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CARRYING CAPACITY ASSESSMENTS FOR SUSTAINABLE TOURISM IN A HERITAGE SITE

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ABSTRACT

In a heritage site, it is important to stay within the carrying capacity and manage the site through tourism carrying capacity (TCC) to ensure sustainability. This study contributes to the conceptual framework of TCC studies by re-evaluating a natural area preservation methodology (IUCN) developed by Cifuentes in a multi-characteristic heritage site for physical, real, and effective carrying capacities (PCCs, RCCs, ECCs) and also inspects the social carrying capacities (SCCs) using two basic theories. These TCC assessments were made for the visitor management zones (VMZs) defined within the Site Management Plan (SMP) area composed of "Mount Harşena and the Rock-tombs of the Pontic Kings" heritage site in Amasya, Türkiye, placed in the World Heritage Sites' tentative list since 2015. Results of the re-evaluation suggested the suitability of using Cifuentes's model in multi-characteristic heritage sites changing from isolated archeological-natural to peopled urban site zones of cultural importance. Different from SCC studies, in general, using either Doxey's Irritation Index or Butler's TALC model, findings from the inspections of SCCs in the cultural zones of the SMP area with the two models supported each other and made the results more robust. Both models have been validated empirically for both non-tourism-dependent and tourism-dependent resident populations.

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INTRODUCTION

The Industrial Revolution and the accompanying increase in the world's population, especially in the second half of the 20th century, created substantial pressure on both natural and cultural resources. Since the

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modeling of the aftermath of the world's resources in "The Limits to Growth" in 1972 by the Club of Rome, today it is a worldwide fact that this pressure is now at the stage of both climate change disasters and the planet's Anthropocene Epoch that would probably cause the sixth mass extinction. Indeed, all the economic sectors have been affected by all these worsening processes in the natural environment, with tourism being one of the most vulnerable sectors. Beginning from the 1960s, the arguments in the international agenda that advocate the necessity of policies concerning climate change and protection/conservation/sustainable management of resources (Wall, 2020) and transformation of these arguments into action has an ever-increasing significance. These resource limitation concerns regarding the tourism sector that emerged as early as the 1930s by the introduction of the term "carrying capacity" indicate a major turn towards sustainable tourism management (Malik & Bhat, 2015). Until its full emergence in the 1960s, the term remained with its limited use in studies measuring the visitor pressure threatening the sustainability of national parks in the US, where the word "tourism" was used seldom. After its inter-continental travel, carrying capacity transformed recently into "overtourism", corresponding to the tourism pressure on historical sites in European settlements (Wall, 2020).

The term carrying capacity advanced from a primitive version based on some numeric value that gives the maximum tolerable number of tourists for a place (Glasson et al., 1994; Lindberg et al., 1997; García-Hernández et al., 2011; Szromek et al., 2020), towards including many different parameters such as visitor type, activities, and stay period that are needed to assess the impact of tourism in a touristic place (Wall, 2020). Based on the requirement of this multi-dimensional perspective, the tourism carrying capacity (TCC) in cultural heritage sites, by definition, should guarantee not only the calculation of maximum visitor number that would ensure the conservation of resources, but also definitions that would provide and regulate the visitors' usage of an area as well as maintaining the visitors' experience (García-Hernández et al., 2011; Wall, 2020). Aiming at sustainable tourism, in a report that shares the experiences in Europe's heritage towns and cities for a better understanding of the carrying capacity concept and its applications and approaches for visitor impact management, TCC is explained:

> *as a network of components including various 'dimensions' (ecological, physical and economic) and 'perspectives' (visitor, local resident/social and decision maker/political administrator). The importance of the various components will vary in time and space. It is the magnitude and direction of impacts on these various components, in varying combinations, which define the ability of a location*

> *to absorb tourism activity and the limits of acceptable change. A visitor impact management approach establishes what are considered to be unacceptable visitor impacts for a location, and sets appropriate objectives, strategies and policies to address the problems. (Glasson et al., 1994: 388)*

By considering the importance of sustainable tourism management, the present study aims to reveal TCC in a heritage site designated as a Site Management Plan (SMP) area composed of neighboring archeological-natural and cultural sites in Amasya, Türkiye. The TCC assessments were done in terms of both physical carrying capacities (PCCs), real carrying capacities (RCCs), effective carrying capacities (ECCs), and social carrying capacities (SCCs) for the visitor management zones (VMZs) that are defined in the SMP area.

In doing this, this study contributes to the conceptual framework of TCC studies by re-evaluating a pre-established natural area preservation methodology, which is Cifuentes's (IUCN, International Union for Conservation of Nature) model, in multi-characteristic sites or VMZs defined in one management (SMP) area for the former set of carrying capacities (PCC-RCC-ECC). Moreover, for the cultural zones with urban site statuses, i.e., the peopled places in the SMP area, the present study also inspects the aforementioned SCC by utilizing both of the basic methods developed in the body of literature by Doxey (Irritation Index) and Butler (TALC), rather than adopting the general attitude in the literature of using either of these models.

As a result, the main contribution of this study is the holistic perspective that both re-evaluates and inspects, using the existing methods in an integrated manner for TCC assessments, to achieve sustainable tourism management policies in a heritage site (SMP area) with multi-characteristic sites defined as different VMZs. The study is a part of the Site Management Plan (SMP) and Project for Application for Entry into the UNESCO World Heritage Sites for "Mount Harşena and the Rock-tombs of the Pontic Kings" in Amasya (MHRTPK in Amasya) to determine the policies that reduce the adverse impacts of tourism and to maintain a sustainable level of potential for tourism in this area that entered into the World Heritage Sites tentative list in 2015.

LITERATURE REVIEW

The definition of carrying capacity evolved over time. The World Tourism Organization's guidebook of 2004 (WTO, 2004:310) provides a list of

definitions under five different capacity types consisting of (1) Ecological, (2) Cultural, (3) Social or Psychological, (4) Infrastructural, and (5) Management. These different dimensions of carrying capacity consist of multiple variables such as usage of environmental resources, preventing local people's culture and quality of life from being affected negatively, keeping the site attractive for tourists, sufficiency of technical infrastructures, providing economic opportunities for tourism business people and political organizations in the site in terms of all kinds of resources.

In numerous studies, the basic concept remained as "tourism carrying capacity", while recently the concept of "overtourism" (Szromek et al., 2020; Wall, 2020) occupied an important place. Similar other concepts have been frequently used to describe the tourism activities' load impacting on the capacity of a cultural heritage site. These concepts involve "tourism/tourist overcrowding" (García-Hernández et al., 2017; Egresi, 2018; Szromek et al., 2020), "tourism/tourist/visitor pressure" (García-Hernández et al., 2017; García-Hernández et al., 2011; Canestrelli & Costa, 1991), "touristification" (García-Hernández et al., 2017), "tourist overload" or "tourist saturation" (García-Hernández et al., 2011). Moreover, in this period, concepts such as "tourismophobia", "anti-tourism" (García-Hernández et al., 2017), and "Trexit" (Séraphin et al., 2018) are used to express the counter-reactions of tourism in a cultural heritage site, and concepts such as "over-advertising" (Szromek et al., 2020) and "demarketing" (Wall, 2020) are used in texts that examine policies for the (de)marketing of tourism.

Doxey (1975) introduced "Irritation Index" or "Irridex" for dealing with the social carrying capacity (SCC) of tourism in a settlement. This index/model, which aims to determine the level or change of the reactions or attitudes of the local people towards tourism, still forms the basis of many studies on this subject (see Szromek et al., 2020). Butler (1980) developed the theory of "Tourism Area Life Cycle (TALC)" based on the assumption that there will be a change in the attitudes of the local people with the increase in tourist traffic. In capacity assessments, as Canestrelli and Costa (1991) and Szromek et al. (2020) point out, it is necessary to distinguish between two different local populations being tourism-dependent and non-tourism-dependent. The former involves tourism business people, and the latter involves locals who are not engaged in tourism.

Recently, studies on carrying capacity have diversified to include generally quantitative dimensions that are used to define physical capacity and optimization in the computer environment (see Canestrelli & Costa, 1991), the use of mapping and geographically based techniques (see García-Hernández et al., 2017; Al-hagla, 2010; Erdoğan, 2023) and simulations/modeling using computer programs (see Lane, 2010). On the other hand, in addition to studies that define social capacity with quantitative methods (see Szromek et al., 2020), there are many studies using qualitative techniques (see Özel, 2014).

A significant part of the natural/environmental carrying capacity studies were undertaken in China and the USA, while the cultural carrying capacity studies originated from Europe. In the national literature, regarding Türkiye, TCC studies date back to the 2000s. In the first decade of that era, studies in general dealt with recreational capacities of national parks and nature reserves and similar areas (see e.g., Gündüz & Akpınar, 2002; Müderrisoğlu, 2002; Tokmak, 2008; Cengiz & Kaptan Ayhan, 2008; Sayan & Atik, 2011; Göktuğ, 2011). The studies in the following decade steered towards social capacity calculations (see e.g., Çalık, 2014; Özel, 2014; Seçilmiş & Köz, 2015; Akdu & Ödemiş, 2018; Seçilmiş & Kılıç, 2018; Öner & Aydoğdu, 2019; Yıldırım Saçılık & Baysal, 2019; Gökdeniz, 2019; Salha et al., 2020; Yaşarsoy & Oktay, 2020; Tokmak & Şen, 2020). A review of the literature showed that studies on the carrying capacity of natural and cultural conservation sites and studies on sustainable management of visitors are similar in terms of methodology and analysis. The techniques used in the empirical studies in the literature reviewed were discussed with a holistic approach for assessing TCC of the SMP for MHRTPK in Amasya, which brings novelty to the present study.

Cifuentes's (IUCN) model, which has been re-evaluated in the present study for calculating three types of carrying capacities including physical, effective, and real, (PCC-RCC-ECC) has been utilized more frequently in international studies. In the national literature (i.e., Türkiye), this method was used in areas that are different from the SMP area for MHRTPK in Amasya in Türkiye, whereby those other studies were limited to recreational capacities in which the cultural aspect is limited mainly to the archeological sites within the whole of the national parks under study (see Cengiz & Kaptan Ayhan, 2008; Sayan & Atik, 2011; Göktuğ, 2011; Yıldırım, 2012; Soylu & Özkök, 2016; Dağ & Mansuroğlu, 2018). In addition to its contribution, in terms of the re-evaluation of this model in a heritage site with multi-characteristic VMZs, in its integrated approach, the present study inspected SCCs with both Doxey's method and Butler's method,

while the international and national literature, focused on SCC in general, utilizing either of those basic methods.

METHODOLOGY

The Case Study Area

The SMP area for MHRTPK in Amasya consists of a 1st Degree Archeological and Natural Site that is similar to both the natural parts and partially cultural zones of national parks with its Rock-thombs and Kızlar Palace zone, plus the zone where the Harşena Castle is located. The existence of populated areas designated as urban sites including Hatuniye and Nergiz Neighborhoods of the City of Amasya located on the shores of Yeşilırmak and at the foothills of Harşena Mountain makes this study area unique and different from those unpopulated conservation zones (Figure 1).

