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Case study

Ecological Risks of Expansive Tourist Developement in Protected Areas – Case Study: Plitvice Lakes National Park

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A B S T R A C T

This paper analyses the impact of expansive tourism growth on protected areas on example of Plitvice lakes National park as the most visited protected area in Croatia, with annualy more than 1,2 milion visitors; the highest concentration of visitors is noted from april to semptember when their number exceeds 13.000 daily. Majority of visitors visit the lake system that amounts only 1% of total Park surface; lake sytem comprises the main natural attractions whereat much pressure is pursued on a few critical points of the environment and natural processes. In that situation a need arises to manage the above mentioned processes with the instruments of strategic crisis management in order to prepare and abate negative effects of turist expansion and to find effective models of visitor system management that will minimise eventuall harm effects of uncontrolled turistic developement. The results of observational, analytical and statistical methods confirm some expected tendencies defined in hypothesis; the paper also shows the need for crisis management in current situation, since a high level of impact on ecological variable is present as well as constant decrease of quality of visitoržs experience; as one solution a long-term model for expansive visitors growth management of Plitvice lakes is suggested, aplicable to other croatian protected areas.

Key words*: crisis management, nature protection, protected areas, Plitvice lakes national park*

Introduction

Tourism in national parks, nature parks and other protected areas is one of the fastest growing segments of tourism demand in world tourist market, which is additionaly confirmed by the fact that proclaiming a natural area a national park results in increasing the number of visitors up to 10%[1]. The primary purpose of proclaiming an area protected is preservation of ecological specificity; however, protected areas also have a secundary purpose – valorisation of the area, mostly accomplished through acceptance of visitors (secondary purpose also fulfils one integral element for protection area functioning – its financing). In the Republic of Croatia when an area is proclamed protected, a great attention is dedicated to the fact that the area is protected and at the same time used by visitors; however, extensive growth of the number of visitors of some protected areas has brought to the situation in which the level of protection of the area and the quality of visitors experience has decreased significantly and the number of visitors became a risk for protection of the conditions that made the area protected. In that situation increased interest/popularity of primary national parks presents at the same time an opportunity and a challenge; the opportunity presents itself in fulfilling primary function of national parks (by assuring the visitors scientific, cultural, educational and recreational function) while additional challenge is refered to the ability to fulfill a complementary component of national park (to preserve the environment and natural and historical specificities as well as flora and fauna of the area), which all becomes very hard to achieve in conditions of large and constant increasing number of visitors.

From alltogether eight national parks in Croatia, two meet the problem of excessive and unbalanced space and time distributed number of visitors; the biggest problem occures in the oldest and by space largest national park – Plitvice lakes. While the interest for visit is constantly increasing, the visiting area is not extended nor the visitors

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are managed in a way to prevent eventuall negative effects on nature or increase the quality of experience for the visitors in times of maximal visit. Most of average 1.2 milion visitors per year, visit Plitvice lakes from april to september, wherefore maximal visit occures in july and august when the number of visitors grows up to 13.000 daily; at the same time, visits take place in the lake part of national park that represents only 1% of the total park area (294 km^2) and that creates a huge pressure on nature and a threat to the safety of the visitors, many intermissions and significant decrease of the quality of visit. Furthermore, on the above mentioned lake area (the main object of all visitors interst) there are few critical spots (Big Waterfall, Kozjačka creek) on which additional risks for protected area and the visitors arise. From all the above mentioned the following hypothesis is that: »increasing number of visitors causes larger ecological risks that present themselves through impacts on soil, devastation of the vegetation and similar variables, while at the same time the social variable of the problem appears in terms of the quality of experience from the visitor's point of view«.

The specific purpose of the research is to show alarming indicators of current state of protected areas on the example of the Plitvice lakes national park, and give the suggestion of organised and methodical visitor management (tourism) model in order to avoid negative consequences of expansive tourist developement and problems in protected area management that have negative influence on ecological and biological processes in protected areas.

