noise can be measured at sources of pollution, i.e. within traffic activities, in hotels, night bars and similar.

Global estimations for traffic jams are carried out on the basis of difference between estimation of driving time period in and out of jams. In this calculation one should include number of vehicles, lost time, overloading and discontent of tourists and local population, etc. All other forms of environmental damages can be globally estimated, too.

One of possible ways for estimation of environmental damages done on cultural-historical monuments that one which uses certain surveys carried out by expert groups. They specify cultural monument values, calculate the value of invested labour, as well as ratio between manual, intellectual, creative, inventive, innovative and protagonist work. It is, e.g., 1:5 millions as proposed by Šošić (Šošić 1991), or

some other ratio of estimation of monument maintaining and restoration costs. A part of these monument legacy costs, estimated in the described way, can appear owing to tourism, too, with respect to number of tourists and visitors who visit and sightsee cultural monuments.

It is much more difficult to estimate impact of tourism on cultural and valuable changes. By help of questionnaires which comprise the above-stated cultural problems, one could, according to Furze *et al.*, make global and rough estimations of these damages.

Damages which arouse from defacing of landscape amenities and coasts, then spatial deviations, could be assessed by direct and indirect methods. Loss of land which has been used for construction of new tourist facilities has got its own price. Short-term value of land represents loss of agricultural values, forest or other lands, while long-term value is reflected in the effects which could possibly appear through previous land function. Furthermore, it is necessary to estimate damages caused by defacing of space and coasts and by total spatial changes. It is difficult to make these estimations, but with Cost-Benefit Analysis and surveys one can do it, with adequate caution.

It is very difficult to estimate damages caused by criminal deeds. However, these estimations can come close to real values by using a more comprehensive approach to these problems.

Quantitative specifying of carrying capacity limits of certain area may serve as an indirect way for global damage estimations. Carrying or quantitative possible capacity determines the following capacities: (Smeral 1996) physical capacity, using capacity, environmental capacity, socio-psychological capacity and supply capacity.

Directives for estimation of tourist carrying capacity of Mediterranean coastal region have been also made (Directives for estimation of carrying capacity of Mediterranean coastal areas for tourism 1997).

In order to recognise global environmental impacts of tourism and its total contribution to economic and other forms of development one should, by help of Cost-Benefit Analysis, specify all damages and benefits which are connected with tourist activity. Simplified model for presentation of damages and benefits at national level is shown in Scheme 1.

Scheme 1. Tourist damages and benefits at national level

<i>DAMAGES</i>	<i>BENEFITS</i>
1. Air pollution caused by road vehicles, ships vessels and airplanes	1. Tourist capacity growth
2. Pollution of water, sea and lakes	2. Rise of employment
3. Pollution by solid waste	3. Foreign currency and budget income rising

4. Pollution by noise of vehicles, vessels and tourist concentration	4. Tourist turnover growth
5. Traffic jams and catering crowds	5. Impact on balance of payments
6. Defacing of landscapes and coasts, forest fires	6. Accelerated development of the country
7. Spatial deviations	7. Impact on development of other sectors
8. Deterioration of cultural-historical values	8. More extensive use of natural and derived attractions
9. Rise of crime	9. Social-cultural benefits

Source: Žuvela, I. (1996), Ekološki aspekti održivog razvoja jadranskog turizma, Pomorski zbornik, 34/1996.

Tourist damages and benefits can be measured or estimated on the basis of used methods and parameters.

A simplified way for estimation of effects and impacts can be expressed by ratios, by help of which one can make a detailed review of tourist impacts. This method examines present value of benefits and costs resulted from certain activity, e.g. tourist activity, in the course of defined time period by using of assumed discount rate. The method uses deficitary values (shadow prices), instead of market prices which are not fully applicable in environmental policy. This relation can be expressed by benefit-damage ratio, i.e. by the following equation:

$$\text{ratio } B/D = \frac{\sum_{i=1}^n \frac{Bi}{(1+r)^i}}{\sum_{i=1}^n \frac{Di}{(1+r)^i}}$$

B = benefits r = discount rate
D = damages i = time period (year)
n = total number of time periods (years)

3.4 Internalization of External Environmental Costs (Externalities)

Internalization of environmental externalities should be applied to tourism, too, in order to compensate damages done to the environment by tourist activities. It will be difficult to realize this because of short tourist season, while the state is to make real estimations of these damages and to direct tourism to reducing them in the first stage and to carry out internalization in the second stage.

