Mirjana Kovačić M.Sc.
Primorsko-goranska County
Department of Maritime Affairs,
Transportation and Communication
Adamićeva 10, 51000 Rijeka

Čedomir Dundović Ph.D.
Faculty of Maritime studies
Studentska 2, 51000 Rijeka

Desimir Bošković Ph.D.
Institute of Agriculture and tourism
C. Hugues 8, 52440 Poreč

Original scientific paper
UDK: 338.48:797.1
Received: 8th February 2007
Accepted: 9th May 2007

NAUTICAL TOURISM DEVELOPMENT THROUGH INTEGRATED PLANNING

In this paper, the authors present a systematic and comprehensive analysis of scenario methods in the integrated planning of nautical port and marina sites. The subject of research is nautical ports and marinas as facilities having the greatest importance for nautical tourism development and for boaters. The optimum scenario for their development is determined, and marina carrying capacity is identified taking into account the given limits of growth and development.

Carrying capacity is a factor central to putting in place the concept of sustainable tourism development. Although a number of researchers have addressed this issue in the past few years, they have failed to formulate a singular technique of what would be the simplest way of determining a destination's carrying capacity. Recent studies have pointed to new problems that arise in measuring carrying capacity, in particular, in relation to planning locations for and constructing new nautical ports and determining their capacities. Nautical tourism, nautical ports and marinas represent a complex field requiring comprehensive, interdisciplinary research that must involve sociologists, psychologists, technologists, technicians, spatial planners, biologists and ecologists, in addition to economists, as well as professionals of other profiles depending upon the case at hand.

Keywords: *integrated planning, development scenarios, sustainable development, carrying capacity assessment, nautical port, marina*

1. INTRODUCTION

In development plans, space serves a dual role as an irreplaceable factor of socio-economic development and as the object of development processes. Development systems evolve and are inter-coordinated in space. This implies that neither can space be considered separately from development processes, nor can development processes be realised without the participation of space. For coastal zone management to be efficient, the use of space must be planned and consistently monitored. Despite its natural and historical conditions and advantages, the Adriatic region is suffering the adverse effects of uncontrolled forces and other deviations in its development. This is the result of mounting pressures on its eco-systems, making it necessary to systematically plan tourism and, in particular, nautical tourism to ensure that quality of life is maintained; otherwise, development becomes meaningless.

2. LIMITS TO GROWTH AND DEVELOPMENT – DEVELOPMENT SCENARIOS

Viewed broadly, space is a fundamental precondition to the arrival and stay of boaters, and at the same time, it is a development factor of nautical destinations. Because the construction of nautical tourism infrastructures is, by its nature, a long-term process, the integrated planning of spatial development is a primary condition for the successful performance of a nautical destination. Spatial plans are the principal documents of nautical tourism development, as they direct and determine planning efforts in all economic branches and activities that take active participation in designing the nautical offering.

2.1. Spatial organisation of nautical ports

The main task of spatial planning is to strike a balance between accommodation facilities, transport, communication and other services, while seeking to protect the attraction resources on which nautical tourism development and marina development are based. Efficient spatial development management should help to boost the value and quality of the environment, enhance the rational usability of space for construction purposes, and development systems to protect biodiversity.

In devising spatial plans, it is essential to address issues regarding sustainable development, the protection of coastal and marine environments, and the development of the entire infrastructure (water supply, drainage and treatment of wastewaters, waste management, the use of alternative energy sources, etc.). The type of nautical port (in respect of its size) that will be capable of making

optimal use of available resources should be determined based on the specific natural and cultural features of a given area and locality, and in compliance with legal provisions[1]. These factors should condition construction that is feasible and acceptable in respect of the key spatial attributes of the nautical destination. The basic determinants of proper spatial use involve:

- The formulation of a spatial plan of nautical tourism development – The plan should take into account not only the physical aspects of port development in nautical destinations but also aspects relating to quality and logistics.
- The formulation of a Master Plan – This is a strategic document that also focuses on the targeted local development of nautical tourism in all tourism regions/destinations.

Master Plans need to be consistent with the strategic development of nautical tourism at the national level. Identifying and valorising existing nautical resources and specifying the nautical product and services that need improvement should be a component part of any Master Plan. Importantly, a Master Plan should also specify the nautical infrastructure, accommodation facilities, logistics, and distribution channels required, and identify the key pricing principles and principles for devising a marketing strategy. An action plan for implementing a Master Plan focuses on the sources of funding, local organisational structures, processes and the operatives needed. Key elements in the development of nautical destinations involve collaboration among regional tourism associations and sharing know-how between regions.