Material and methods

The data analysed and presented in this paper was derivated from data bases of Plan and analyses department of Public institution »Plitvice lakes National park«, business and financial plans and other relevant documents for the period 1996.- 2010., as well as personal experience of authors. Domestic visitors attitudes were measured by a poll administred on Plitvice lakes National park web site during 2011.; the sample consisted of alltogether 163 person, 71 (44.5%) males and 92 (55.5%) females. Relevant parts of the poll were analysed by means of descriptive statistics and correlation analyses. Plitvice lakes national park were studied as an example of Croatian micro-protected area; in order to shed light on some of the apparent influences that tourism has on nature, the authors were interested in finding out if and to what extent is that influence sustainable.

Results

After the war in Croatia in terms of number of tourists it was very difficult to achieve pre-war results; in case of Plitvice lakes national park the number of tourists equal to the last year before the war (800.000 visitors) has been reached in 2005. Due to the war situation it was very difficult to return the trust of tourists in terms of security of the area, not just in Plitvice but in Croatia. In analysed period (1996.-2010) it is noted that in 1996. Plitvice lakes were visited by alltogether 238.401 visitors; in 2006. that number increased (866.218) and in 2011. it has exceeded one milion visitors (Table 1).

TABLE 1
GROWTH/AMATEMENT RATE OF NUMBER OF VISITORS OF PLITVICE LAKES NATIONAL PARK (2000–2010)

Year	Number of visitors	Growth/amatement rate
2000	482.275	–
2001	597.884	24%
2002	665.108	11%
2003	721.265	8%
2004	749.209	4%
2005	855.866	14%
2006	866.218	1%
2007	927.661	7%
2008	948.891	2%
2009	939.747	–1%
2010	962.322	2%

The number of visitors must be observed with taking into consideration some particularities: from total number of visitors almost 85-95% refers to foreign visitors. In regarded period the greatest growth of visitors number is noted in 2001.; every next following year shows more lower rate regarding to antecedent, while the percentage of growth in noted decade amounts precisely 100% (2010. vs 2000.) With the same rate growth in 2020. Plitvice lakes could be visited by 1.8 milion tourists. The thing that rises as a question refers to the annual distribution of tourists; the highest concrentation of tourists is in july and august (in august 2000. – 69.505 tourists, in august 2010. – 282.325); daily average of visitors in the last few years in those two months amounts between 10.000 and 13.000 visitors: more than total monthly visit in decembre.

Trend of monthly tourist visits (except in numbers) has not been changed significantly over the past ten years; even though the Plitvice lakes are open all year long, tourist season starts in april (Easter) and ends in october. 2010. was a record year in terms of visitors; in august 2010. Park was visited by 282.325 visitors i.e. 30% of total annual number of visitors. July, august and september bring more than 64% of total annual number of visitors; for comparison, in 2000. and 2005. the numbers were as followes (Figures 1 and 2):

In total number of visitors, domestic visitors participate 15% and the trend has not changed in observed period. The poll published on the Parks web site in 2011. and filled by 163 domestic visitors shows that 79% of them visite Park once a year, and only 21% more than once; 71% of them stay in the Park one day, 20% stay five days and only 9% stay more than six days. National

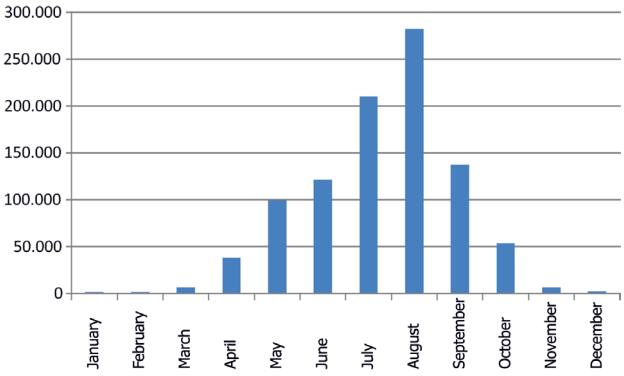

Fig. 1. Oversight of number of visitors by months in 2010.