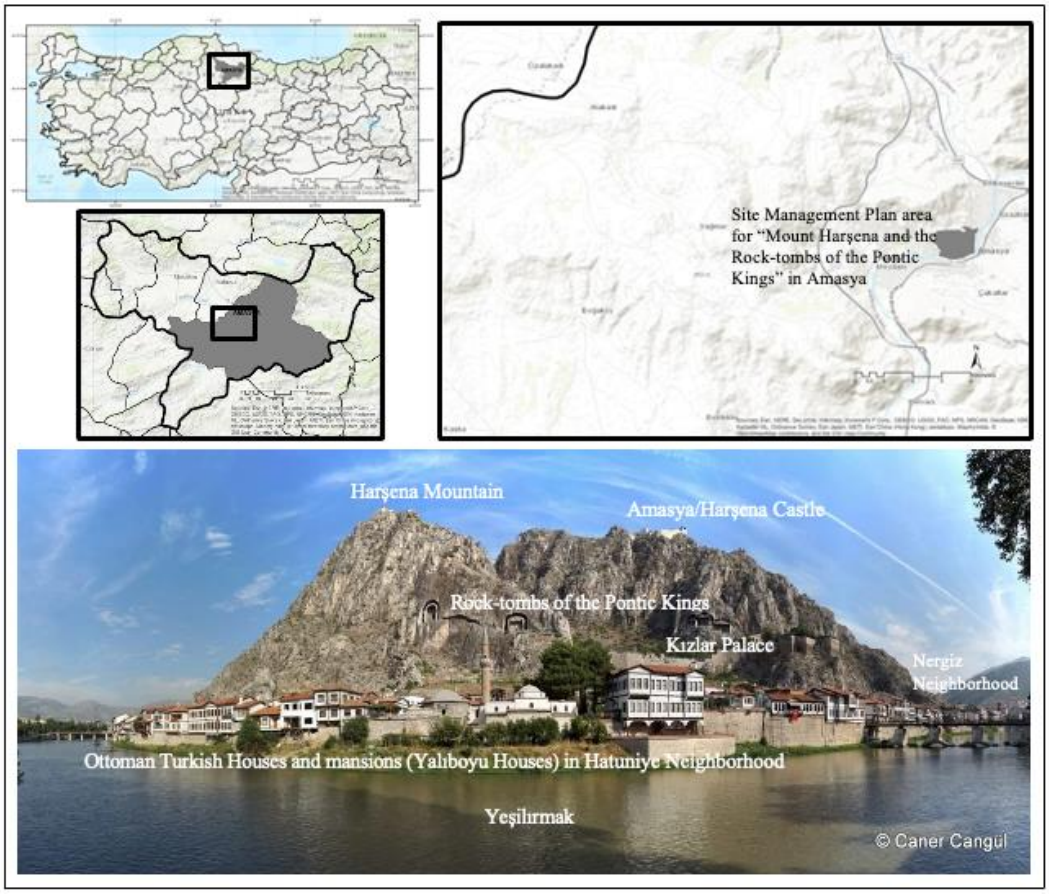


Figure 1. *Study area (SMP area for MHRTPK in Amasya)*
Source: *In upper figure the SMP area boundaries were taken from Amasya Belediyesi (2022a); the text was added to the lower panorama taken from Caner Cangül's © archive (https://www.canercangul.com/7989/panoramik-amasya/)*

The history of the city of Amasya, which was established on the shores of Yeşilırmak (Kumeşmaha in the Hittite period, Iris in the ancient period), dates back to the period of the Hittite Kingdom (1650-1190 BC). Hittites were the first organized administrative power where the city was located in the Kingdom's region defined as the Upper (or High) Land (Amasya Belediyesi, 2022a). Due to its location on the trade routes between Asia and Europe, and the Mediterranean and the Black Sea, Amasya has maintained its importance for thousands of years, and the topographical constraints and possibilities of defense formed by the mountains surrounding the valley have determined its location. For the same reasons, the boundaries of the city have continued unchanged in the narrow strip of the valley from ancient times to the present day (Meşhur, 1999; Amasya Belediyesi, 2022a) (Figure 1).

The first settlement of the city started with the ancient castle established during the Hittite period on the upper elevations of the dominant Harşena Mountain, and then the first infrastructures such as roads and water channels were created by the Phrygians, Cimmerians, and Persians who subsequently ruled the city. Afterwards, under the sovereignty of the Pontus Kingdom, of which the city was the capital, the development activities matured and the city expanded beyond the walls (Meşhur, 1999) (Figure 1). In its rich fabric reflecting its history:

> *Harşena Mountain … [holding] the [t]races of the Iron Age, [being] the capital of the Pontus Kingdom of the Hellenistic Period, ... [being] military-oriented ... management center …. fortress-city ... of the Roman Period ... [being] the Episcopal Centre of the Eastern Roman (Byzantine) Period ... [being] the fortress of the Seljuks, [and being] the administrative and military center of the Ottoman Period; it has maintained its cultural continuity with its dominant position in the narrow valley in which it is located. .... Harşena Mountain constitutes the identity and spirit of the city with its geological form and the Harşena Castle, Rock-tombs of the Pontic Kings on it, Yeşilırmak and the ancient walls on its shores, and the traditional Ottoman Turkish Houses and mansions [Yalıboyu Houses] rising on these walls. The identity of the city of Amasya is multi-layered and cultured, as it has been used as a continuous settlement since the Iron Age to the present [emphasis removed].*
>
> *The combination of "Harşena Mountain and Yeşilırmak" [emphasis removed], which is the center of attention of travelers, creates an impressive and unique natural landscape. Harşena Mountain, starting with Mithradates Ktistes I, King of Pontus, until Pharnakes I; houses the monumental-magnificent rock-tombs of five kings. The Royal Cemetery (Rock-tombs) of the Kingdom of Pontus is … a unique example in the world [emphasis removed]. It also represents the most recent examples of monumental rock-tombs in Anatolia. (Amasya Belediyesi, 2022a: 22, 27, 28, 121)*

The rich biodiversity with its natural landscape and environmental resources that make up its physical geography, the SMP area house critical plant and animal species which have been identified according to both IUCN criteria and the degree of endemism (ÇŞB-TVKGM, 2016).

All these unique historical/cultural and natural characteristics of the SMP area create a high level of potential for tourism and attract both foreign and domestic tourists with differentiating interests, especially in their respective tourism seasons. This tourist load in the area requires an assessment of the carrying capacity of each of the core zones (VMZs) and the SMP area as whole for the sustainable tourism management of this unique touristic destination.

The Adoption of TCC models into the Case Study

In order to provide a clear description of the methodology adopted for the SMP area for MHRTPK in Amasya, a conceptual Venn diagram based on the related TCC models is presented in Figure 2. One of the sets in the figure involves capacity calculations in previous work in terms of only PCC calculations using methods other than the IUCN (Cifuentes's) model as given in the light blue border. Another set depicted with dark blue border and green color involves studies using that particular method for calculations of PCCs, RCCs, and ECCs. In this set the natural characteristics of the area dominate the cultural features of the studied destinations. Similarly, the dark blue bordered and yellow colored set defines the only known published research using Cifuentes's (IUCN) model in a holistic cultural heritage site carried out by Erdoğan (2023) within the scope of Artuklu SMP planning study (Mardin BŞB, 2022), which covers City of Old Mardin and its immediate surroundings.

The existence of a zone with natural and archeological characteristics (1st Degree Archeological and Natural Site), which is similar to national parks of this nature and the existence of cultural characteristics as of the Hatuniye and Nergiz Neighborhoods (Urban Sites) (Figure 1), makes the study area different from the Artuklu SMP area. In addition, these features also make it different from the cases with characteristics given in either dark blue bordered and green colored set mentioned earlier (Figure 2). Being different from either, in fact, the study area covers both of the dark blue bordered and yellow and green colored sets.

Inspection of SCCs in the study area will be based on Doxey's Irritation Index and Butler's TALC model, which are often taken as bases in

the literature (see e.g., Çavuş, 2002; Akdu & Ödemiş, 2018) as depicted in the small red bordered set of studies concerning case areas having both natural and/or cultural characteristics.

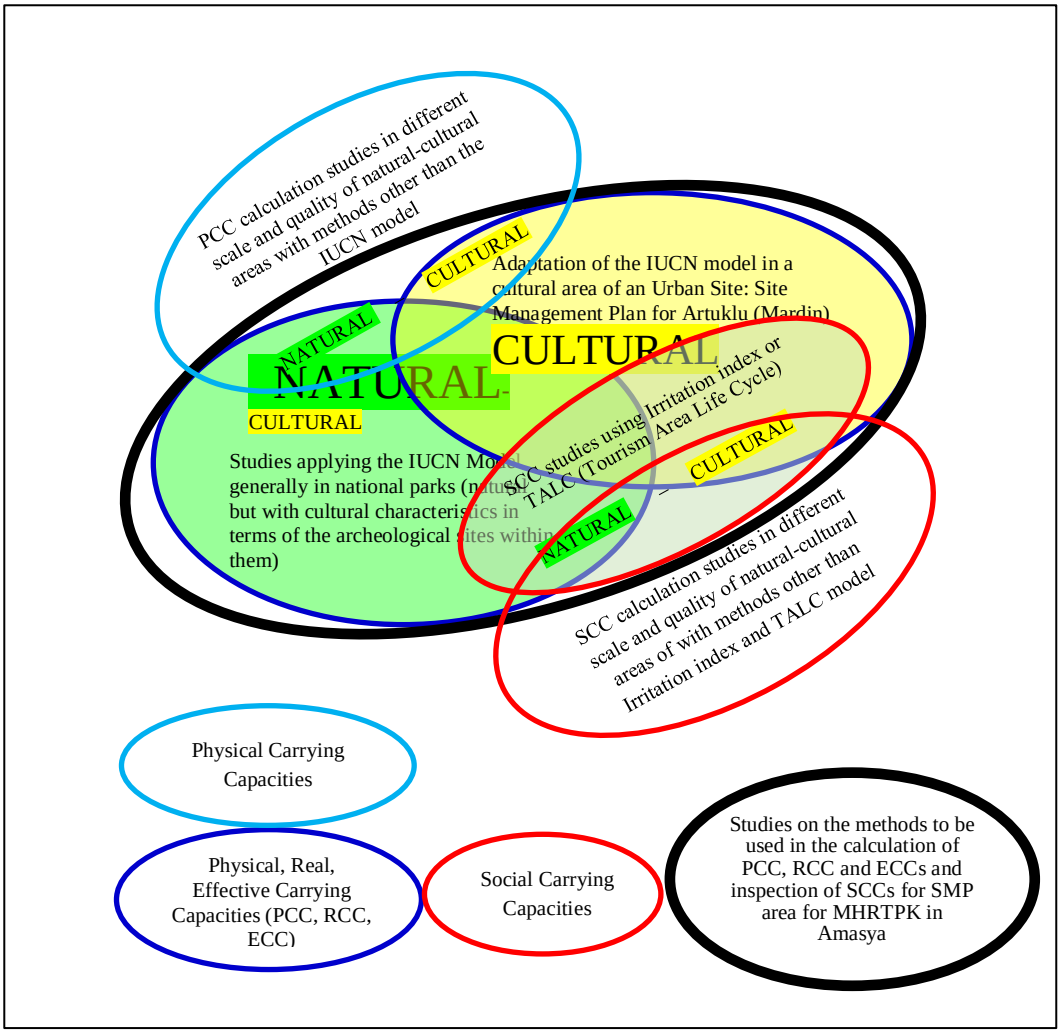


Figure 2. *The relationship of the methods to be used in the study with similar studies in the literature*

Source: *Author's own elaboration (originally submitted in report for Amasya Belediyesi (2022b))*

In sum, the holistic methodology which involves TCC assessments by both re-evaluation of Cifuentes's (IUCN) model for PCCs, RCCs, and ECCs and inspection of SCCs by means of the Irritation Index and the TALC model (Figure 2), has some common grounds with the studies in the literature using either of these models. Accordingly, in Figure 2, the big and bold framed set represents the methodological domain of the present study, omitting the studies covering only the calculation of PCCs using methods other than IUCN model and methods other than Irritation Index and TALC model for SCCs.

In addition to the nature of the area, the methodological perspective of the present study is novel, in terms of the profession that performed the research, which is urban planning rather than the former landscape architecture or tourism studies.

Data Collection, Data Use, and the Methodological Stages

The data used in the study with their temporal intervals (months/years), spatial scale/levels, and the sources from which they were compiled are summarized in Table 1.

