Chapter 5

Challenges in the Management of Plitvice Lakes National Park, Republic of Croatia

Maja Vurnek, Andrijana Brozinčević, Krešimir Čulinović and Anđelko Novosel

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/intechopen.72375

Abstract

Plitvice Lakes National Park is the oldest protected area in the Republic of Croatia and the biggest by its surface. The park is designated as the UNESCO World Heritage Site. Outstanding universal value is recognized within significant natural and geological processes, habitats and biodiversity. Only 1% of the park's large surface is the main focal point for visitors and active tourism. We evaluated management of the park through Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis interpreting internal and external factors. High conservation of biodiversity, investments in different projects and high number of employees are considered as strengths. High number of visitors in small area and lack of visitor management plan, educational programs and marketing strategy are weaknesses. Threats are present through the inadequate management of drinking water supplies, lack of wastewater treatment plant and excessive construction in villages. Our opportunity definitely lies in protected nature and biodiversity. Considering very good status of the park's finances, there aren't any significant barriers for sustainable tourism approach, development of educational programs, various investments and adoption of new management plans. However, these activities must be beyond any potential political influence and they should have continuity in order for the park to be an example of quality management in the years to come.

Keywords: national park, SWOT, Plitvice Lakes, management plan

1. Introduction

Protected areas such as strict nature reserves, wilderness areas, national parks, natural monuments and others are essential for biodiversity conservation. They exist in natural or near-natural ecosystems, and they maintain ecological processes and conserve threatened or

endemic species from becoming extinct. The other important part of protected areas is a benefit for humans regarding the opportunities for recreation and providing the human population with different ecosystem services [1]. There are 202,467 terrestrial and inland water protected areas recorded in the World Database on Protected Areas (WDPA) and they cover 14.7% of the world's extent, which means 19.8 million km^2 [2]. The Conference of the Parties (COP) in 2010 adopted the Strategic Plan for Biodiversity 2011–2020 with a goal to promote effective implementation of the Convention on Biological Diversity, and in this plan, five strategic goals (A–E) with several targets (1–20) known as Aichi Biodiversity Targets were included [3]. The Aichi Biodiversity Target 11 says that "*By 2020, at least 17% of terrestrial and inland water areas, and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes*." However, designation of protected areas often changes with regard to the increase or decrease in size or they are not even qualified to be included in the WDPA. Regarding the above stated target, by 2020, an additional 3.1 million km^2 of terrestrial area needs to be protected [2]. According to the former State Institute for Nature Protection (now Croatian Agency for the Environment and Nature) in the Republic of Croatia, there are 409 protected areas of different categories, covering 7547.18 km^2 of total surface, which means 8.56% of the Croatian territory [4].

Management of the protected area is defined through four basic functions: planning, organizing, leading (implementing) and controlling (evaluating). The resources include people, their skills and financial resources. There should be clarity of direction provided by the protected area in a sense that the activity being managed has a purpose and direction. In an organization, the management is undertaken by people with different functions and it is a team effort. Regarding the fact that protected areas constantly face threats such as climate change effects, introduced species, visitor impacts, development and others, there is a great need for active management [5].

1.1. Site description

Plitvice Lakes National Park is the oldest protected area in the Republic of Croatia designated since 8 April, 1949. As a national park, it is listed in the second IUCN category of protected areas regarding the description: "*Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities* [1]." In the Croatian Nature Protection Act, national park is defined by the article 153: "*(1) A national park is a large, predominantly unmodified mainland and/or marine area of outstanding and multiple natural values. It includes one or more conserved or slightly modified ecosystems and is primarily intended for the conservation of autochthonous natural values. (2) A national park has a scientific, cultural, educational and recreational purpose. (3) In a national park only those actions and activities are permitted that do not pose any threat to the authenticity of nature. (4) In a national park all economic use of natural resources is prohibited* [6]." Little is known through the literature that Plitvice Lakes were designated as a national park very early at the beginning of the

nineteenth century in 1928. However, this was only for one financial year until 1929. Since then, the natural values were recognized even though it took almost 20 years for its designation as a protected area.

In 1979, the Plitvice Lakes National Park was inscribed in the UNESCO World Heritage List by criteria vii, viii and ix: "*Criterion (vii): to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; Criterion (viii): to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features; Criterion (ix): to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals* [7]." The National Park is also the only national park in Croatia that is on the UNESCO World Heritage list as natural heritage. The park was recognized for its outstanding universal value (OUV) present in significant geological, biological and ecological processes of which the most important one is the process of tufa formation. The term OUV was formally defined and adopted in 2005 and it means "*cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole* [8]."

The National Park functions as a public institution like most of the protected areas in Croatia. With regard to the type of governance, the park is governed by the government (type A of IUCN governance), which means that the national Ministry of Environment and Energy is the main governing body [9]. As a public institution, the park has an administrative council consisting of five members, the Director and many different services among which the most important one is the Nature Conservation Service managed by the Conservation Manager. Each of the services has its role in managing the protected area or its organizational parts, and the structure of a public institution is rather complex with many different departments (**Figure 1**).