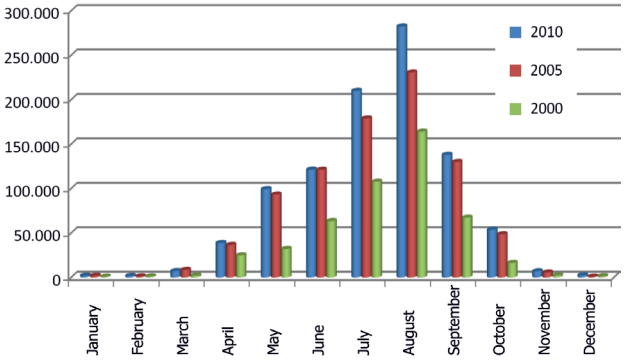

Fig. 2. Parallel oversight of visitors by months in 2000., 2005. and 2010.

structure of visitors also shows no change, except the oscillations in the percentage of the visitors from certain countries; most visitors come from countries that border Croatia (Germany, Italy, France) and Japan whose annual rate growth is 39% (Figure 3).

According to the trends when it comes to national structure of the visitors, from 1997. as dominant appear foriegn visitors; from 2003. the percentage of domestic visitors lies between 7 and 8%. If we look at the number of visitors on annual basis from 1996-2010., a growing trend is notable; only in 1999. decline of number of visitors is noted while all other years have increasing trend (Table 1). In 2008. for the first time the number of visitors exceeds 900.000 visitors; in 2011. there were 1.082. 000 visitors, and in 2012. the number has exceeded 1,2 milion. Causes of growth in 2011. lie in enhanced promotional activities of NP marketing department (advertising, tourist fairs, campaigns), increased number of visitors in coastal areas and regional economic and unfavourable security situation in competitive countries (Figure 4).

In case of Plitvice lakes national park, growing number of tourists is concerning in terms of visitors management and a small visiting surface/carrying capacity of the visited area.

Plitvice lakes national park as the oldest national park in Croatia, proclamed in 1949., and listed to the UNESCO's World natural heritage list in 1979., along with the role of protected area plays a role of actuator of economic developement. National park Plitvice lakes manages four hotels (»Jezero«, »Plitvice«, »Bellevue«

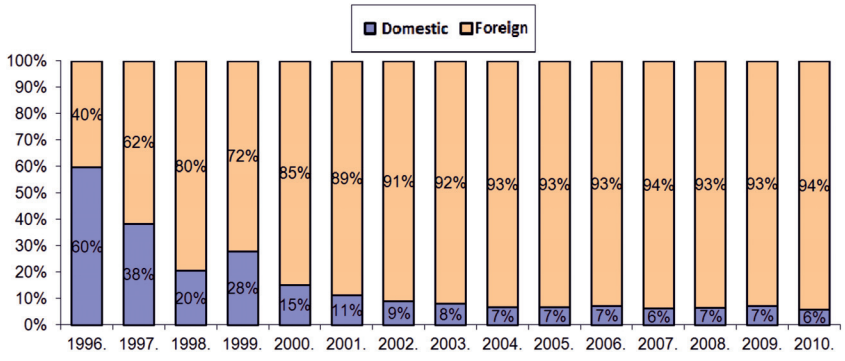

Fig. 3. Share of domestic and foriegn visitors of Plitvice lakes (1996.- 2010.).

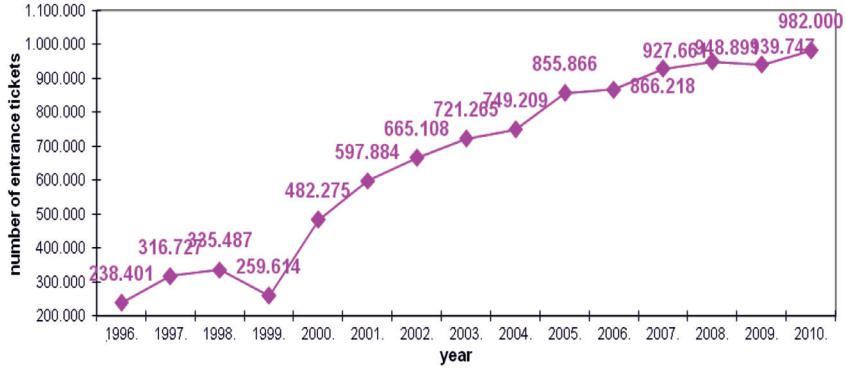

Fig. 4. Oversight of total number of visitors of Plitvice lakes in period of 1996.- 2010.