Table 1. *Temporal intervals (months/years), spatial scale/levels and sources of the data*

	Data		Months/Years	Scale/Level	Source of the data /website
From the Field (Primary)	Observations from and interviews made in the field	Institutions Mukhtars Businesses	June 2022	Whole SMP area	In-depth interviews conducted during the fieldwork in August 2021
	Questionnaire surveys from Hatuniye Neighborhood	Workplace surveys Household surveys	June 2022	Hatuniye Neighborhood	Questionnaire surveys applied by the delivery of Hatuniye Mukhtar
	Detailed spatial information for all core and sub-zones in the SMP area	Spatial details of the 1st, 2nd, 3rd, and 4th core zones and sub-zones around them	As of the end of June 2022 and the beginning of July	Whole SMP area	Fieldwork
Institutional (Secondary)	Tourism statistics: Accommodation facilities	Municipality licensed-ML	Annually for 1992, 1994, 1997 and for 2006 to 2021	Whole Amasya Province	Official statistics website of the MoCaT
		Tourism licensed-TL (including (TOLs)	Annually for 1991 to 1999, 2004 to 2021	Whole Amasya Province	
	Tourism statistics: Accommodation data	In ML facilities (on yearly-basis)	Annually for 2000 to 2021 (2007 missing)	Amasya Province and the Central District	
		In TOL facilities (yearly-basis)	Annually for 2000 to 2021	Amasya Province and the Central District	
		In ML facilities (monthly-basis)	Monthly for 2017-2021	Whole Amasya Province	
		In TOL facilities (monthly-basis)	Monthly for 2017-2021	Whole Amasya Province	
	Registered traditional buildings	List of locational and other detailed information for the registered traditional buildings	As of 2022	SMP area and the urban sites in its near vicinity	Amasya Municipality during the fieldwork
	Number of employees in the core or nearby zones of the SMP area	Employees responsible for core zones or working in the official tourism related organizations	As of the end of June 2022 and the beginning of July	SMP area and its near vicinity	Amasya Municipality and Provincial Directorate of MoCaT
From the Field (Primary)	Detailed information about touristic facilities/businesses	Details of the capacity, active state, type, etc. for the touristic workplaces	As of May 2022	Whole SMP area and its eastern vicinity	Provincial Directorate of MoCaT and Amasya Municipality
		Detailed data for the completion/updating/mapping of the two data sets for tourist facilities	As of the end of June and the beginning of July 2022		Updating carried out during the fieldwork as of June 2022
Primary and Secondary Data	Parking capacities and their spatial data	Data which was mapped and capacity information was entered	As of the end of June and the beginning of July 2022	SMP area and its near vicinity	Amasya Municipality and the fieldwork

Rock-tombs that are not currently visible on the topographical map	Data whose locations were mapped with points	Historical data as of 2022	Whole SMP area	Provincial Directorate of MoCaT Amasya Municipality and verified during the fieldwork

Source: *Originally submitted in report for Amasya Belediyesi (2022b) with date revisions in the first, and the remaining primary data lines.*

In Table 2, the four methodological stages of the study are presented with the data used in each of these stages, with reference to the dataset presented in Table 1. The use of these data in each of these stages is explained in detail in the four sub-sections that follow.

Table 2. *The flow of methodological stages with data used*

The Methodological Stages		**Used Data (refer to Table 1)**
1. Examination of official tourism statistics	to obtain general perception for the tourist load and to make capacity related discussions	• Tourism statistics: Accommodation facilities • Tourism statistics: Accommodation data
	to obtain parameters for PCC calculations	
2. Mapping and analysis of core zones (VMZs)	to obtain parameters for PCC calculations	• Detailed spatial information for all core and sub-zones in the SMP area • Registered traditional buildings • Rock-tombs that are not currently visible on the topographical map
3. Re-evaluation of Cifuentes's (IUCN) model	by calculating PCCs	• Data from the 1st and the 2nd stages
	by calculating RCCs	• Observations from and interviews made in the field • Parking capacities and their spatial data
	by calculating ECCs	• Number of employees in the core or nearby zones of the SMP area
4. Inspections of SCCs	using Doxey's (1975) "Irritation Index" or "Irridex"	• Observations from and interviews made in the field • Questionnaire surveys from Hatuniye Neighborhood • Detailed information about touristic facilities/businesses
	using Butler's (1980) "Tourism Area Life Cycle" (TALC) model	

Stage 1: Examination of Official Tourism Statistics

In the first stage, official tourism statistics in terms of both the facilities and accommodation of Amasya Province and the Central District were examined and interpreted. These statistics were examined to obtain a general perception for the tourist load of the study area, and also for some of the calculations. In this respect, while the number of facilities was discussed concerning their quantitative adequacy for the tourist load, the detailed accommodation statistics were used in parameter calculations such as Rotation factors in the PCC of Cifuentes's model.

Stage 2: Mapping and Analysis of Core Zones (VMZs)

In the second stage, the SMP area was mapped for its differentiated core zones (VMZs) to obtain the related parameters for calculating PCCs in these

zones, which were used to obtain RCCs and ECCs, subsequently. The subdivision process of the SMP area into different VMZs was based on different tourist densities and heterogeneous physical, spatial and visual features of those zones, implying different management strategies. This zoning involved definition from the most isolated/natural zone to the most densely urban zone, following the common focus of the opportunity spectrum methods such as Recreation Opportunity Spectrum (Clark & Stankey, 1979), Tourism Opportunity Spectrum (Butler & Waldbrook, 1991), and The Ecotourism Opportunity Spectrum (Boyd & Butler, 1996). The process started with a preliminary reading of the reports of local institutions and organizations on the maps and was finalized by the mapping and observations carried out in the field. As a result, four core zones and three similar pairs of sub-zones around them, where visitor circulation is not allowed or not possible, were delineated (Figure 3).

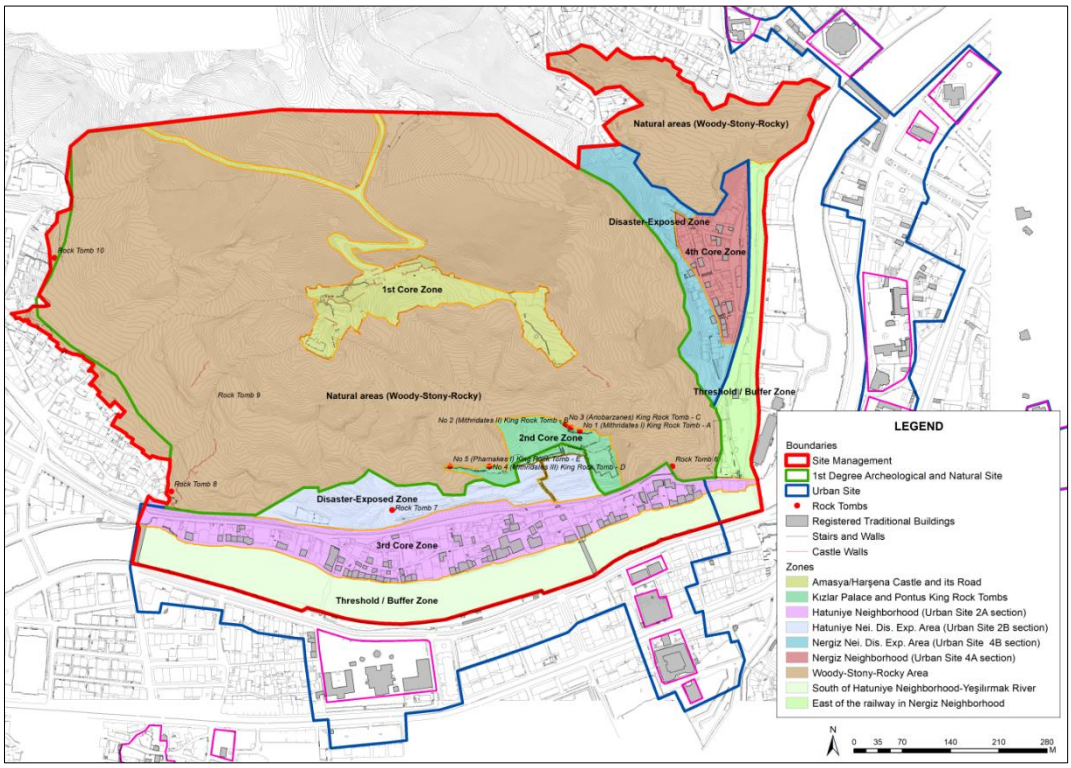


Figure 3. *Core zones (visitor management zones) defined within the boundaries of the SMP and their location relative to the site boundaries and connection points*
Source: *Author's own elaboration (originally submitted in report for Amasya Belediyesi (2022b) and for data used, see Table 1.)*

Capacity calculations were not performed in these sub-zones, which are located outside the core zones. These include woody-stony-rocky 2 sub-zones depicted in light brown, disaster-exposed 2 sub-zones depicted in light blue, 2 sub-zones forming thresholds/buffers depicted in light green

in Figure 3. The physical and social characteristics of each zone were determined and the tourism-related businesses information obtained from the relevant institutions for the 3rd and 4th VMZs were integrated into their dataset, which later were mapped in GIS during the fieldwork. In addition, based on field observations, the new touristic facilities were completed and updated for both their spatial and attribute data in GIS.

Stage 3: Re-evaluation of Cifuentes's (IUCN) Model

In the third stage, Cifuentes's (1992) model to determine the capacities for the tourist load in the protected areas, and subsequently proposed by the IUCN for use in nature protection/conservation areas (Ceballos-Lascuráin, 1996), was re-evaluated for the four core zones defined in the previous stage and for their total. The defined sub-zones, on the contrary, have not been subjected to this re-evaluation. The calculations for PCCs, RCCs, and ECCs were based on field observations and the data obtained from the relevant institutions and organizations and Mukhtars.

Calculation of Physical Carrying Capacities (PCC)

The first stage of the model is the calculation of PCC, which is defined as "the maximum number of people who can physically fit into a defined space at a given time" (Dağ & Mansuroğlu, 2018:110), was calculated by the following formula.

$$PCC = (A \times V) / (a \times Rf) \quad (1)$$

where,

A: Available area for public use (m^2). This term was determined by areas or pedestrian routes where visitors can circulate in the VMZs.

V/a: Visitor/used area (visitor per square-meter) (visitor/m^2) (computed considering pandemic conditions not only to model, it as at the time of writing, but also to ensure the general public health in the new normal conditions)

Rf: Rotation factor (the time the area is open per day/average duration of a visit) (visit/day/visitor), which was defined by the visiting times allowed and duration of visit for a visitor for each zone.

Contrary to the original 1 m^2 (1 m distance with the same width) for single-direction, and 1.2 m^2 (1 m distance x 1.2 m road width) per person

for no single direction in the original formulation (Cifuentes, 1992), the physical distance rule of 1.5 m radius in accordance with the Covid-19 Pandemic protocols was considered. Thus, the V/a for one person was taken as 7 m^2 with this radius. For the A value, fieldwork data from the first two core zones were used, while the roads within the other two zones, were obtained from GIS overlay analyses.

As for the Rotation factor (Rf), 1st VMZ's visiting hours are between 09:00-19:00 taking 10 hours. In the fieldwork, the east part was visited in 2 hours and the west part in 1.25 hours (1 hour and 15 minutes) taking 3.25 hours total visit duration. 2nd VMZ's visiting hours are between 08:00-19:00 taking 11 hours. In the fieldwork, this area was visited in about 3.25 hours (3 hours and 15 minutes). Accordingly, the rotation factor for the 1st VMZ was found to be 10/3.25=3.08 and for the 2nd VMZ it was found to be 11/3.25=3.38.

Tourism statistics show that in the last twenty years in Amasya, domestic and foreign tourists stay duration was 1.4 and 1.5 days, respectively, in TOL facilities and 1.5 and 1.6 days, respectively, in ML facilities. Therefore, the average visit duration per tourist is 1.5 days. Regarding the 3rd and 4th VMZs open daily, if the time the area is open per day (opd) is assumed 1 day and the average duration of a visit (atv) is assumed to be an average of 1.5 days, the Rotation factor (opd/atv) is calculated as 1/1.5=0.67 for both zones. When the average stay is prolonged, the factor will decrease, and the PCC of the area will decrease at that rate.