The public institution owns hotels, restaurants, auto camps and buffets. It employs over 600 permanent employees and additional 300–400 seasonal employees during touristic season. In the area of the park, there are 29 settlements with almost 1400 residents. Plitvice Lakes National

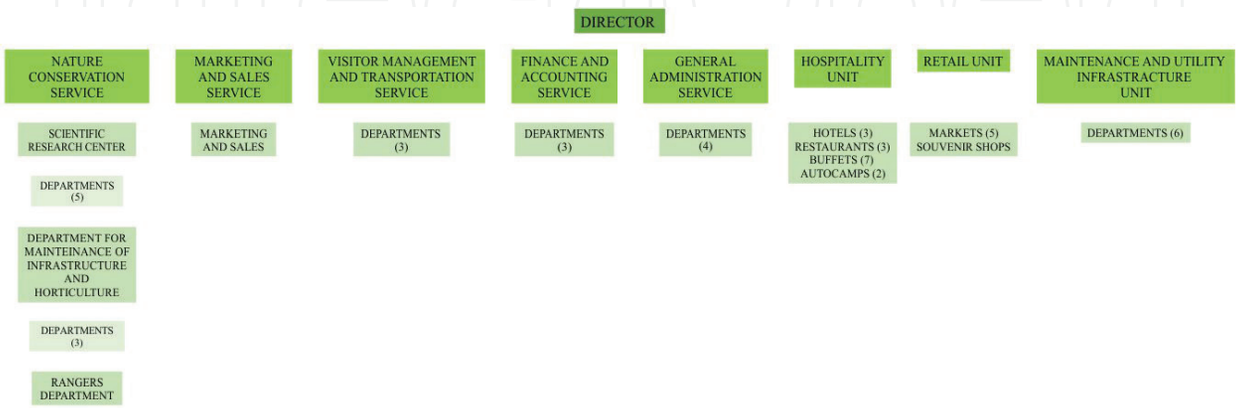

Figure 1. Organizational structure of a public institution of Plitvice Lakes National Park.

Park is financed by sales of the entrance tickets and from visitation and hospitality services. The income is used for management and various investments of the public institution.

Plitvice Lakes National Park is settled in the middle mountainous part of Croatia as a part of Dinaric karst area. The surface of the park is divided between two counties: Lika-Senj County (90.7%) and Karlovac County (9.3%). The total surface of the park is 29,685.15 ha, and by surface, it is the biggest national park in Croatia. The borders of the park were expanded in 1997 for additional 10,000 ha (previously the surface was around 19,000 ha) in order to include the wider catchment area of main tributaries (**Figure 2**).

The entire area of the park is considered a Natura 2000 site (HR5000020) with around 64 Special Protection Areas (SPA) for birds and proposed Sites of Community Importance (pSCI) for flora and fauna species and habitat types regarding the Birds Directive and Habitats Directive. The bigger part of the park's surface is covered with forests (2/3), which consists mainly of European beech and fir forest. The important part of the forest ecosystem is an old-growth forest "Čorkova uvala" covering over 84 ha of surface and considered to be the secondary type of forest (without or with insignificant influence of man). In the area of the park, there are several types of grassland vegetation covering around 1/3 of the total surface. Very important habitat types present in the park are peat habitats (mires and fens), which are rare and endangered on the national level. On only 1% of the total park's surface there is a fascinating freshwater ecosystem of karst springs, small rivers and 16 lakes divided with tufa barriers. Tufa barriers are considered one of the most important OUVs that this park has, and without this specific biodynamic process of tufa formation, there would not be any lakes. Tufa barriers form the cascading system of lakes that are almost a phenomenon for the karst area. The abundance of flora and fauna species is also high in this protected area with over

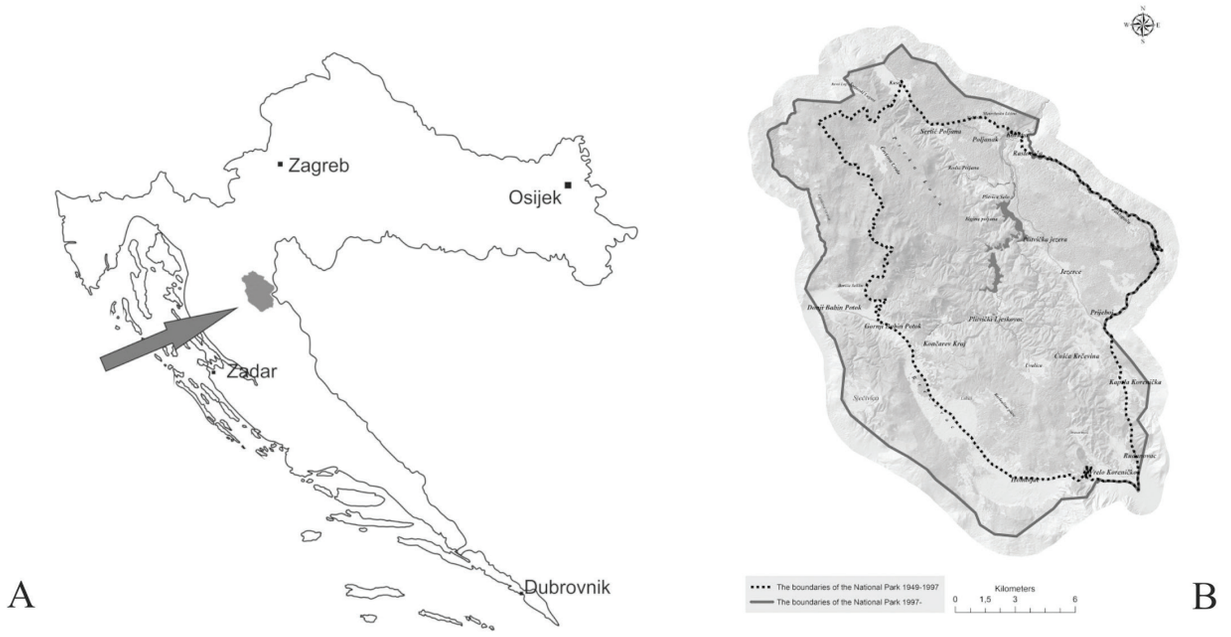

Figure 2. Map of the Republic of Croatia (A) and Plitvice Lakes National Park with border until 1997 and after the expansion (B).