and »Grabovac«), three big restaurants (»Lička kuća« and »Poljana« i »Borje«), two camp-sites (»Borje« and »Korana«), large number of little restaurants and buffets and seven souvenir shops. When compared to other protected areas in Croatia, Plitvice lakes are prominent as the only protected area that finances itself i.e. generates all necessary income on its own by placing its offer on free market without any help from its founder (the State). In 2007. according to IUCN clasification of protected areas and growing number of visitors of Plitvice lakes, project »KEC« divided the Park into different zones defined according to natural values and need to manage the area based on nature protection principles and natural values, cultural values, spatial plan and plans for tourism management. In that context following zones are as follows (p.46)[2].

1. Zones of strict protection

1. a) the most strictly protected zone – approach to visitors is not allowed; area of high biological and landspace diversity;

1. b) very strictly protected zone – limited acces to visitors alowed,area with slightly changed nature

2. Active protection zones

2. a) active protection habitat zone

2. b) forests ecosystem active protection zone

3. Zones of use

3. a) settlement zone

3. b) recreation and tourist infrastructure zone

In a structure of total surface of the Park, on strictly protected zones with no access alowed relates 8.4%; visitor acces is limited on 58.4% of total surface; active protection zone amounts 31.5% of total surface while use zone amounts only 1.7% of total surface (that is at the same time the percentage of total space most used by the visitors). From the above mentioned a conclusion can be withdrawn that the zone of visitor use is concentrated mostly on lake area which makes a great pressure on the nature eco-system (Figure 5).

Zoning was made according to existing state of turist movement and state of the nature; however, it contains some illogicalities such as dividing a lake (Prošćansko lake) into two diametricalli opposed zones (strictly protection zone and use zone) when it is obvious that activi-