Calculation of Real Carrying Capacities (RCC)

The RCC is defined as "the maximum number of visits allowed in an area" (Cengiz & Kaptan Ayhan, 2008:98) and is calculated by the following formula.

$$RCC = PCC - Cf_1 - Cf_2 - \cdots Cf_n \quad (2)$$

where,

$Cf_1, Cf_2, \ldots . Cf_n$ are the correction factors for each variable including factors such as sun, rain, erosion, accessibility, disturbance to wildlife, temporary closure of the area, etc. (Cifuentes, 1992; Kourandeh & Fataei, 2013; Cupul-Magaña & Rodríguez-Troncoso, 2017; Sayan & Atik, 2011; Soylu & Özkök, 2016), peculiar to the specific conditions of the area.

They are indicated as percentages, determined by using (Cifuentes, 1992):

$$Cf = \frac{Ml}{Mt}\ x\ 100 \quad (3)$$

where,

Cf: Correction factor (%)

Ml: Limiting magnitude of the variable

Mt: Total magnitude of the variable

The correction factors are used to find RCC with the following formula.

$$RCC = PCCx\ \frac{100-Cf_1}{100}\ x\ \frac{100-Cf_2}{100}\ x\ \ldots..\ x\ \frac{100-Cf_n}{100} \quad (4)$$

Since RCC, which is a ratio of PCC, it will always be smaller. Similarly, the highest value of ECC is equal to RCC as seen in the following inequalities (Cifuentes, 1992):

$$PCC > RCC \text{ and } RCC \geq ECC \quad (5)$$

Institutional interviews obtained from the fieldwork revealed that in the SMP area, climatic conditions generally do not pose a problem for the visit. However, since the months of January-February 2022 were relatively cold, snowy, and icy, it was learned that the 1st and 2nd VMZs were closed for a total of two weeks in that period and that this closure was generally enforced during such severe cold periods. Considering that similar problems will continue in the future, the winter limiting factor was taken into account as a correction for the working area.

Taking 14 days out of 365 days for the resulting winter correction factor, it was calculated as:

$$Cf\ winter\ = \frac{14}{365}\ x\ 100 =\ 3.84\ (3.84\%)$$

In the institutional interviews, no authority mentioned any delineation for a specific plant or animal cover for the SMP area similar to the Ecologically Based Scientific Research Report prepared for the 1st Degree Archeological and Natural Site, despite some critical endemic species were identified (ÇŞB-TVKGM, 2016). Therefore, these living species, if any, are expected to survive safely away from human influence due to the fact that pedestrian circulation is prohibited, dangerous, or not possible in these natural areas or sub-zones compared to the core zones, i.e., VMZs.

Of the literature examined, it was only in the study of Malik and Bhat (2015) that correction factors were searched by variables concerning transportation, infrastructure, tourist perception and management besides natural limitations.

Based on institutional interviews and fieldwork no tour parking or parking problems were implied, when those services are used regularly or effectively. Moreover, there is no significant problem in the SMP area regarding solid waste or water infrastructure, but the continuity of the measures and controls for this should be ensured by creating stations suitable for recycling and compatible with the character of each of the VMZs.

Calculation of Effective Carrying Capacities (ECC)

"Effective or permissible load capacity" (Cifuentes, 1992:18) or simply "Effective Carrying Capacity (ECC) is the maximum number of visitors that an area can deal with relative to its current management capacity." (Cengiz & Kaptan Ayhan, 2008:99). It is calculated using the formula:

$$ECC = RCC \times MC \quad (6)$$

where,

Management Capacity (MC) is the percentage of the minimum management carrying capacity (Cifuentes, 1992:18).

While PCC calculations were made in all of the 10 studies reviewed, 4 of which were international and 6 were native, and made using the IUCN Model, RCC was calculated in a total of 8 and it has been noted that this was only in the 2 international studies (Cifuentes, 1992; Cupul-Magaña & Rodríguez-Troncoso, 2017); and only in the 4 of the native studies ECC calculations were made (see Cengiz & Kaptan Ayhan, 2008; Sayan & Atik, 2011; Soylu & Özkök, 2016; Göktuğ, 2011). All four of these studies are on national parks, and their authors referred to only a single factor for MC. This is an easy-to-define and accessible variable for national parks as the percentage of the number of personnel in charge, within the minimum number of personnel that should be in charge. This shows the difficulty of calculating the MC and, accordingly, the ECC.

Similarly, for the study area, MC problems caused by lack of personnel revealed the ECCs that decreased even more than the RCCs. Information on the number and adequacy of employees working in

tourism-related organizations was obtained during the institutional interviews, as shown in Table 3.

Table 3. *Number and adequacy of personnel in the official tourism organizations*

VMZs	Number of personnel in charge	The minimum number of personnel that should be in charge
1st Core Zone	5	Although it was said to be adequate, there was encountered only 1 personnel member during the fieldwork.
2nd Core Zone	5	Adequate
Museum of Writing History and Calligraphy in the 3rd Core Zone	6	Adequate
Unesco Office in the 3rd Core Zone	2	Adequate
Hazeranlar Mansion (Museum House) in the 3rd Core Zone	6	Twice as much
Şehzadeler Museum in the 3rd Core Zone	3	Twice as much
Sales office (out of the SMP area)	3	Adequate
Archeological Museum (out of the SMP area)	35	Increase by a rate of 1/3

Source: *Originally submitted in report for Amasya Belediyesi (2022b) and for data used, see Table 1.*

From this point of view, MC arising from the lack of adequate personnel in the 3rd VMZ is found by using the formula:

$$MC = (\text{Number of personnel available}/\text{Minimum number of personnel required}) \times 100) \quad (7)$$

was found as MC = 9/18=0.5 x 100, i.e., 50%.

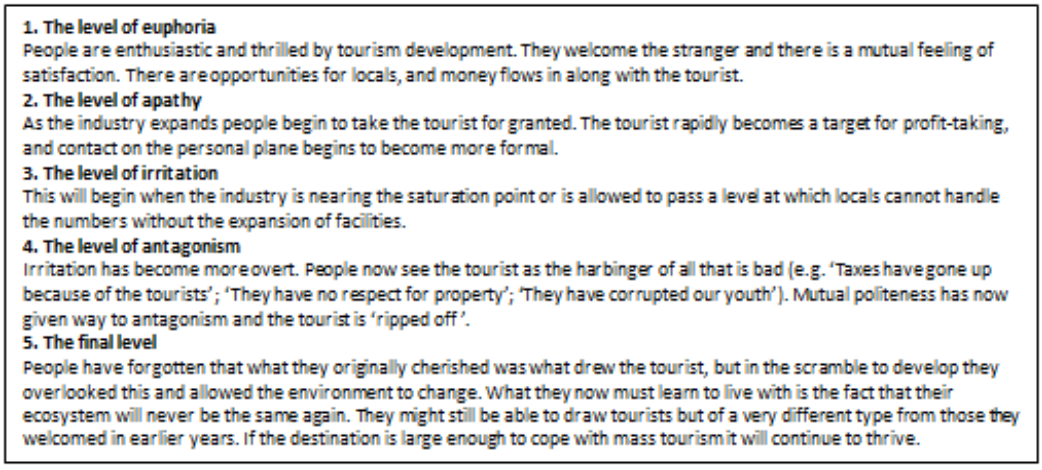
These numbers, which are calculated for only two organizations, result in an outcome that reduces the RCC of the zone they are located in by 50%, on the assumption that all the tourists coming into the relevant VMZ visit those museums in question.

Stage 4: Inspections of SCCs

In the fourth stage, for inspecting the social carrying capacity (SCC) of the study area, the information and observations obtained from the relevant institutions and organizations during the fieldwork, the Mukhtar interviews, workplace, and household questionnaire surveys applied in the 3rd VMZ were used. The general approach in the SCC literature is to use either "Irritation Index" or "Irridex" of Doxey (1975) or "Tourism Area Life Cycle" (TALC) model of Butler (1980), which conceptualizes SCC into a life cycle model considering natural resources and economic development. The use of both, on the contrary, which is adopted in the integrated approach of the present study, is not usually undertaken.

Aiming at determination of the level or change in the reactions of local people to tourism or their attitudes towards tourists, Doxey (1975)

points out that this change occurs in four successive stages in the Irridex he suggested, to which later a fifth, the final stage, was later added by Doxey (1976). In each of these stages, as the number of tourists visiting the area increases, the reaction of local people to tourists experiences a gradual positive to negative process, i.e., from the level of excessive well-being (euphoria) to indifference (apathy), discomfort (irritation/annoyance), opposition (antagonism) and to the final stage, which is "reaction characterised by both acts of tourismphobia (behavioural approach of citizens) and tourism exit "Trexit" (behavioural and strategic approach of cities and institutions in response to tourismphobia)" (Bourliataux-Lajoinie et al., 2019:583) (Figure 4). This final stage of the Irritation Index as proposed by Doxey (1976) was added to the earlier classical four stage scheme of Doxey (1975) by Bourliataux-Lajoinie et al. (2019), as seen in Figure 5, who evolve the four-stage segmentation by adapting from Doxey (1975) and from Zaidan and Kovacs (2017).



1. The level of euphoria
People are enthusiastic and thrilled by tourism development. They welcome the stranger and there is a mutual feeling of satisfaction. There are opportunities for locals, and money flows in along with the tourist.
2. The level of apathy
As the industry expands people begin to take the tourist for granted. The tourist rapidly becomes a target for profit-taking, and contact on the personal plane begins to become more formal.
3. The level of irritation
This will begin when the industry is nearing the saturation point or is allowed to pass a level at which locals cannot handle the numbers without the expansion of facilities.
4. The level of antagonism
Irritation has become more overt. People now see the tourist as the harbinger of all that is bad (e.g. 'Taxes have gone up because of the tourists'; 'They have no respect for property'; 'They have corrupted our youth'). Mutual politeness has now given way to antagonism and the tourist is 'ripped off'.
5. The final level
People have forgotten that what they originally cherished was what drew the tourist, but in the scramble to develop they overlooked this and allowed the environment to change. What they now must learn to live with is the fact that their ecosystem will never be the same again. They might still be able to draw tourists but of a very different type from those they welcomed in earlier years. If the destination is large enough to cope with mass tourism it will continue to thrive.

Figure 4. *Stages in "Irritation Index" (Irridex) of Doxey*
Source: *Doxey, 1976:26-27*

The theory of Tourism Area Life Cycle (TALC) by Butler (1980), which is based on the assumption that attitudes of local people change with the increase in tourist traffic density (Szromek et al., 2020), introduced an evolutionary cycle with six recurring stages. These stages are exploration, involvement, development, consolidation, stagnation, and rejuvenation or decline (Figure 6). The two extreme processes in the sixth stage involve more than one possible direction between them. The two extremes (A and E) and those in-between directions are A renewed growth (rejuvenation), B reduced growth rate, C stable visitation level, D marked decline, E immediate decline (decline) (Butler, 1980:11).