http://dx.doi.org/10.5772/intechopen.72375

1400 plant species, 50 species of mammals, 22 species of bats, around 160 species of birds, 320 species of butterflies, 8 species of fish and other representatives of fauna species (**Figure 3**).

1.2. The background

Management plan for the National Park was adopted in 2007 and was developed through the Karst Ecosystem Conservation (KEC) Project that lasted from 2003 to 2007 and was financed by the Global Environmental Fund [10]. The plan is valid until 2017 and that is why the park's management started the process of writing a new management plan that will be finished by the first trimester of 2018. As a part of this new management plan, the park is currently in the process of writing the action plan for visitor management. The new physical plan was adopted in 2014 as the previous plan dated from 1986 ended.

The need to write new a management plan did not come only from the obligation stated in the Croatian Nature Protection Act in the article 181: "*The management of protected areas…shall be carried out according to the management plan. (2) The management plan shall be adopted for a period of ten years. (3) The management plan shall lay down development guidelines, methods of protection implementation, use and management of a protected area, including detailed guidelines for the protection and conservation of natural values of a protected area, respecting the needs of the local population.*

Figure 3. Three large carnivores: bear (*Ursus arctos* L.), wolf (*Canis lupus* L.) and lynx (*Lynx lynx* L.). These species are using the territory of the park and the park's management is financing the project for monitoring their activities in the protected area.

(4) The management plan shall be binding for all physical and legal entities involved in activities in a protected area [6]." Every protected area has to evaluate the effectiveness of management regarding the main objectives and values that are being conserved. Management effectiveness evaluation can enable and support an adaptive approach to management, assist in effective resource allocation, promote accountability and transparency and help involve the community. The evaluation should be seen as normal part of the process of management by which the management becomes adaptive [11].

According to the framework for assessing management effectiveness (**Figure 4**), there are many steps in the assessment [11].

Regarding the framework and the purpose of this article, we are looking now at the context (status and threats) using Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis for the initial assessment or rather a quick summary of Plitvice Lakes National Park management effectiveness regarding the main values of the protected area and all other resources that are present. The main objective of this analysis was to see which management areas can be improved and whether the factors influencing the management come from the microenvironment of the public institution or from external sources.

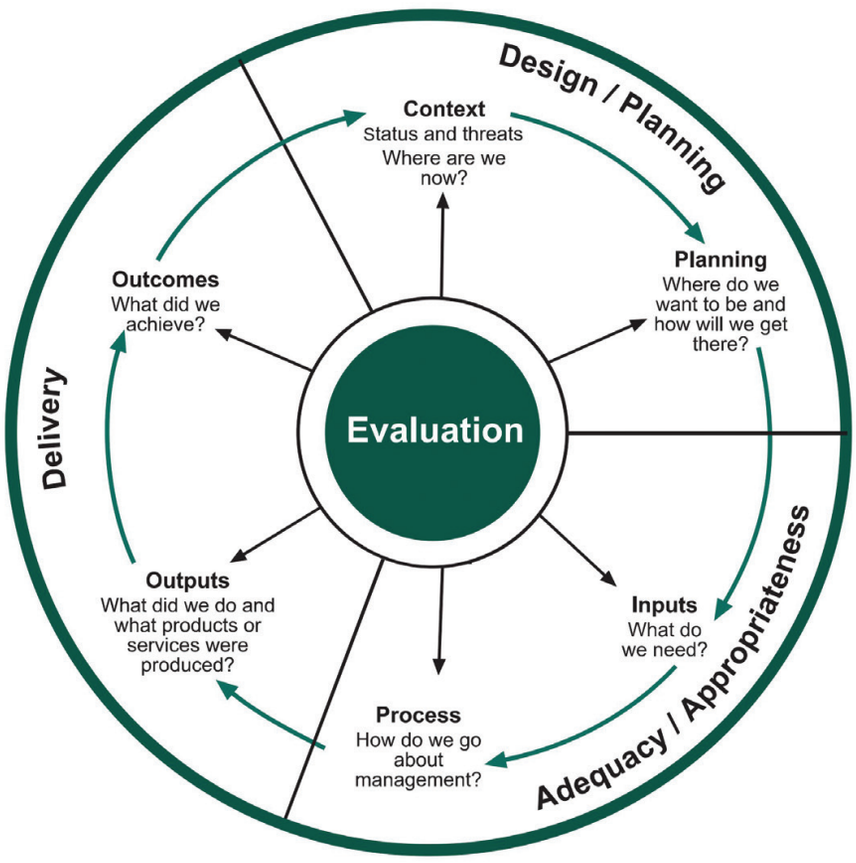

Figure 4. The framework for assessing management effectiveness [11].