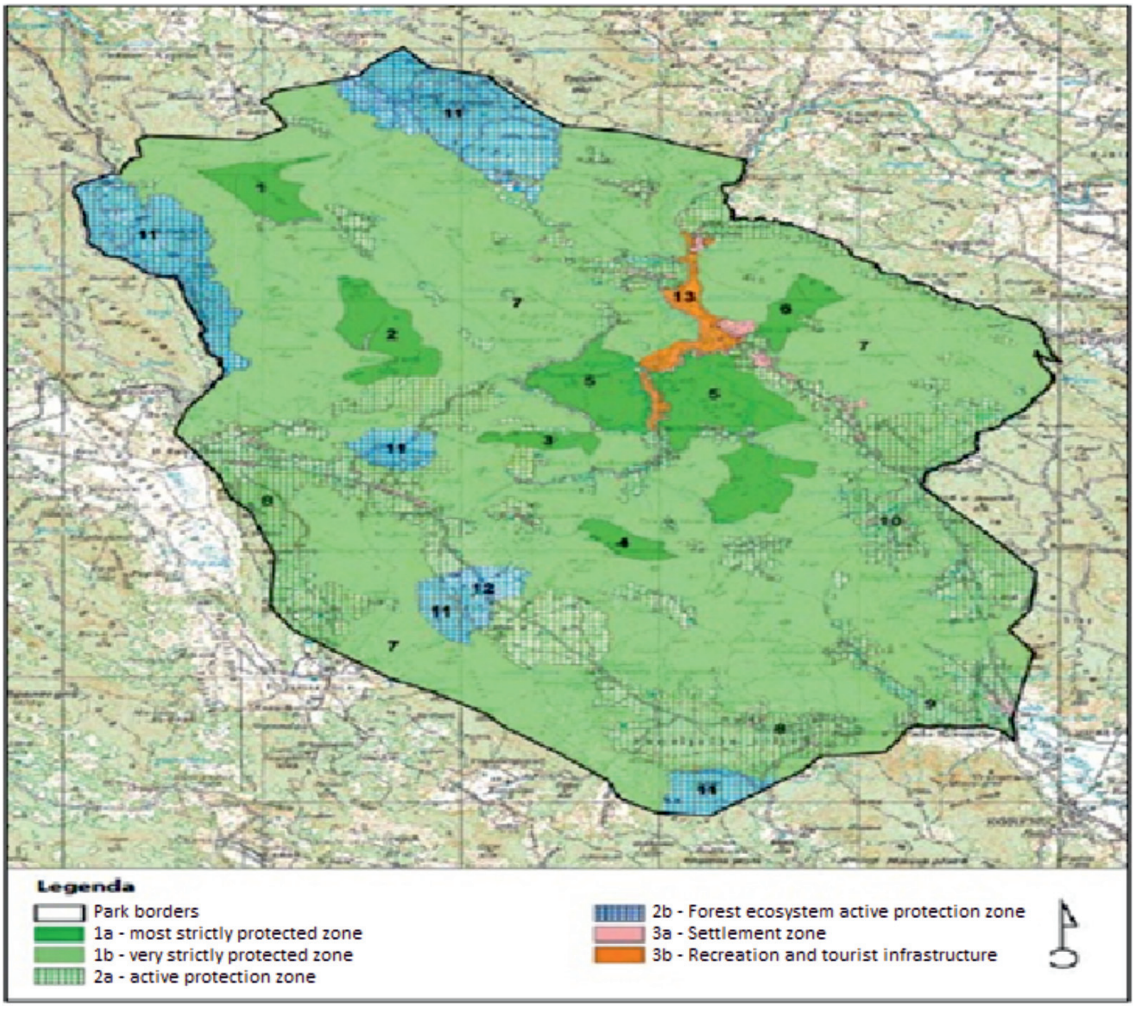

Fig. 5. Zones of Plitvice lakes national park.

ties on one side of the lake will effect the other; also, zoning is a part of a 10-year management plan that excludes hotels, restaurants and souvenir shops even though they exist (even more, they are located in the centre of protected area, unlikely to be removed in next period of time, therefore not possible to elude), which shows the lack of advised, methodical and realistic approach in creation of documents that shoud direct protected area developement in the next decade.

Discusssion

Ecological risks and problems of expansive turist developement of Plitvice lakes national park or any other protected area could be defined through following elements:

- insufficient turist infrastructure for reception of increased number of visitors;
- Security risks related to the insufficient space for safe passing of visitors along defined tourist paths within the protected area;
- Impossibility to keep the visitors within defined visiting paths which opens the space for protected area devastation;
- overload of critical points where large number of visitors appear, and inability to manage them in an adequate way;
- Unequal phisical exertion of park entrances in order to disburden sightseeing points on which visitors meet in large number (eletric boats, panoramic trains);
- Lowering the possibility of forehand reaction in case of emergencies.

Visitor infrastructure in Plitvice lakes national park did not pursue expansive growth of visitors; optimal number that current infrastructure can endure according to an unofficial management estimate without any burden for nature and employees of service industries, reaches the number of 800.000 visitors per year: that number proved to be optimal when it comes to pressure on environment and tourist infrastructure. Together with the increased number of visitors, efforts have been made to expand visit system onto the forest ecosystem but in total number of visitors prevaile those who wish to visit exclusively lake system, mostly because they form a part of a larger tourist group that is time limited in their visit (one of the reasons of increased number of visitors is the fact that stationary tourism is present in a very low percentage, while the majority refers to daily transit tourism that can also be confirmed by average visit lenght – 1.7 days). Second problem is a seasonal character of visit – big pressure on nature from april to october. Along with the groups that announce their arrival, there is an increasing number of one-day visitors coming from the seaside areas; also there is a large number of individuall visitors who plan their visit to the park or decide to stop and visit the Park on their way to some other (seaside) destination. In that situation it is only possible to manage part of the visitors (announced groups and individualls) while the rest can be eventually estimated based on former years.