Environmental externalities result from production and consumption activities which are not enough valued by the market and are most frequently connected with environmental pollution without compensation of damages done, and with the activities linked with certain kinds of environmental protection and improvement when all the subjects have not been overloaded by these expenditures. The market mechanism has not proved sufficiently effective in adequate distribution of all benefits and damages, caused by various types of environmental degradation, to carriers and victims of degradation. Markets have not succeeded in an efficient resource allocation, and this happens partially because of ignorance and inertia of polluters and sufferers. Science is still tagging behind a real and comprehensive tackling of this problem, as the path from theoretical pondering to real and pragmatic solutions is long and thorny one. Even within the system of social accounts, which were prepared by international institutions in 1993, there were no final solutions that would comprise exhausting or overexploitation of environmental resources and environmental pollution costs (Črnjar, Šverko 1998).

In order to determine optimal scope of pollution, which could guarantee certain environmental quality and acceptable welfare level, it is indispensably necessary and commonly useful to internalize external effects in the most efficient and equitable way.

By general application of internalization of environmental costs, internalized costs can (but not necessarily) be transferred to consumers in form of higher prices (prices which will cover total costs). The aim of internalization includes external costs and benefits into calculation before subjects-producers and consumers make their decisions, in order to adapt their behaviour to socially optimal combination of production and consumption.

Carrying out of internalization of total environmental costs is considerably hindered because of two reasons:

1. there are many methodological dilemmas and obstacles in measuring and assessment of environmental effects, costs and benefits, because of which a socially optimal level of internalization cannot be precisely defined (performance problem);
2. internalization of an environmental cost may cause large structural changes in economic activity and distribution of income (acceptability problem) (Alanen 1996).

4. CONCLUSION

Although tourism has indisputably contributed to economic development, as well as to development of other economic and social activities and better valorization of natural resources, it has, at the same time, caused many negative effects and damages. It is notably accurate for mass tourism.

Among negative environmental effects, i.e. economic damages caused by tourism, one can point out the following ones: air, water, marine and soil pollution, noise pollution, traffic jams, catering crowds, spatial deviations, deterioration of cultural-historical values and rise of some criminal activities.

In up-to-date research works the importance has been given to damages done by other actors and to damages which tourism suffers from, while researches of environmental damages caused by tourism have been only partially done.

Methods of estimation of environmental damages caused by tourism represent general methods which are used for estimation of damages within other activities, too, whereas they are adapted to tourist activity. The basic problem in this field is lack of examining of these impacts and of relevant data.

Internalization of these damages is possible if one possesses previously made estimations of environmental damages caused by tourism.

More comprehensive research work should be directed to specifying of objective criteria and methods for estimating of positive and negative tourist effects. On the basis of estimation of tourist costs and benefits one can determine its more objective contribution and optimalize tourist development from economic, sociological and environmental aspects.

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Sažetak

METODOLOŠKE OSNOVE PROCJENE EKOLOŠKIH ŠTETA OD TURIZMA

U uvjetima sve veće degradacije okoliša koji nastaje porastom proizvodnje, prometa, stanovništva, ali i turističkim aktivnostima, narušava se ekološka ravnoteža.

Analizira se tipologija ekoloških šteta od turizma - zagađenje zraka, mora, voda, tla, buke i otpadaka, prometna zakrčenost, prostorne devijacije, narušavanje kulturno historijskih vrijednosti, gubljenje identiteta domicilnog stanovništva, povećanje kriminala i drugo.

Posebno se iznose metode procjene ekoloških šteta od turizma i to: ekonomske (novčane) procjene, posredne procjene, globalne procjene, te mogućnosti internalizacije eksternih ekoloških troškova.

Ključne riječi: ekološke štete od turizma, metode procjene ekoloških šteta, turizam.