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2. SWOT analysis

SWOT analysis as an acronym for Strengths, Weaknesses, Opportunities and Threats is a business analysis technique used by an organization when deciding on the best way to achieve future growth. Strengths and weaknesses are considered as internal factors that are favorable and unfavorable as the opposite to opportunities and threats that are considered as external factors, again favorable and unfavorable [12]. For evaluating an organization's environment, two types of analysis are performed: internal analysis by which we analyze internal environment (or microenvironment) considering resources that need to be developed and sustained and external environment (macroenvironment) by which we recognize major developments and future implications [13].

Even though SWOT analysis is highly used by different companies or organizations, it can be used for different management assessments in the environment or protected areas. SWOT analysis was used for environmental management status evaluation [14], for ecosystem services in protected areas [15] or for sustainable tourism development in protected areas [16].

For the purpose of this article, before performing SWOT analysis, we grouped factors into four management areas that we found important for the evaluation: *natural and cultural values* (NCV), *visitation, education and marketing* (VEM), *local community and stakeholders* (LCS) and *infrastructure* (I). For each group, we determined internal and external factors.

Additionally, we performed simple matrix analysis of data using the following:

i. Weight (W) that was estimated regarding partially objective point of view for each factor and scored from 0 to 1 (total score for weight should be 1).

ii. Effectiveness factor score (EFS) that was assigned to each factor (1 as fundamental weakness or threat, 2 as minor weakness or threat for unfavorable factors, 3 as strength or opportunity and 4 as great strength or opportunity for favorable factors).

iii. Final score (FS) calculated by multiplying W and EFS.

The analysis was finished by calculating the sum of final scores for internal and external factors. If the final score of internal or external factors is above 2.50, it denotes that favorable factors prevail over unfavorable factors. Similar methodology was performed as in Ref. [16].

2.1. Internal factors

Seen as strengths, we determined 13 factors for natural and cultural values (NCV), 4 factors for visitation, education and management (VEM), 3 factors for local community and stakeholders (LCS) and 3 factors for infrastructure (I). As weaknesses, we determined 7 factors for NCV, 6 factors for VEM, 4 factors for LCS and 4 factors for I.

Natural values of Plitvice Lakes National Park are the most important ones and several factors are seen as strengths for this protected area. The beautiful landscape is in the form of 16 lakes in a cascading system divided by tufa barriers, pristine beech and fir forests that cover almost 80% of the park's surface and grasslands that are considered hot spots for biodiversity.

One of the most important OUVs for the park is most certainly the special biodynamic process of tufa formation that requires a good water quality, different micro- and macroorganisms and certain chemical properties of water. Karst relief with different geological forms like dolines and sinkholes is responsible for special features of this area. Groundwater system is diverse and developed and is considered as a source of water for karst springs that are really valuable and sensitive. Furthermore, biodiversity of flora and fauna species, different habitats and Natura 2000 species is also an important natural value. In the area of the park, there are also some special types of habitat regarding forest with an old-growth forest "Čorkova uvala" and peat habitats like mires and fens. For many years now, natural and geological values of this area have attracted many scientists who found great interest in researching different processes. The park staff within Nature Conservation Service monitor certain flora and fauna species and habitats. Some cultural values, even though there are not many, are also seen as strengths. As a part of material cultural heritage, there are several archeological sites, among which the one that is researched the most is above Lake Kozjak, the "Krčingrad." In some villages, there remains traditional local lifestyle in the form of watermills and sawmills. Intangible cultural heritage is represented through traditional songs, dances, crafts and gastronomy. Plitvice Lakes have always attracted people to visit the area and is recognized with significant touristic attractiveness because beside the beautiful and outstanding landscape there is also a possibility to use the electric boat and panoramic vehicle and walk behind waterfalls and lakes on wooden bridges while visiting the park. The National Park logo is recognized on the national level and is connected with parks of Croatia that unites all protected areas. Important part of visitation system is that the whole public institution is financed through sales of the entrance tickets and from hospitality services. The park also gives significant importance to different educational activities in the form of Junior Ranger program, volunteer program and workshops for children and celebrating important dates in nature protection. The park is also a "driving force" for the entire region. Not only because the park has significant number of local residents employed in different sectors, but also because residents can use apartments that are owned by the park. Because of the high touristic activity in the area, local community can sell their traditional products like cheese, jam and honey and can make additional income for their household. Local community can also use their households to accommodate guests. The park owns significant infrastructure in the form of buildings, hotels, restaurants, auto camps and buffets. One of the strengths is also that, after many years of lobbying, the state road that goes through the park is prohibited for dangerous goods transportation, especially for gasoline and other flammable substances.