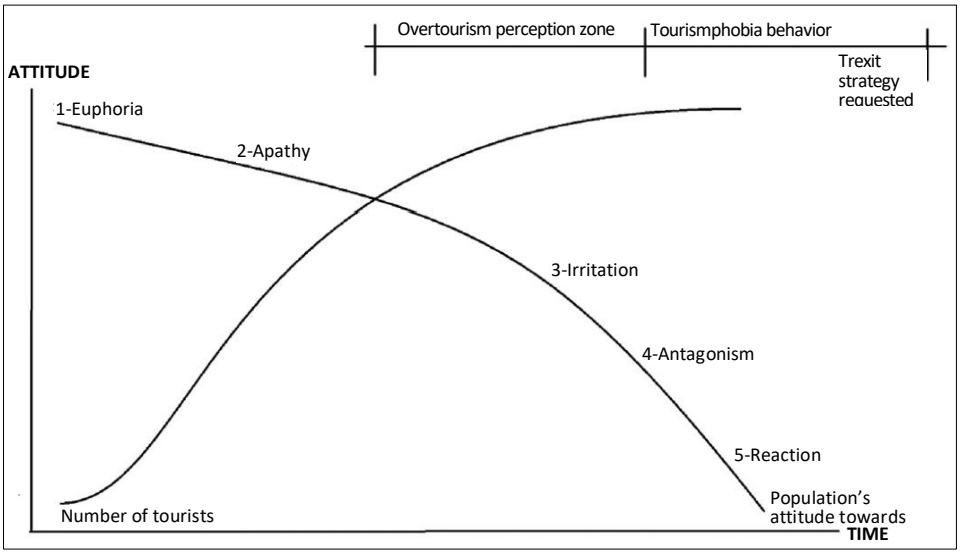


Figure 5. *Crossing Doxey's model to overtourism, tourismphobia and exit tourist strategy "Trexit"*
Source: *Bourliataux-Lajoinie et al., 2019:584, who adapted from Doxey (1975) and Zaidan and Kovacs (2017). (The texts on the figure were enlarged by the Author)*

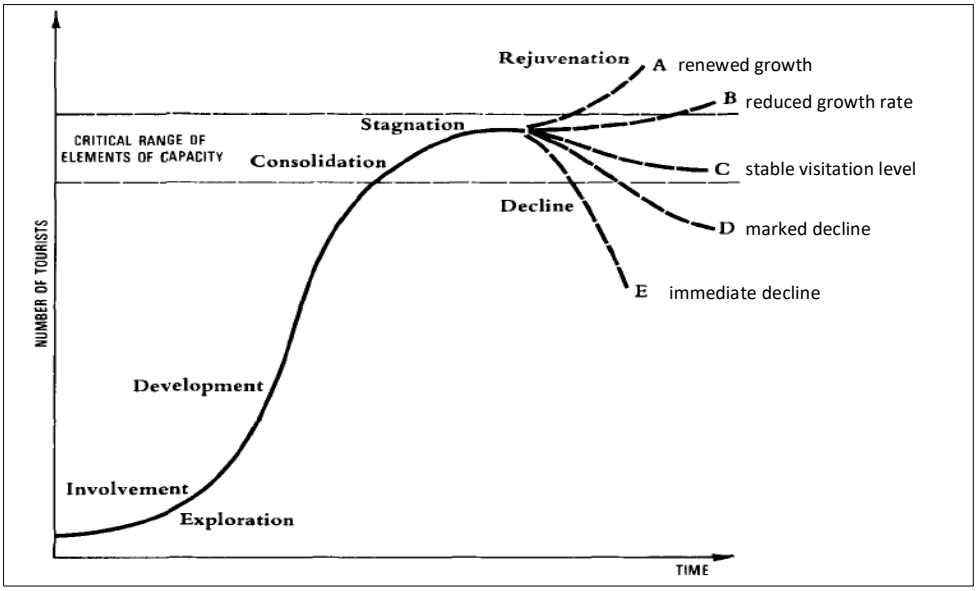


Figure 6. *Hypothetical evolution of a tourism area*
Source: *Butler, 1980:7; explanations of A-E is added as a summary from Butler, 1980:11.*

The main primary data for inspection of SCCs of the two peopled core zones, which are the 3rd VMZ (Hatuniye Neighborhood) and the 4th VMZ (Nergiz Neighborhood), involved observations and interviews from the field, and questionnaire surveys. Further, detailed information about touristic facilities/businesses obtained both from the fieldwork for data update as of June 2022 and the secondary source of Provincial Directorate of MoCaT and Amasya Municipality.

One section of the primary data for both neighborhoods was the questionnaire surveys that were delivered to the Mukhtars. It was adapted from the work of Szromek et al. (2020) and its preliminary version was acquired from Z. Kruczek (personal communication, July 13, 2021). These randomly distributed surveys (Table 4) had the same content for the two groups affected by tourism, that is, the tourism-dependent and the non-tourism-dependent local populations.

Table 4. *Population and sample sizes of the workplace and household surveys applied in the 3rd and the 4th core zones, and the number of surveys distributed and returned*

Core Zones/ VMZs	2021 population (1)	Number of households (2)	Household Survey			Number of workplaces directly related to tourism (6)			Workplace survey		
			Distributed	Returned	Sampling rate	Souvenirs (3)	Accommodation and Accommodation+ food and beverage (4)	Food and beverage (5)	Distributed (total for the first two categories on the left)	Returned	Total in terms of open workplaces
3rd Core Zone (3rd VMZ)	125	46	15	5	11%	14 (all is open)	41 (34 is open)	21 (19 is open)	30-40	A total of 27, which is about half of the first two categories on the left	56%
4th Core Zone (4th VMZ)	134	55	5-6	0	_	_	1 (closed)	_	_	_	_

(1) TURKSTAT, ABPRS data were used.
(2) Obtained from the Mukhtar interviews.
(3) Two of them in Hatuniye are referred to as "Food and Souvenirs".
(4) Subtypes: Accommodation+Café, Accommodation+Restaurant with beverage, Accommodation+Restaurant, Accommodation+Café+ Restaurant with beverage
(5) Subtypes: Kiosque, Café, Restaurant, Alcoholic beverages kiosque, Restaurant/Café
(6) The total number of workplaces directly related to tourism is 78, and 75 of these are located in the SMP area and the 3 are outside of it. Out of all, only 69 are currently open (active).
Source: *Originally submitted in report for Amasya Belediyesi (2022b).*

The questionnaire was composed of five parts with Likert scale rating for all questions except for the second question, which included a single-select form. The main questions of these parts were as per the following:

1. How would you grade your attitude towards tourists?
2. Which of the following categories would best express this attitude?
3. In your opinion, does tourism cause conflicts between parties in Amasya and if so, how would you evaluate it?
4. To what extent do you agree with the following statements when evaluating Tourist Traffic?
5. Express your opinion on the impacts of tourism on life in the center of Amasya. (Amasya Belediyesi, 2022b: Survey table)

Accordingly, the first part involved only that question asking for a 5-point Likert scale rating from absolutely negative to positive. The second part involved five statements indicating the level of attitudes changing between best to worst. The third part asked for a 5-point Likert scale rating for each of the seven statements between and within paired comparisons concerning parties like tourism industry, residents, tourists, local government, from absolutely not to yes. The fourth part asked for a 5-point Likert scale rating for 13 statements, which were seen as either external/internal cause or effect of tourist traffic changing from Covid-19 to refugees, from resident livelihood to gentrification etc., from absolutely not to yes. Finally, the last part asked for a 5-point Likert scale rating for 11 different groups of tourism impacts on economic situation (5 factors), business relationships, transportation facilities (4 factors), comfort of recreation, ritual/cultural activity watching, professional life satisfaction, accessibility to commercial facilities, safety in streets (3 factors), sense of belonging, natural (4 factors), and social environment (2 factors), from absolutely negative to positive.

The total returns for the surveys were only 27 and 5 for the tourism-dependent and the non-tourism-dependent locals, respectively, and they were only from the 3rd VMZ, Hatuniye (Table 4). However, most of the parametric tests require that the minimum sample size of 30 to meet the assumption of normality according to the Central Limit Theorem. If this condition is not met, for those smaller samples the normality tests are required before doing any parametric inferential test. If this condition is not met either, then non-parametric tests are preferred (Orhunbilge, 2000). However, in any case, before any testing on the survey, first, it needs to pass the Cronbach's Alpha Test for its reliability. Nevertheless, scholars in general accept that this reliability test also needs a minimum sample size of 30 (Samuels, 2017).

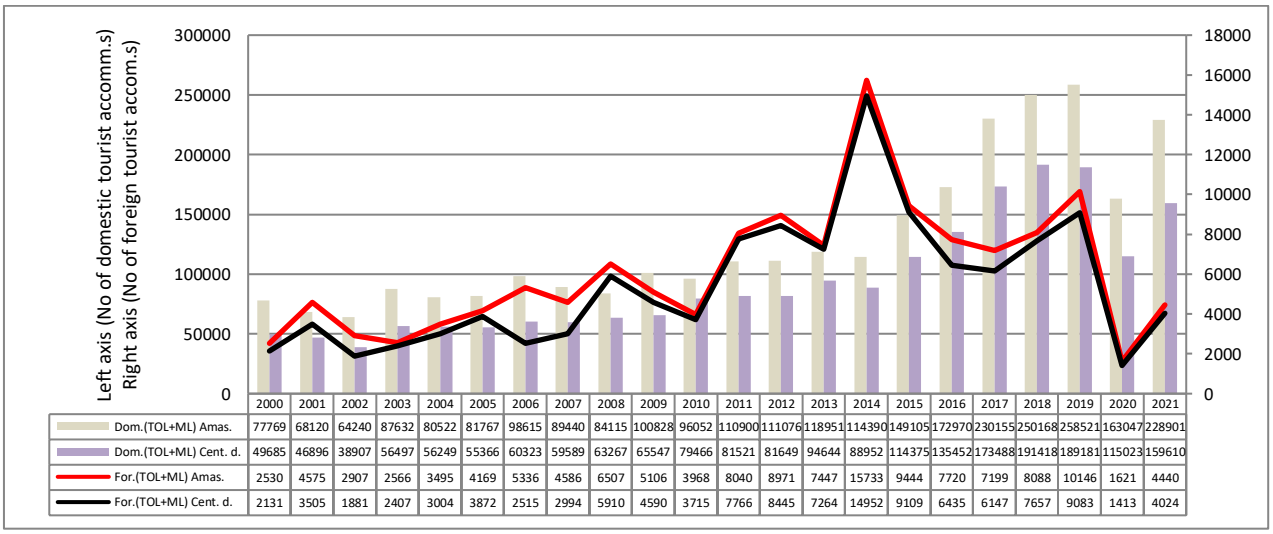
Therefore, although quantitative analysis was intended at the beginning for inspection of SCCs, the collected data did not meet its assumptions. In this respect, the aim of the analysis turned from the generalization of the sample data for population into qualitative analysis and into detailed description and interpretation of the collected data to understand the perspective of the participants (see Yıldırım & Şimşek, 2021) as presented in the related Results section.

RESULTS

Official Tourism Statistics

Touristic facility statistics in Amasya Province for the last 30 years show a continuous increase in the number of facilities with tourism license (TL) both as tourism investment license (TIL) and tourism operation license (TOL), and municipality license (ML). Accordingly, the total room and bed capacity of TL and ML facilities in Amasya Province in 1992, which was 570 and 1203 in 31 facilities, increased to 1678 and 3567 as of 2021 in 90 facilities, respectively.

Accommodation statistics of the last 20 years for the whole province and the Central District of Amasya are summarized in Figure 7. The province and the Central District show similar trends in terms of both domestic and foreign tourists. Accordingly, a steady increase in the number of domestic tourists is observed both in the province and in the Central District from 2000 to 2019, until a sudden decrease due to the Covid-19 pandemic in 2020 and a slight recovery after the relief from the pandemic curfews.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Dom.(TOL+ML) Amas.	77769	68120	64240	87632	80522	81767	98615	89440	84115	100828	96052	110900	111076	118951	114390	149105	172970	230155	250168	258521	163047	228901
Dom.(TOL+ML) Cent. d.	49685	46896	38907	56497	56249	55366	60323	59589	63267	65547	79466	81521	81649	94644	88952	114375	135452	173488	191418	189181	115023	159610
For.(TOL+ML) Amas.	2530	4575	2907	2566	3495	4169	5336	4586	6507	5106	3968	8040	8971	7447	15733	9444	7720	7199	8088	10146	1621	4440
For.(TOL+ML) Cent. d.	2131	3505	1881	2407	3004	3872	2515	2994	5910	4590	3715	7766	8445	7264	14952	9109	6435	6147	7657	9083	1413	4024

Note: Since there were statistics only for TOL facilities for 2007, this year's data were completed by averaging of 2006 and 2008 values of ML facilities, and a holistic reporting was made.