Along with the problem of insufficient infrastructure there is a risk of reduced safety for both visitors and nature, especially in times of maximal visit, when 12.000 visitors create great croud in visitor system (mostly in spots where transport vehicles are included in the tour) which leads to displeasure of visitors and general negative impression of organisation of visit (lowering visitoržs quality of experience) since the visitor is forced to pay much more attention to the safety of other visitors and it's own, than on the nature. Besides, visitors of Plitvice lakes are allowed to move only on marked paths because moving outside the marked paths is explicitly forbidden which additionally decreases the posibility to lower the crowd. Although walking outside the marked paths is not allowed, in times of highest visit the risk of ignoring that rule is increased which further leads to risks of nature devastation or endanger of one own's or someone else's life. One additional problem accurs on places on tour that are recognised as »must see« locations; the biggest problem occurs during the visit to the Big waterfall that can be reached only by using one-way path (that is later used as a path for visitor to continue the visit) which as a result has constant high concentration of visitors beneith the Big waterfall. The far biggest crowd is created on electric boats ports since almost all visiting programmes include boat rides; the number of boats is limited and insufficient to adequatly and timely transport all visitors and thereby reduce the crowd.

One of possible causes why organisational problems occure when it comes to number of visitors is the organisation; individuall and group visitors are left a choice to pick one of the visiting programmes depending on time they have; they also have a choice to pick a point (entrance) from which they will start and finish the tour (that also effects highly porosity of the system especially in times of high visit since most of the visitors want to start their tour on entrance near the Big waterfall, and that causes long lines while the visitors wait to buy an entrance ticket). In other words, visitor system is not managed by the Park but by the visitors which leads to organisational problems that consequentually leads to higher risks of nature devastation due to inability of adequate survey and controle of visitors once they enter visitor system; all that finally results in increasing risk of lowering the opportune reaction in case of need or an emergency.

Although the organisational problems and a need to adequatly distibute the visitors in place and time are the main problems, the main reason of potential ecological and other problems of protected area management lies in defining optimal, sustainable parameters that will create start base for imlementing an adequate functional model for protected area management. Taking current expansive tourism developement in Plitvice lakes situation into consideration, a need ocuurs to apply effective prin-

ciples and strategies of crisys management. Even though the decision of considerable increase of the price of entrance fees in times of high tourist visit periods is a quality step towards lowering the pressure as well as expanding of the visitors system onto fores ecosystem, it should stay clar that even in situations like that ones, situation is not tottaly controlled because the visitors are again left with the choice if a higher entrance fee price is too high, or not motivateing at all in intention to decide weather they want to visit forest ecosystem instead lake system, which finally does not lead to managing but trying to find alternative solutions that may (but also may not) be succesfull. In that contexst it is necessary to find the model that will not offer alternative but set straight rules of managing and organisation of protected area that will finally lower ecological risks. One of the most efficient model of strategic crisys menagement is »carrying capacity« of protected area that defines precise optimal number of visitors in every moment, and clear guidance of how to manage current expansive situation into optimal level of visit situation.

According to Mathiesson and Wall[3] carrying capacity represents the level of human activities that space can handle without beeing devastated, without major impact on local community or the quality of visitors experience. World tourism organisation[4] suggests that carrying capacity understands maximal number of people who can visit (tourist) destination at the same time without causing destruction of physical, economic, socio-cultural features of the area and non-satisfying level of quality of visitors pleasure. Carrying capacity of the area is measurement tool that allows a partnership relationship between management of the protected area and ecologic impacts of the activities that are beeing undertaked on the area, and as such can be usefull in estimating the average number of visitors in protected area. That information can reduce impacts of recreational visitors[5]. A need to calculate carrying capacity accures as a management concept for the first time in the 30 years of 20 century[6] but another 30 years have passed untill its implementation. When implementing carrying capacity the main question is how many visitors (or any other impact) is acceptable whereat following can be helpfull (along with obligatory evaluation addendum by the management).