There are several internal weaknesses regarding natural and cultural values that were recognized through this process. Allochthonous fish species (pike, chub and rudd) are present in the water ecosystem and can influence biology and lifecycle of other indigenous fish population. Active measures and objectives in management of natural values especially in dealing with succession of grasslands and other important habitats are missing. Succession of grasslands that happens due to several factors like abandonment of traditional agriculture, poor management and unsolved problems with legal property relations can cause a certain biodiversity loss. Lake Kozjak, which is in the core zone of visitation and on which electric boats navigate, is the only water supply for the wider area of the park and the municipality of Rakovica. Beside scientific activity conducted in the area, the park still misses the inventory of some flora and fauna species, habitats and speleological forms. Cultural heritage is missing a plan and vision, and its value is

http://dx.doi.org/10.5772/intechopen.72375

underestimated and unrecognized. The construction of a visitor center that has been planned for many years now is not built yet, in spite of the fact that it is much needed for additional presentation of natural and cultural values. In visitation part, several factors need to be addressed and the most important one is the high number of visitors in a short period of only several months (especially in July and August). In that period and on some days, almost 14,000–16,000 visitors are present in the small area of the park, mainly on lakes. However, the visitors only stay for a day or for several hours, so this type of transit tourism is also considered as a weakness. The park doesn't have a visitor management plan and marketing strategy. Even though there are several educational activities, the park lacks educational programs. In different sectors regarding capacity, public institution has deficiency of highly educated employees. The demographic structure of local community is old, and the abandonment of traditional agriculture due to depopulation processes is present. Different social activities in closer areas are lacking. There are unsolved problems with legal property relations. Regarding infrastructure, traffic on some roads still goes through the sensitive catchment area. Maybe the main issue is that some villages do not have proper wastewater sewage system and still uses septic tanks. Hotels, restaurants and even buildings do not have energy certificates, and hotels or other facilities cannot be renovated because of complicated documentation and permits that need to be gathered (**Table 1**).

Code		W	EFS	FS
	Strengths			
NCV	Beautiful landscape of lakes and waterfalls, pristine forests and grasslands.	0.035	4	0.14
NCV	The ongoing process of tufa formation is still active and represents one of the main OUVs of the park.	0.050	4	0.2
NCV	Biodiversity of flora and fauna species in different ecosystems (water, forest, grasslands and others).	0.050	4	0.2
NCV	Natura 2000 species and habitats in the area of the park.	0.035	4	0.14
NCV	Presence of old-growth forest "Čorkova uvala."	0.020	3	0.06
NCV	Characteristic karst pastures, meadows and arable land.	0.010	3	0.03
NCV	Peat habitats (mires and fens) are still conserved in the area of the park.	0.030	4	0.12
NCV	Karst relief with variety of forms (dolines, sinkholes, groundwater system and caves).	0.025	3	0.075
NCV	Significant scientific interest for all segments of natural and geological values.	0.030	4	0.12
NCV	Monitoring of different species and habitats.	0.015	4	0.06
NCV	Around 20 archeological localities in the park (the most researched one is above Lake Kozjak, the Krčingrad).	0.010	3	0.03
NCV	Traditional watermills and sawmills in villages.	0.005	3	0.015
NCV	Rich intangible cultural heritage in the form of local songs, dances, gastronomy and traditional crafts.	0.005	3	0.015
VEM	Significant touristic attractiveness of the area with recognizable visitation system (electric boat, panoramic vehicle and wooden bridges).	0.030	4	0.12
VEM	Entrance fees are a significant financial income for the park's economy.	0.045	4	0.18
VEM	Brand and visual identity is recognized on the national level connected with parks of Croatia.	0.025	4	0.1

Code		W	EFS	FS
VEM	Different educational activities.	0.020	3	0.06
LCS	The park employs significant number of local residents.	0.040	4	0.16
LCS	Several small family owned agricultural economies producing different products (honey, cheese and jams).	0.010	3	0.03
LCS	Traditional touristic activity (capacities for private accommodation).	0.005	3	0.015
I	Park owns significant infrastructure (buildings, hotels, restaurants and auto camps).	0.040	4	0.16
I	Residents of several villages have an opportunity to use apartments owned by the park.	0.015	3	0.045
I	State road that goes through the park is prohibited for dangerous goods transportation.	0.025	4	0.1
	Weaknesses			
NCV	Allochthonous species present in the water ecosystem.	0.020	1	0.02
NCV	Lack of active measures and objectives in management of natural values.	0.040	1	0.04
NCV	Lake Kozjak supplies part of the park's area and municipality of Rakovica with drinking water.	0.025	1	0.025
NCV	Succession of grasslands.	0.020	1	0.02
NCV	Inventory of some flora and fauna species, habitats and speleological forms.	0.010	2	0.02
NCV	Unrecognized value of cultural heritage that lacks defined plan and vision.	0.010	2	0.02
NCV	Visitor center for presentation of natural and cultural values is not built yet.	0.020	2	0.04
VEM	High number of visitors in small area of the park (congestion during high season).	0.050	1	0.05
VEM	Visitors stay for short amount of time in the park area (transit tourism).	0.020	2	0.04
VEM	Lack of visitor management plan.	0.050	1	0.05
VEM	Lack of different educational programs.	0.025	1	0.025
VEM	Lack of marketing strategy.	0.030	1	0.03
VEM	Deficiency of highly educated employees.	0.005	2	0.01
LCS	Unsolved problems with legal property relations.	0.020	1	0.02
LCS	Old demographic structure.	0.005	2	0.01
LCS	Abandonment of traditional agriculture.	0.010	2	0.02
LCS	Poor additional social activities for local community in the broader area.	0.005	2	0.01
I	Traffic on some roads in the park still goes through sensitive catchment area.	0.020	1	0.02
I	Wastewater sewage system is missing in some villages (septic tanks).	0.025	1	0.025
I	Hotels and facilities do not have energy certificates.	0.005	2	0.01
I	Lack of complete documentation (permits) for hospitality infrastructure, which causes obstruction for renovation.	0.010	2	0.02
		1	/	/
Total				**2.70**

Table 1. Internal factors of SWOT analysis for Plitvice Lakes National Park with weight (W), effectiveness factor score (EFS) and final score (FS).