Figure 7. *Number of domestic and foreign tourists staying in TOL and ML facilities in Amasya Province and Central District, 2000-2021*
Source: *Originally submitted in report for Amasya Belediyesi (2022b) without 2007 values and for data used, see Table 1.*

The average length of stays of foreign and domestic tourists accommodating in TOL facilities for the period of 2000-2021 was found as 1.5 days and 1.4 days, respectively, in both the province and the Central

District. In ML facilities, these periods increased for foreigners to 1.6 in Amasya and to 1.7 in the Central District, and for domestic tourists to 1.5 in both. The fact that any tourist, domestic or foreign, does not stay in the area for more than two days, shows that accommodation capacity is not used effectively, rather than the inadequacy of this existing capacity and potential of the area, which is currently in a transition point for tours to and from the north and mid/southern Anatolia.

The monthly occupancy rates of both TOL and ML facilities of the province and the district also repeat this situation. The monthly occupancy rates, which follow a fluctuating trend, were around 45% in total for domestic or foreign tourists at TOL facilities and 30 to 35% in ML facilities. Therefore, there is an emptiness of around 55% in TOL facilities and an emptiness of around 65-70% in ML facilities. For both the province and the district, these trends point to the need to protect the natural resources of the study area and prevent its deterioration, improve its cultural quality, urban services and tourism infrastructure, rather than the opening of new facilities. Thus, it will be possible to increase the occupancy rates with domestic tourists and especially with foreigners by ensuring that the existing facilities use their capacities effectively and also to increase the accommodation periods, in the best situation, which do not exceed 1.7 days for foreigners and 1.5 days for domestic tourists in the ML facilities.

The examination of the proportional distributions of domestic tourist accommodation between months without distinguishing the types of facilities, showed that July-September, which coincides with the summer holiday period, receives the highest shares between 2017 and 2021. The first two months of 2020, just before the pandemic, were among the months in which the accommodation could have taken place most frequently in that year (Figure 8). In this 5-year period, the accommodation preference of foreign tourists was concentrated generally in the July-September period (Figure 8). Based on statistical data and institutional interviews, Central District is found to have similar trends with those of the province. The period between the closure of schools in mid-June and the opening of schools in September is a period of the highest concentration of tourist flow to the Central District.

All these statistics for both the province as a whole and the Central District give information merely about registered facilities. Therefore, these data do not include unregistered tourist accommodation and day-trippers who do not accommodate. Thus, the real number of tourists is most likely higher. However, it was learned from the interviews with the Mukhtars in

the study area, that there was no online rental accommodation in both neighborhoods. Notwithstanding, that does not mean it will not happen in the future. If necessary, in the future, the municipality may need to develop a registration system for such accommodations, and for day-trippers, which is important to be achieved ahead of time to ensure that the area is used in the right capacity.

Figure 8. *Proportional distribution of the number of domestic (upper) and foreign (lower) tourists staying in all facilities (TOL + ML) in Amasya Province according to months, 2017-2021*

Source: *Originally submitted in report for Amasya Belediyesi (2022b) and for data used, see Table 1.*

The Core Zones (VMZs)

First Core Zone (cultural-natural) (1st VMZ)

This zone, called "Amasya/Harşena Castle and its Road", includes the connections of the Harşena Castle, which was established in the upper elevations of the Harşena Mountain, and the traffic route leading to the north side of the castle (Figure 9). The total area of the circulation routes, which are approximately 1 m in width are generally suitable for single-row

passage to be used in the calculation of PCC (Figure 9) was found to be 695 m^2.

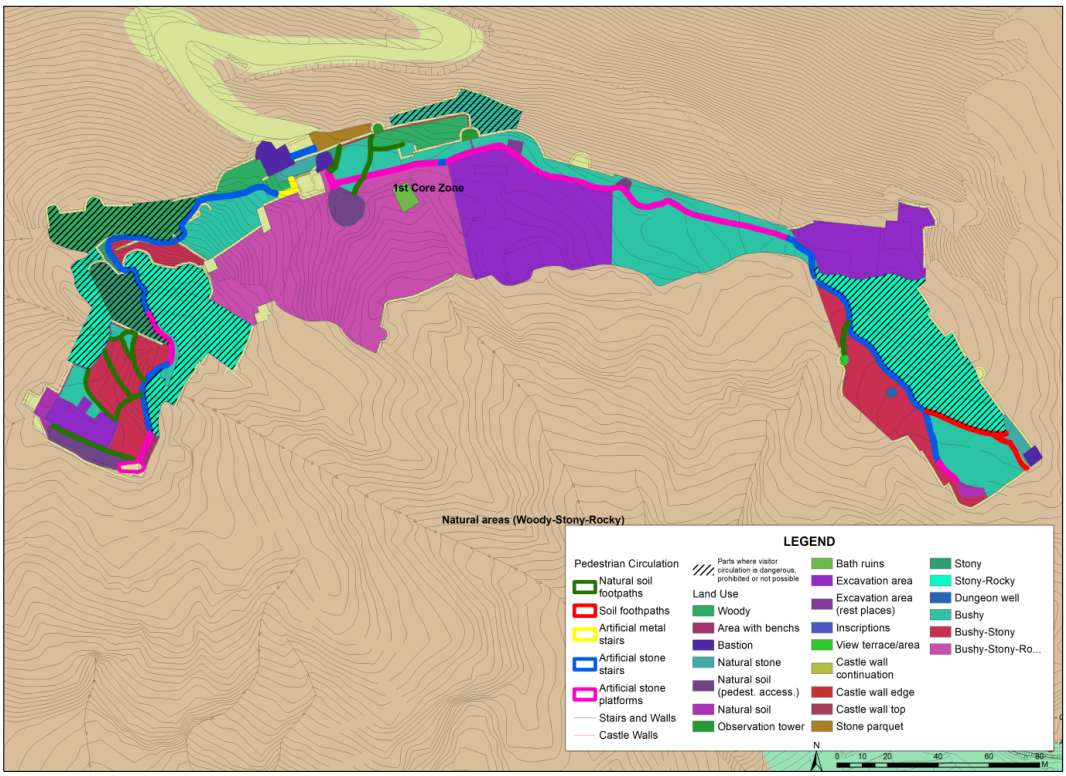


Figure 9. *Spatial details of the 1st Core Zone (1st VMZ) defined within the boundaries of the SMP*

Source: *Author's own elaboration (originally submitted in report for Amasya Belediyesi (2022b) and for data used, see Table 1.)*

Second Core Zone (cultural-natural) (2nd VMZ)

This zone (Figure 10), called "Kızlar Palace and Rock-tombs of the Pontic Kings", is located in the middle of the southern foothills of Amasya Castle on Mount Harşena, which covers the monumental rock-tombs of the Pontic Kings, the roads accessing them, and the Kızlar Palace. It extends beyond the boundary of the 1st Degree Archeological and Natural Site by about 15 m (Figure 3, Figure 9). Since the access roads to the Kızlar Palace and the King Rock-tombs from the Hatuniye Neighborhood provide access to the 2nd VMZ, they have been included in this zone and used in capacity calculations. The total area of the circulation routes ranging from 1-4 m in width, were generally deemed suitable for single-row passage to be used in the calculation of PCC within this zone, is 882 m^2 (Figure 10).

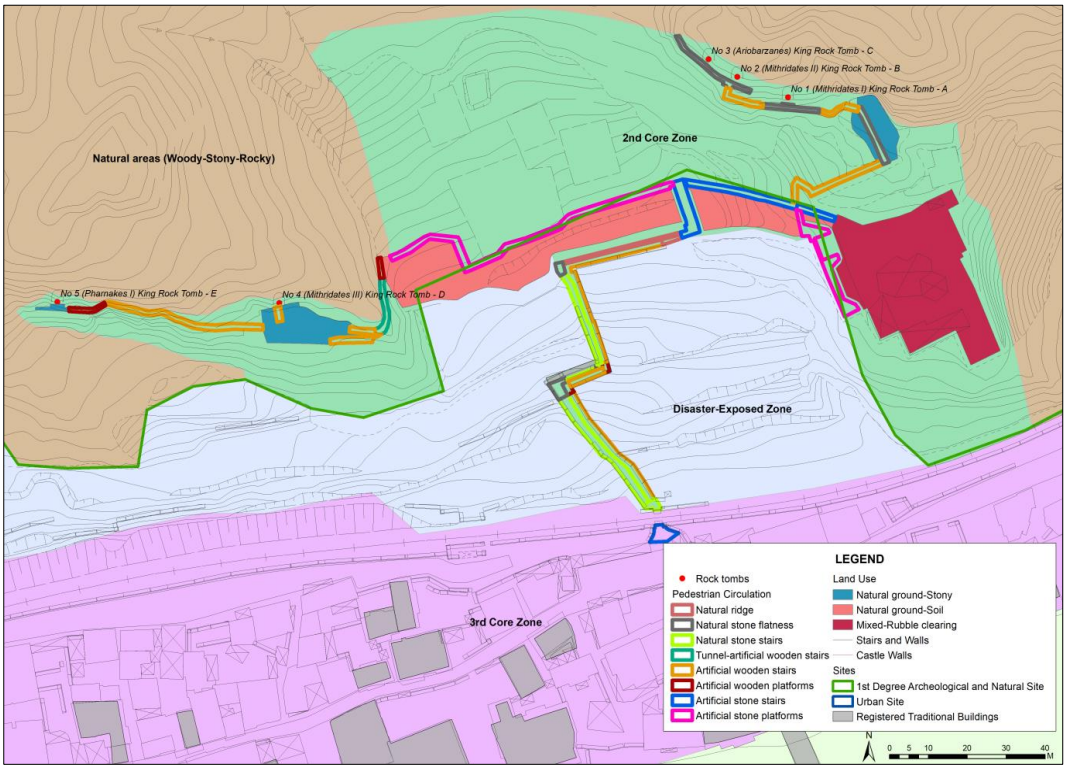


Figure 10. *Spatial details of the 2nd Core Zone (2nd VMZ) defined within the boundaries of the SMP*

Source: *Author's own elaboration (originally submitted in report for Amasya Belediyesi (2022b) and for data used, see Table 1.)*

Third Core Zone (cultural) (3rd VMZ)

This zone, called "Hatuniye Neighborhood (Urban Site 2A section)" is located between the city walls on the banks of the Yeşilırmak River, starting from the inner-city wall south of the Kızlar Palace at the southern slopes of Mount Harşena. The administrative boundaries of Hatuniye Neighborhood consist of the built area in the south of the railway and the evacuated area due to disaster exposure in the north. Currently, according to the Mukhtar's information, 46 households compose the resident population, which decreased between 2007 and 2017 and became stagnant since then regarding TURKSTAT data. Considering that 70% of the population is retired, according to the interview with the Mukhtar, the residents constitute an elderly population.

The fieldwork showed that this zone covers all workplaces, which are 75 in total, in the entire SMP area. The majority of these establishments serve in the tourism sector (Figure 11). Thirty-eight (38) of them offer accommodation services, the total number of rooms is 284, and the total number of beds is 587. These numbers do not include the capacities of

facilities that were closed during the fieldwork (Figure 11). The total area of the roadways to be used in the PCC calculations, which usually consists of narrow streets, is 8,843 m².