Hipothetical relation shown in Figure 6 explains that certain level of load of the system is inevitable even with the lowest level of visit present. Besides, some levels of load must be tolerated in order to leave protected areas open for public. In hypothetical dependence shown in Figure 5., X1 and X2 present the levels of use by visitors that result in different levels of load defined in spots Y1 and Y2. But which one of those spots – Y1 or Y2 – or any other spot in the Figure presents the maximal amount of acceptable load? The main problem in defining carrying capacity comes from defining how much of load (or any other impact) is acceptable. Empirical relations shown in Figure 6 can be usefull in making informed decisions about carrying capacity, but they must be adjusted with management attitudes. Evaluation or prescriptive component of carrying capacity deals with subjective problem on what level impact or change in resource conditions and a quality of visitors experience is acceptable (how much contact between groups of visitors is appropriate, what level of overload is allowed before the need of intervene from the management etc.).

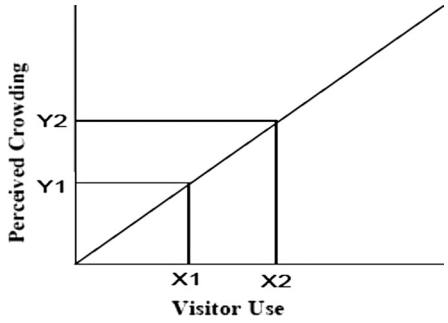

Fig. 6. Hipothetical relation between using protected area by visitors and overcrowding.

American US National park service has recognised the need to define carrying capacity in 1978.; ten years later so called VERP (Visitor Experience and Resource Protection) system was implemented on those national parks that have experienced extensive growth of visitors or public use[7]; for comparison, not a single protected area in Croatia has carried out carrying capacity, not even Plitvice lakes that is experiencing very extensive growth of public use. The main motive for VERP implementation is the fact that protected areas that are beeing estimated touristicly generate finantial benefits needed to pursuit the activities of nature protection but also at the same time (for the fact that visitors find them attractive) could become a threat to natural specificity that made them protected. Principle on which VERP works is as followes:

Defining the framework

1. Form interdisciplinary project team;
2. Develop public involement strategy;
3. Develop new directions about protected area purpose, its importance and interpretative themes;

Analysis

4. Analyse protected area resources and existing areas of use;

Decree/regulative/rule

5. Describe potential range of visitors experience and conditions of resources (potentional regulation zones);
6. Alocate potential zones into specific locations (regulative management zoning);
7. Select the indicators and specify standards for every zone; develop monitoring plan;

Monitoring i management

8. Sources of monitoring and social indicators;
9. Undertake management actions.

Carrying capacity manages the area through desirable resource and social conditions with an adequate number of indicators and quality standards. Indicator variables are monitored through defined period of time in order to assure that the standards of quality are kept; if standards are desturbated, VERP orders that the management takes adequate actions. It is important to mention that defining carrying capacity in the Republic of Croatia is often stated as a possible efective solution, but is never implemented[8] in that context VERP is just one of few frameworks for analisys and management of carrying capacity that in practice (especially in protected areas in the USA) has accomplished envable results and as such could also be implemented (under controlled circumstances) on other croatian protected areas.

Conclusion

In protected areas, especially national parks, conflicts between two different interest – nature protection and tourism developement (earning/income) frequently occure. By steping up tourist activities, a pressure on protected area increases; that process is barely visible on example of Croatiažs oldest national park – Plitvice lakes; tourist expansion in Plitvice lakes does not show any signs of stagnation while at the same time organisational, ecological and social risks decrease. Tourist expansion has reached relevant proportions; it slowly reaches it's peak which leads to need of crisis managemenat of protected area; this paper concentrates on carrying capacity analysis and suggestion of a new model of carrying capacity that would encompass social, economic, ecologic, phisical and perception aspects of space, by analysing and giving the answer to following question: how much presure an area can handle up to the point where it's natural and ambiance values start to degrate irreversible? Managinig visitors system in described circumstances produces considerable risks and leads to the need for applying strategic crisis management in order to minimise or avoid risks for protected area and the visitors. In that situation relevance of carrying capacity lies in the fact that it significantly contributes to improvement of co-existency of tourism developement and nature protection actions within the protected area.