The final score was 2.70 meaning that in the analysis of internal factors, the strengths prevail over the weaknesses.

2.2. External factors

As threats for Plitvice Lakes National Park, we determined 6 factors for NCV, 2 factors for LCS and 5 factors for I. As our opportunities, we determined 5 factors for NCV, 5 factors for VEM, 4 factors for LCS and 4 factors for I.

Threats for the Plitvice Lakes National Park are seen through several factors in different management areas. In the area of the park, there is still illegal hunting and fishing present. Even though the Ranger Service is doing their best job in preventing it, it is still present. There is a strong threat from invasive species of crayfish (*Pacifastacus leniusculus* [Dana, 1852]) that were introduced in lower parts of the river Korana outside the borders of the park; however, it can move to upper parts of the river and inside the protected area. Furthermore, the karst area has a high vulnerability and any kind of contamination can end up in the groundwater system and appear at the surface in springs. This possible contamination can come from inadequate and uncontrolled septic tanks. High risk for water contamination also comes from uncontrolled construction and development of houses and buildings in the area that is vulnerable regarding certain loss of water in the underground. Also recognized as a threat is the influence of climate variations and climate changes, especially in water ecosystem regarding changes in water level and temperature. Changes in other ecological factors can also influence different species and other habitats apart from water ecosystem. Villages are getting more and more depopulated as young people move to bigger cities. A certain political instability on local and national level causes changes in the administrative council and in other parts of the organizational structure. Possible concession and privatization of hospitality infrastructure are considered threats. Unsolved issues with water supply system (Lake Kozjak as water supply) and with wastewater system (the lack of wastewater treatment plant) are the main threats regarding infrastructure. There is still uncontrolled traffic of dangerous goods on some roads that pass through sensitive catchment area. The most present threat in recent times has been uncontrolled construction in small villages that does not meet the standards of traditional construction and is developed in villages without basic communal infrastructure.

The opportunities of the park can be seen in several factors that are considered favorable. In cooperation with different national stakeholders and with a continued support from the park's management, the alternative water supply source can be found. Invasive and allochthonous species can be eradicated from the habitats. However, this activity must be based on scientific proposals and research. National protocols or programs for monitoring of Natura 2000 species and habitats are in the process of development. In cooperation with local community and others, there is a possibility for resolving issues regarding legal property relations that will further improve management of certain habitats and resolve issues with some parts of cultural heritage. In the year 2017, the park's management started the process of writing the new management plan that will also include action plan for visitor management. The opportunity of the National Park is definitely present in the fact that this protected area is inscribed in the UNESCO Heritage List and this can be used for promotion of the park. From 2018, new technologies will be adopted, especially regarding online booking that will improve reservation process. Interpretation of natural and cultural values can be better presented through

visitor center (possibility of using EU funds) and through development of educational programs. There is also an opportunity in developing sustainable tourism approach from getting certain certificates. By using EU funds and similar external sources, there is a possibility to stimulate traditional agriculture, where local products can get national certificates for quality. Furthermore, local households can develop an ecotourism approach and be more competitive on the market. Apartments that are used by the park's employees can be repurchased, which will help people to stay in the area of the park. Regarding other infrastructure, the signed agreement between different stakeholders is an opportunity to resolve issues with wastewater system and management. The use of EU funds again can help resolving issues regarding energy efficiency and reconstruction of water supply system. The park can lobby in different institutions that are relevant for decision making about relocation of traffic from some roads. Hotels and other hospitality facilities can get environment-friendly brand (**Table 2**).

The final score was 2.61 meaning that in the analysis of external factors, the opportunities prevail over the threats.

Code		W	EFS	FS
	Opportunities			
NCV	Relocation of water supply system outside the park in cooperation with stakeholders (alternative water supply).	0.035	4	0.14
NCV	Eradication of invasive and allochthonous species.	0.030	4	0.12
NCV	Monitoring of Natura 2000 species and habitats regarding national protocols and programs.	0.040	4	0.16
NCV	Cooperation with local community and others for resolving legal property relations for better management of habitats.	0.030	4	0.12
NCV	Development of new management plan.	0.050	4	0.2
VEM	Interpretation and education about natural and cultural values.	0.040	4	0.16
VEM	World Heritage List of UNESCO can be used for promotion of the NP.	0.025	3	0.075
VEM	Using new technologies for booking, reservation and online ticket sales.	0.035	4	0.14
VEM	Development of visitor management plan.	0.050	4	0.2
VEM	Sustainable tourism approach.	0.040	4	0.16
LCS	Possibility to stimulate traditional agriculture (EU fond).	0.025	3	0.075
LCS	Certification of local products.	0.020	3	0.06
LCS	Development of ecotourism.	0.020	3	0.06
LCS	Possibility for repurchasing of apartments by the employees.	0.020	3	0.06
I	Signed agreement between different stakeholders for resolving wastewater management issues.	0.040	4	0.16
I	Use of EU funds to resolve issues connected with energy efficiency and reconstruction of water supply system.	0.020	3	0.06
I	Possibility for traffic relocation from roads in the park's area.	0.020	4	0.08
I	Getting the environment-friendly (or other) brand for the hotels.	0.025	3	0.075