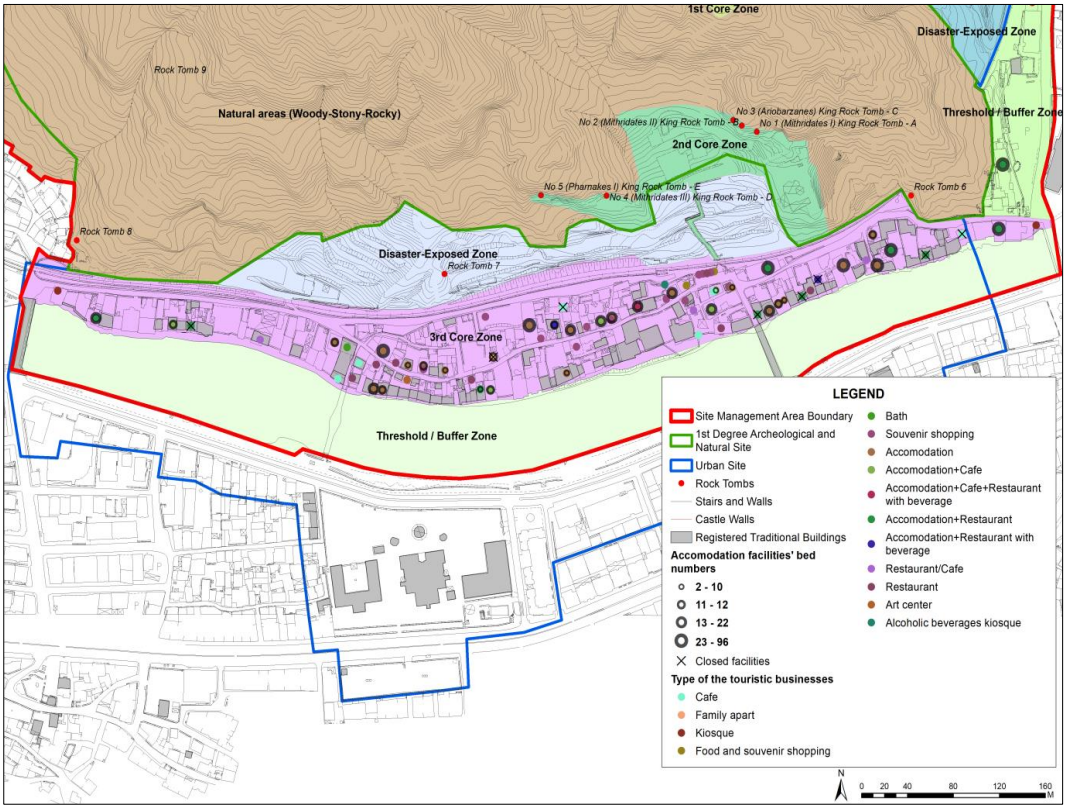


Figure 11. *Spatial details of the 3rd Core Zone (3rd VMZ) defined within the boundaries of the SMP*

Source: *Author's own elaboration (originally submitted in report for Amasya Belediyesi (2022b) and for data used, see Table 1.)*

Fourth Core Zone (cultural) (4th VMZ)

This zone, called "Nergiz Neighborhood (Urban Site 4A section)", consists of the part of the Helkis or Nergiz Neighborhood located to the east of Harşena Mountain within the boundary of the Urban Site. The Nergiz Neighborhood includes an area that is being evacuated because of its designation as a disaster-exposed area in the west, and a threshold/buffer zone up to the Yeşilırmak River outside the SMP boundaries in the continuation of the railway line in the east. The population of the neighborhood since 2007 shows a trend of continuous decrease in general according to TURKSTAT data. The Mukhtar interview revealed that among the 55 households in total, many local elderly people moved out and they are replaced by tenants. In addition, the biggest problem declared by the Mukhtar is the lack of visibility due to the threshold effect created by the

railway, the lack of workplaces, and the difficulties tourists have in finding this location.

In the threshold/buffer zone just in the east of the 4th Core Zone, there is the Police Guesthouse with a capacity of 10 rooms and 26 beds and nearby, outside the SMP boundaries there is 47-room and 96-bed Büyük Amasya Hotel and Amasya Military Club with approximately 50 rooms and 100 beds, estimated from the field observations. In sum, the total accommodation capacity of this zone and its adjacent periphery is 107 rooms and 222 beds. The Mukhtar noted that the only touristic facility (accommodation+restaurant) in the zone was unfortunately closed during the pandemic (Figure 12). Recently, a five-star hotel with approximately as much capacity as the zone and its near environs (110 rooms and about 250-300 beds) was projected by means of converting the old City Hall just south of the Military Club. The total area of the roadway, which is mostly composed of narrow streets and will be used in PCC calculations, is 2,700 m^2.

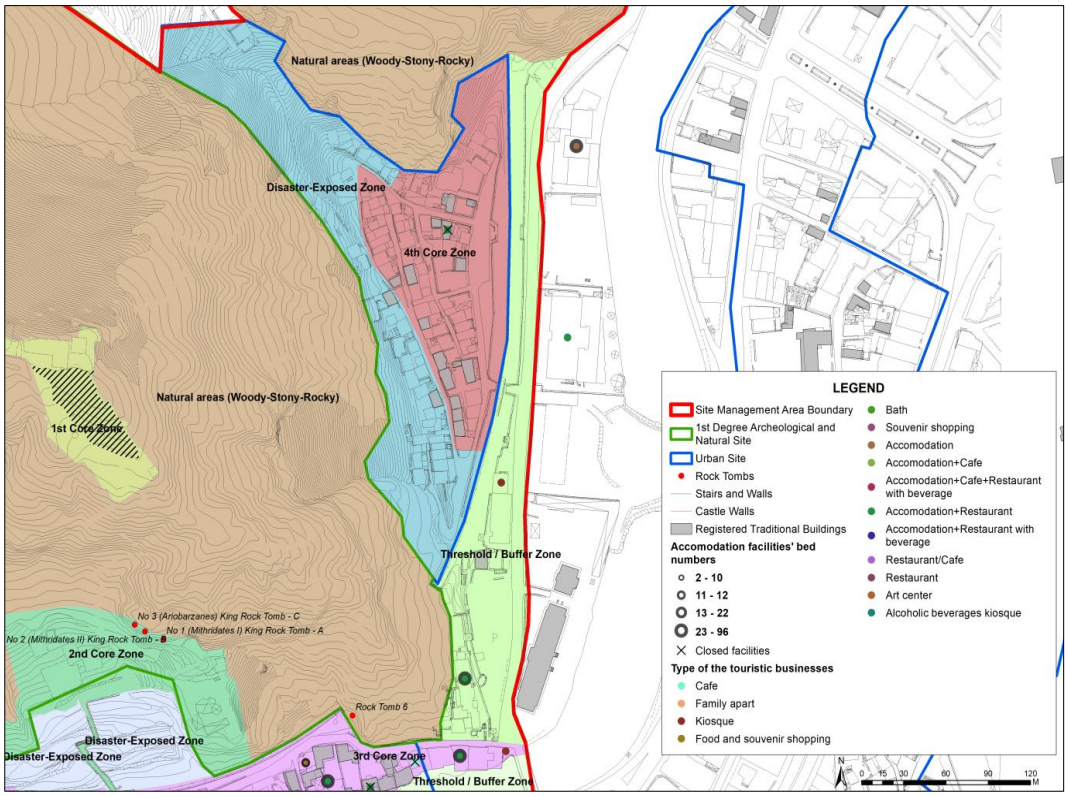


Figure 12. *Spatial details of the 4th Core Zone (4th VMZ) defined within the boundaries of the SMP*

Source: *Author's own elaboration (originally submitted in report for Amasya Belediyesi (2022b) and for data used, see Table 1.)*

Physical, Real, and Effective Carrying Capacities

With reference to the model's calculations in the Methodology section, A, V/a and Rf values for the 1st to 4th VMZs were obtained. These parameters, afterwards, were used to calculate the PCCs in visit/day units, as seen in Table 5.

Table 5. *PCCs calculated for each of the core zones (VMZs) and the SMP area as a whole*

VMZ	A (m^2)	V/a (visitor/m^2)	Rf (opd/atv) (visit/day/visitor)	PCCs (visit/day)
1	695	1/7	10/3.25=3.08	305
2	882	1/7	11/3.25=3.38	426
3	8,843	1/7	1/1.5=0.67	842
4	2,700	1/7	1/1.5=0.67	257
Total				1,830

Source: *Originally submitted in report for Amasya Belediyesi (2022b).*

The PCC values obtained for 1st to 4th VMZs show only the adequacy of the physical space. If it is ensured that the VMZs are visited by maintaining the pandemic distance conditions, the 1st VMZ may accept 305, the 2nd VMZ may accept 426, the 3rd VMZ may accept 842, and the 4th VMZ may accept 257 visitors per day at the maximum. Therefore, the total PCC was found to be 1,830.

Based on the calculations of correction factors, which were considered for only the 1st and the 2nd VMZs, the transformation of PCCs into RCCs resulted as seen in Table 6.

Table 6. *RCCs (together with PCCs) calculated for each of the core zones (VMZ) and the SMP area as a whole*

VMZ	PCCs (visit/day)	RCCs (visit/day)		
1	305	$PCCx\ \frac{100 - Cf_{winter}}{100}$	305x((100-3.84)/100)	293
2	426	$PCCx\ \frac{100 - Cf_{winter}}{100}$	426x((100-3.84)/100)	410
3	842	–	842	842
4	257	–	257	257
Total	**1,830**			**1,802**

Source: *Originally submitted in report for Amasya Belediyesi (2022b).*

Therefore, the actual capacity of the first two VMZs due to their climatic conditions beyond their physical location decreased slightly, from 305 to 293 for the 1st VMZ, from 426 to 410 for the 2nd VMZ, and the RCCs for the other VMZs remained the same as the PCCs. The total RCC was 1,802, with PCC decreasing by 28 visits.

With reference to MC calculation concerning the 3rd VMZ, which suggested a change in the RCC of only that zone in calculating the ECCs, the final results for all VMZs were found, as shown in Table 7.

Table 7. *ECCs (together with PCCs and RCCs) calculated for each of the core zones (VMZs) and the SMP area as a whole*

VMZ	PCCs (visit/day)	RCCs (visit/day)	MCs	ECCs (visit/day)
1	305	293	–	293
2	426	410	–	410
3	842	842	0.50	421
4	257	257	–	257
Total	**1,830**	**1,802**		**1,381**

Source: *Originally submitted in report for Amasya Belediyesi (2022b).*

The ECC calculations revealed that the ECC value for the 3rd VMZ, in which the MC has decreased by half, caused the RCC value to decrease also by half and to 421. The total ECC was found to be 1,381. Compared to the total PCC found as 1,830 and the total RCC found as 1,802, this capacity is the value for which the highest rate of decrease is observed (Table 6).

Social Carrying Capacities

Inspection of SCCs within the SMP area with both approaches shows that the first stage for the Doxey's Irridex and the first two stages in terms of the TALC model have been experienced by the residents. The Mukhtar interview for the Nergiz Neighborhood implies that the first stage of positive view for tourists is valid, as can be grasped from the expression "*citizens want tourists, they like them, there is no problem in that regard*". During the same interview, the issues addressed involved that being a transfer point, the SMP area only welcomes incoming tourists who are coming and going without accommodation. Thus, the city lacks possible economic contributions of tourists, and this was expressed as "*the tourist comes to Amasya first on their visit to the Black Sea, but he/she only eats here, and then starts his/her Black Sea tour without staying, and it is a problem for us*".

For the 4th Core Zone (the whole of the resident population of Nergiz) where there are no active tourism workplaces except for a single café, only household data were requested. However, only 5 household surveys were obtained from Hatuniye and none from Nergiz (Table 4). As a result, it can be stated that the above-mentioned Mukhtar comment conveys the general opinion of the 4th VMZ.

The stages of the SCC of the 3rd Core Zone (the whole of the resident population of Hatuniye) were determined by the survey that was applied.