Proposed model of carrying capacity does not exclude the possibility of tourist developement, but it emphasises the need to understand carrying capacity of protected areas in terms of how much pressure the area can handle, by reflecting it's quality by limiting the number of visitors. This paper exposes the reasons of pressure that could be categorized in following: the lack of long-term strategy of tourist impact measurement and the fact that the problem (for example the problem of large number of visitors during summer period) is recognised, but not handled adequatly. Tourist growth in protected areas is still a priority that is planned in short terms; that has to be changed by creating an adequate long-term strategy and by applying regulative measures within assigned management plans for protected areas that will controll tourist growth and presure (for which carrying capacity has enough quality). Proposed VERP frame is developed to identify and manage carrying capacity in protected areas; area is managed by defining desirable resource and social conditions by an adequate number of indicators and quality standards that are beeing monitored through certain period of time to assure that the quality standards are beeing kept; in case that those standards are endangerd, VERP demands an adequate action by management. By taking into consideration relatively small amount of space put in to touristic use in Plitvice lakes national park (when compared to total space of the Park) and by putting that small space in a relation with continuous growth of number of visitors, it is urgent to implement suggested or any other available long-term carrying capacity model, in order to manage protected area in an adequate and optimal way due to expansive tourist growth.

Increasing the number of visitors in national parks is an management aim that has not only educative and recreational but also a financial function since all national parks (except Plitvice lakes) depend on their fouinders (State ie. State budget) and since budget funds are not sufficient for realization of all planned protection, scientific and investment projects within national parks. In that context tourism has become an alternative solution for independence of national parks in terms of developement. In the situation of Plitvice lakes one paradox arises; finantial function is accomplished (more visitors means more income while the majority of income comes from entrance fees), growing number of visitors increases negative impact on nature which leads to the need to re-organise or lower the number of visitors; that ultimately results with the risk of posssible decrease of finantial effects and possible return to partial or total financial co-depenedence on the founder.

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EKOLOŠKI RIZICI EKSPANZIVNOG TURISTIČKOG RAZVOJA ZAŠTIĆENIH PODRUČJA – STUDIJA SLUČAJA: NACIONALNI PARK PLITVIČKA JEZERA

S A Ž E T A K

Rad analizira utjecaj ekspanzivnog turističkog razvoja na zaštićena područja na primjeru Nacionalnog parka Plitvička jezera kao najposjećenijeg zaštićenog područja u Hrvatskoj, sa godišnje više od 1.2 milijuna posjetitelja čija je najveća koncentracija zabilježena u periodu od travnja do rujna kada broj istih prelazi 13.000 dnevno. Većina posjetitelja obilaze sustav jezera koji iznosi samo 1% ukupne površine Parka; jezera objedinjuju glavne prirodne atraktivnosti čime je najveći pritisak stavljen na nekoliko kritičnih točaka prirode i prirodnih procesa. U takvoj situaciji javlja se potreba upravljanja gore navedenim procesima uz pomoć instrumenata strateškog kriznog menadžmenta kako bi se uklonili negativni efekti turističke ekspanzije te pronašli modeli upravljanja posjetiteljskim sustavom koji će minimalizirati eventualne štetne utjecaje nekontrolitanog turističkog razvoja. Rezultati opservacijskih, analitičkih i ststističkih metoda potvrđuju očekivane tendencije definirane u postavljenoj hipotezi; rad također ukazuje na potrebu kriznog menadžmenta u trenutnoj situaciji, budući da je prisutna visoka razina utjecaja na ekološku varijablu, uz stalno opadanje kvaliete doživljaja posjetitelja; kao rješenje je predložen dugoročni model upravljanja ekspanzivnog rasta broja posjetitelja Plitvičkih jezera, primjenjiv i na druga hrvatska zaštićena područja.