Code		W	EFS	FS
	Threats			
NCV	Illegal hunting.	0.015	2	0.03
NCV	Invasive species.	0.035	1	0.035
NCV	High vulnerability of karst area (groundwater system).	0.040	1	0.04
NCV	Climate changes and variations and their influence on species and habitats.	0.020	2	0.04
NCV	Uncontrolled construction in the high-risk zone for water contamination.	0.045	1	0.045
NCV	Contamination of natural waters from inadequate and uncontrolled septic tanks.	0.040	1	0.04
LCS	Depopulation of villages.	0.015	2	0.03
LCS	Political instability at local and national level.	0.045	1	0.045
I	Possible concession and privatization of hospitality infrastructure (hotels and restaurants).	0.035	1	0.035
I	Unsolved issues with water supply system.	0.045	1	0.045
I	Unsolved issues with wastewater system.	0.045	1	0.045
I	Uncontrolled traffic of possible dangerous cargo on some roads.	0.020	2	0.04
I	Uncontrolled construction in small villages without the basic communal infrastructure.	0.035	1	0.035
		1	/	/
Total				**2.61**

Table 2. External factors of SWOT analysis for Plitvice Lakes National Park with weight (W), effectiveness factor score (EFS) and final score (FS).

3. Discussion

After performing SWOT analysis, a few important facts about the management of the park became evident. For both the internal and external factors, the final score was above 2.50 meaning that favorable factors (strengths and opportunities) prevail over unfavorable factors (weaknesses and threats). Furthermore, internal factors are stronger than external ones. However, the main problem with the methodology was in deciding about the weight of each factor considering that management of the park is not only directional toward nature conservation, but there are also other different factors that needed to be taken into consideration.

The park's natural value is still very well conserved through biodiversity of different species, important habitats and ongoing process of tufa formation that was significant for forming such landscape of lakes and waterfalls. Recognition of the park by the UNESCO with significant OUVs that are present is definitely a strength of this protected area. Good financial status provides the stable income for the park`s management and allows financing of various projects and developing infrastructure. There are also several other strengths in every management area highlighted in **Table 1**. Among positive external factors, the opportunities for the

park are in sustainable tourism and development of eco-tourism, perhaps not connected to the park's facilities but rather to private households. The park has been a long-time member of EUROPARC Federation and there is an opportunity to be involved in the European charter for sustainable tourism, a type of certificate that is given to protected areas regarding its sustainable tourism management [17]. Regarding eco-tourism, there are still several households that maintain traditional agriculture and production of homemade products that can find their way toward an interested market.

Even though favorable factors prevailed over unfavorable factors in the park's management, they should also be mentioned and addressed. There is definitely a high pressure from tourism in the park. Since the year 2000, there has been a constant increase in the number of visitors to the park (**Figure 5**). The first one millionth visitor was noted in 2011, and in 2016, the park had over 1.4 million visitors per year. The highest visitation is present during summer months in July and August, which brings a lot of pressure to the park's management dealing with congestion and long waiting periods to use the electric boats and panoramic vehicles. In addition, the experience of the protected area is low, with negative effect regarding connection with nature. This issue was recognized previously, through the assessment of visitor and tourism management in the National Park [18].

Infrastructure is also a significant issue for the National Park and it should be resolved in the next several years. There is lack of adequate water supply, considering the fact that Lake