In the total of 27 touristic workplace surveys (Table 4), the employees/officials of the businesses, except for 1 neutral opinion out of 20 responses to the 1st part, where the attitude towards tourists was questioned, had rather or absolutely positive opinions. When the opinion for the best expression of this attitude was asked in the 2nd part, it was seen that all 20 people who gave a valid answer (1 cancelled) marked the answer "*I am happy with the visits of tourists, because this means income, new connections, jobs, prestige for the city*" and displayed a positive attitude with the statements of indicating to be in the early stages according to the Irridex and TALC models, similar to Nergiz. When the respondents to the 3rd part, where the extent of a tourism-induced conflict is within and between the tourism industry, tourists, and residents, as well as between the tourism industry and local government, and also between residents and local government, were asked on a categorical scale, those who had absolutely or rather no conflict between any paired groups turned out to be about 73% of the total (128 out of 175 total markings). In other words, approximately 3 out of 4 of the tourism business people had no tourism-induced conflict between any groups or within the same group. The answers to the 4th part, where a querying about tourist traffic is made, were found to be as absolutely or rather not, accounted for about one-third (101 in 341) of all responses that generally address the negative aspects of tourist traffic; and as the responses that find tourist traffic to be normal/positive were absolutely or rather yes, and accounted for one-fourth (86 out of 341). For those questions on the effects of tourism on culture and nature, positive, undecided and negative opinions were distributed more or less equally, and the negative impacts of refugees on tourism were replied as absolutely or rather yes by 20 markings out of 26 in total. Finally, the answers to the 5th part about the impacts of tourism on daily life, were absolutely or rather positive with 47% (134 out of 288); were absolutely or rather negative with 38% (109 out of 288) and neutral with 15% (45 out of 288). This indicates that besides the high rate of positive viewpoint, there is some concern and some complaints growing. This point, which signals the transition to the subsequent stages of the Irridex and the TALC models, should be closely monitored and pre-cautions should be considered for the sustainable visitor management of the area.

The responses to 5 household surveys (Table 4) in the same zone gave similar impressions. All respondents among who expressed absolutely or rather positive attitude towards tourists, and except for the 2 cancellations due to the corresponding 2 statements that were selected at once, 3 stated their opinion as "*It is natural for tourists to come to visit our city.*

It has no real/direct impact on me. We must show our hospitality." This situation can be seen as the beginning of the transition to the next stage in the Irridex and the TALC models for the local people. For intra and inter-group conflicts, 31 out of a total of 35 markings indicate that this is absolutely, or rather not existing. However, although locals had similar relatively high rates of positive viewpoints as tourism business people when commenting on tourist traffic (18 out of 58), different from them, they stated with also relatively high rates that they absolutely or rather not agree with the normal/positively perceived aspects of tourism (10 out of 58). The negative impacts of refugees on tourism were also found to be at similar rates with those of the business people as the majority of the residents who absolutely or rather agree (4 out of 5). Among the locals, where displeasure began to rise, the negative impacts of tourism on life were expressed more frequently than by the business people, as those who found it absolutely or rather positive, and those who found it absolutely or rather negative were balanced (both with 23 markings out of a total of 53), while others expressed their neutrality (7 out of 53).

DISCUSSION AND CONCLUSIONS

The management strategies for sustainable tourism in a heritage site, where archeological-natural and cultural characteristics play an important role in the continuation of tourism activities, must ensure a balance between development and conservation. As Butler (1991:201) states "coordination of policies, pro-active planning, acceptance of limitations on growth … and commitment to a long-term viewpoint, are prerequisites to the successful linking of tourism and sustainable development". Accordingly, sustainable tourism in a multi-characteristic heritage site depends, in the first place, on policy coordination and pro-active planning and on the acceptance of limits to growth, which requires the assessment of what are those limits in terms of ecological, cultural, social, management, and similar aspects.

This study empirically assessed TCC in the SMP area for MHRTPK in Amasya by means of a holistic perspective that involves the calculation of PCCs, RCCs, and ECCs; the last of which covers the management aspect and also involves the inspection of SCCs in its different core zones (VMZs). In this respect, the present study re-evaluated a pre-established natural area preservation methodology of Cifuentes's (IUCN) model in this multi-characteristic heritage site for the former set of carrying capacities. The results from this re-evaluation suggest that this model, with its well-structured stages, is suitable for use in heritage sites with multi-

characteristic zones of management, changing from visit-time limited isolated archeological-natural sites to urban sites of cultural importance that are always peopled.

In addition to this conceptual contribution, SCCs of the cultural zones having urban sites status in the study area were inspected by means of the two basic methods developed in the body of literature. Different from the SCC studies in general utilizing either Doxey's Irritation Index or Butler's TALC model, the findings from the usage of the two have been more robust, which means they supported each other. The theoretical models developed to measure the SCC of both the non-tourism and the tourism-dependent resident populations, have been validated empirically once more.

However, there are some limitations concerning these analyses. First, the low return rates for the SCC surveys have resulted in low sample size not enabling inferential quantitative analyses and generalizations of the results. Moreover, the third crucial party of the carrying capacity studies, that is visitors/tourists, was not assessed in the present study for whom the maintenance of an acceptable level of experience is critical for sustainable tourism. Moreover, the examinations of tourism statistics and the comparisons of calculated capacities with the existing tourist load utilized data that were only about registered facilities and accommodations, and not the unregistered tourist accommodation and day-tripper tourists who do not utilize accommodation.

Future research might address all these limitations of the present study, besides performing empirical works for single- or multi-characteristic heritage sites using other models such as Limits of Acceptable Change (Stankey et al., 1985), Visitor Impact Management (Kuss et al., 1990), and Sustainable Visitation Index (Northcote, 2020) (for a complete list, see Erdoğan, 2023). A further research context is related to the need of interdisciplinary works on tourism carrying capacity based on its interdisciplinary nature, contrary to independent former landscape architecture or tourism discipline works in general and the present study's contribution from the urban planning perspective.

The general assessments for TCC and visitor management of the SMP area for MHRTPK in Amasya, which is currently included in the temporary World Heritage List, will be more clearly understood by comparing the daily carrying capacity data of the area, and the total daily tourist visits to the area. For this, first, daily total visit data on a monthly basis had to be calculated within the scope of the study area. To this end,

the rate of the Central District relative to Amasya Province is calculated on a monthly basis for the years 2017 to 2021. Accordingly, the Central District received 76%, 77%, 74%, 71%, and 70% shares, respectively, in these years. Subsequently, the monthly district data obtained for the same period were divided into the number of days of each month, and in this way the numbers of daily visitors were found. These data were compared with the ECCs that need to be taken as a basis for the visitor management of the area, as shown in Figure 13.

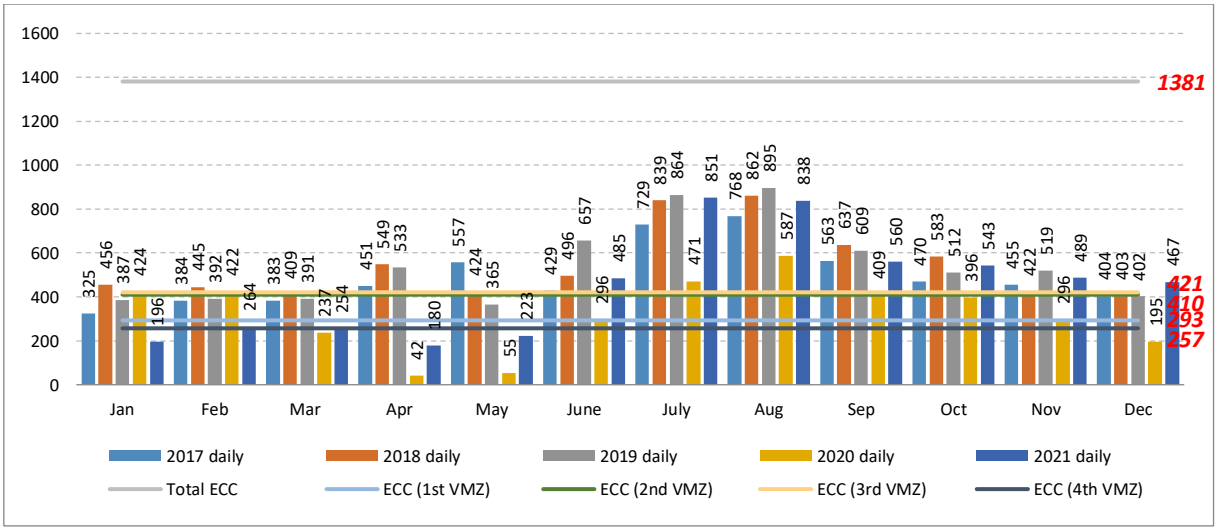


Figure 13. *Comparison of the real and effective carrying capacities calculated for the sum of the VMZs that show the maximum number of daily visits possible and the average number of daily (domestic + foreign) tourist accommodation in the ML and TOL facilities of Amasya Central District with occupancy rates of 27% and 34%, respectively, 2017-2021*

Source: *Originally submitted in report for Amasya Belediyesi (2022b), except 2022 first five months data and for data used, see Table 1 and the comments in the text.*

Although a visit below the total capacity in all months for around the last 5-year period is apparent, it is not valid for all of the VMZs when they are assessed separately (Figure 13). Therefore, considering that all tourists who come to the area to visit these zones at the same time, it is understood that not every VMZ can tolerate this load. In particular, ECCs were found to be well overpassed for the 1st and the 4th VMZs throughout the year and for the 2nd and the 3rd VMZs during the tourism season between 2017 and 2021 (Figure 13). Moreover, since those tourists who come especially to the 1st, 2nd, and 4th VMZs will also visit and stay in the 3rd VMZ, their load will be added, in a way, to the load of this zone itself. Thus, a management strategy is required for both to solve the problems that limit the ECC in the 3rd VMZ especially and to keep a level of visitation that complies with the found values for each VMZ. These visits do not include unregistered

accommodations outside of TOL or ML facilities and day-trippers. Therefore, total visits are likely to rise much higher than the ECC limits. For this reason, developing registration systems for those tourists and registering them for each VMZ appears as an important task.

The total occupancy rates of 34% in the TOL and 27% in the ML facilities for domestic and foreign tourists in total, calculated from the statistics for the same period and the domestic and foreign total average of accommodation period of about 1.4 days for both types of facilities in that period, also show that the capacities of the facilities have not been filled. This indicated that the total capacity of 809 in facilities that are located inside and in the near eastern vicinity of the SMP area (587 in the 3rd VMZ, 222 in the 4th VMZ and its threshold/buffer zone on the east besides the near eastern vicinity outside the study area) remained empty and were used for a very short time. These figures do not include the capacities of facilities found to be closed during the fieldwork (estimated to be around 30-40 in total). Therefore, when the closed facilities are opened, and the additional 250-300 bed capacities (to be supplied by the 5-stars hotel which would be built by conversion of the old City Hall on the immediate periphery of the SMP area) are added, this capacity which is not filled and cannot be used effectively hitherto is further increased.

As a result, as long as the existing facilities cannot be fully utilized to their capacities, there is no need for additional new facilities. Moreover, considering that the supply of short-term rental houses over the internet other than registered accommodation facilities, and that the demand of tourists for such rentals, which may be increasing in the future, new facilities will become even more questionable in this regard. Therefore, rather than the addition of new facilities to the area, it is rational to solve the management capacity problems by increasing the occupancy rates and average duration of stays, and to protect the resources.

Regarding the SCCs, to date the local people living in the 4th VMZ have not had these problems due to their fewer contacts with tourists. On the other hand, in the 3rd VMZ, which covered 99% of the tourists' visits, the surveys indicated a start of divergence between the opinions of tourism-dependent and non-tourism-dependent locals. While the former group were expressing their "level of excessive well-being/euphoria", which is the first stage of the Doxey's Irridex, the latter group of locals have already passed to the second stage, which is the "level of apathy" or indifference. This path implies moving towards the stage of the dangerous course of the

cycle ending with "stagnation" and continuing with either "renewed growth" or "immediate decline", according to the TALC model.

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