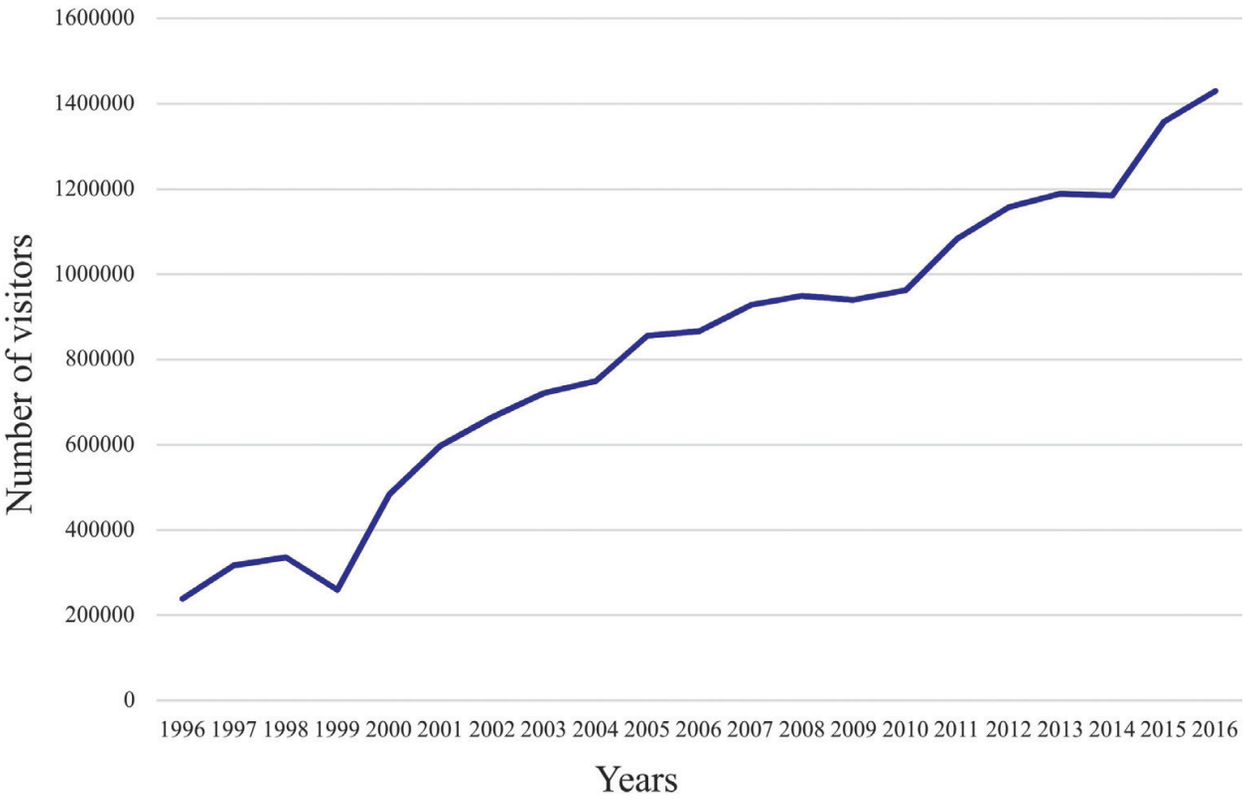

Figure 5. Number of visitors per year in the period from 1996 to 2016.

http://dx.doi.org/10.5772/intechopen.72375

Kozjak is not suitable as a water supply. Even though the lake is of good water quality [19, 20], there are certain threats still present. The lake is used for navigation of electric boats; however, the important factor that needs consideration is environmental flow. Environmental flow for freshwater ecosystems is a significant part of adaptive management [21]. Furthermore, the management of wastewater sewage system is inadequate, lacking the wastewater treatment plant for entire sewage system. This issue has been a problem for many years considering the fact that investment in this project is rather high and it cannot only be financed solely by the park; it requires additional funding. The positive step for resolving this issue is in the signed Agreement between different stakeholders.

External factors that have a great impact on this protected area are recognized through several important issues. One of the most important issues that has been present in recent times is an uncontrolled construction in small villages like village Plitvica. In a short period of time, many houses have been built mainly with a purpose to be rented to visitors as a private accommodation. However, the area of construction is rather a sensitive karst area were certain amount of water from the stream Plitvica is lost in the underground [22] and there is a lack of any kind of proper communal infrastructure that gives a great concern about the possible water contamination. Regarding that issue, the National Park had Reactive Monitoring Mission by UNESCO that gave recommendations that should be addressed in future management of the park. These recommendations are not only mandatory for the park to adopt, but also for the other national institutions and ministries in Republic of Croatia have the same obligation [23].

During the Homeland War (1990–1995), the area of the park was under the occupation and was depopulated. Afterward, some percent of the population returned and continued to work and live in the area. However, villages remained depopulated, and mostly with older generation of residents. Nowadays, this issue is still present but is more connected with the issue of general moving of population to bigger cities. According to the UN Revision, by 2050, 66% of world's population is projected to be urban [24].

Climate change is also an important external factor that influences not only the biodiversity but also the habitats. For freshwater ecosystem in the park, researchers compared the data of water temperature with time difference of 30 years and concluded that the water temperature rose by 1.5°C in lakes [25]. Even though climate change is a significant threat to declining freshwater population, it seems also that the great impact comes from habitat loss or degradation. Freshwater habitats are strongly affected by different impacts, and according to Freshwater Living Planet Index, the abundance of the populations has declined by 81% between 1970 and 2012 [26].

Rather important, but a highly external factor, is lack of continuity in the political sense where the political influence and changes have certain impact in protected areas either through financing them or designating new protected areas. This is not something that is unusual or new and it has been recognized in other protected areas all over the world. The increasing number of governments are overtly decreasing resources for protected areas, upgrading and upsizing protected areas require persistent political engagement and most conservation problems cannot be solved in 5-year stands [27, 28].

4. Conclusions

Plitvice Lakes National Park has a rather complex management system. The most important part of its management is most certainly the nature conservation and conservation of all the important processes (ecological, chemical and geological) that are present in the protected area. Other important management areas are seen through cultural heritage, tourism and education. However, to be adaptive as a protected area, the National Park has to have good cooperation with local community and different stakeholders. Additionally, the park owns important infrastructure not only for its residents, but also for hospitality services that it provides.

The assessment of management effectiveness for this protected area through SWOT analysis gave an insight into the park's internal and external factors, highlighting that favorable factors still prevail over unfavorable. However, in this changing world with lot of possible threats and weaknesses present through climate change, biodiversity loss, invasive species, uncontrolled construction, insufficiently managed touristic activity, poor infrastructure and ever-changing political atmosphere, every protected area should pay attention to its management to minimize those negative factors.

The future of Plitvice Lakes National Park is situated in well written and adaptive management plan with action plan for visitor management, in developed and applied educational and interpretative programs, in good cooperation with local community and in wise investments in projects, researches and monitoring. In all these activities, the primary end objective should be nature conservation.

Author details

Maja Vurnek*, Andrijana Brozinčević, Krešimir Čulinović and Anđelko Novosel

*Address all correspondence to: maja.vurnek@np-plitvicka-jezera.hr

Public Institution Plitvice Lakes National Park, Scientific-Research Centre Ivo Pevalek, Plitvice Lakes, Croatia

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