2.2. The scenario method in integrated planning for nautical tourism (marina) sites

In its general design, the scenario method belongs to the order of prospective methods used in various research fields and in preparing strategic decisions. In its essence, this method is a way of defining the future through temporal demarcation by demonstrating the development of occurrences in temporal and successive parts, while taking into account action and reaction to one or more actions coming from the environment and setting up counteraction aimed at achieving the best possible results in fulfilling the primary objective. Hermann Kahn is the creator of the scenario method. Kahn published his first reports on this method in a Hudson Institute study entitled “On Alternative World Future: Issues and Themes”, and in a shorter version on new approaches to international relationships later in 1968 (Filipić, Šimunić, 1993, p. 65). There are few cases today in which the scenario method is used in form origi-

[1] Act on Maritime Domain and Sea Ports, Official Gazette Zagreb, No. 158/03. Regulations on the Classification and Categorisation of Nautical Ports, Official Gazette Zagreb, No. 142/99 142/99, 47/00, 121/00 i 45/01.

nally presented by Kahn. Instead, it is adapted to the research subject and to the concrete conditions for its application. For example, H. Ayres, working on a world food-production scenario, suggested the combined used of the scenario method and an operative method known as "cost-benefit analysis". The output he obtained in this way demonstrated not only food production trends, but also cost tendencies relative to investments in food production.

The scenario method is a prospective way of writing "the history of the future". "Prospectivity" is the main attribute of the scenario method. Its second attribute is reflected in the fact that its methodical concept can be realised in different ways providing the basic scenario principles and structures are adhered to. The scenario structure comprises a set of specific scenarios that are differentiated or linked, in terms of design, with regard to:

- how an occurrence is viewed,
- the starting point from which it is viewed,
- the objective to be achieved using the scenario method.

2.2.1. Types of scenario and selection of the most suitable scenario method

Two scenarios exist in viewing the course of development an occurrence may take:

- the situation scenario – describes how an occurrence will look after a certain period, but does not describe the manner and conditions in which the situation will come about.
- the process scenario – in seeking a more appropriate scenario for development and natural resource management, focus should be placed on those attributes of a scenario method that allow for a multitude of alternatives in its construction and that do not preclude a specific systems configuration. This method must ensure that it is possible to conceive of amazing development courses and processes.

It can be concluded that managing development and natural resources in a highly complex task, integrating two functions. These are:

- the management function – designing development processes, decision making and implementation, and
- the planning function – a development process based on understanding the capacity of the environment within a unique system demonstrating a high level of causality.

Selecting the most appropriate scenario method comes down to making trade-offs within a complex structure of scenarios of interlaced attributes. The individual scenarios do not have a fixed position within the system. A good scenario is one that is good in combining both of the functions, the management function and the planning function. Scenario methods and techniques should not be final, that is, they must not possess the attributes of exclusivity and integrity. Normally they can produce an unlimited number of scenarios

(Chandler, Cockle, 1982). Contrary to the conventional practise of making decisions based on notions such as maximisation, optimisation, etc., flexible and open techniques that allow for the maximum participation of decision-makers are increasingly gaining recognition.

2.2.2. Importance of environment for the selection of scenario

The environment should be brought into consideration when identifying development scenarios. In identifying scenarios of the future, it is necessary to continuously valorise and evaluate socio-economic development from the viewpoint of its implementation in space. This requires looking into the capacity of the eco-system as a whole, as well as into each of its factors individually (air, spring water, the sea, rock, the earth, flora, fauna). Good knowledge of local-level issues is needed, as are efforts in seeking and finding support for their resolution. The structure elements are scrutinised, together with their environmental impact as a whole and as individual factors, and placed within the context of a multi-level scenario. Adapting this form of procedure serves to guarantee that overall development will be based on knowledge and consideration of the environment, and that environmental protection will not be viewed as an autonomous segment of action but as an integral part of activities across all dimensions and in every segment.

3. DEFINING CARRYING CAPACITY FOR A NAUTICAL DESTINATION

The application of sustainable development entails defining the carrying capacity of a nautical destination. Carrying capacity is dependent upon a number of elements. It is a managerial decision made at a destination level following comprehensive and interdisciplinary research. The carrying capacity of nautical tourism is determined on the basis of a selected scenario of nautical development, taking into account the given limits of growth and development.

Carrying capacity is a factor central to putting in place the concept of sustainable tourism development. Although a number of researchers have addressed this issue in the past few years, they have failed to come up with a singular technique of what would be the simplest way of determining a destination's carrying capacity. Recent studies have pointed to new problems that arise in measuring carrying capacity, in particular, in relation to planning locations for and constructing new nautical ports and determining their capacities. Nautical tourism and nautical ports represent a complex field requiring comprehensive, interdisciplinary research that must involve sociologists, psychologists, technologists, technicians, spatial planners, biologists and ecologists, in addition to

economists, as well as professionals of other profiles depending upon the case at hand.

3.1. Conceptual and contextual attributes of carrying capacity

In analysing tourism destination management issues, Cooper, Fletcher and other authors argue that the concepts of sustainable development and carrying capacity will become central to the interests of tourism destination managers (Cooper, Fletcher, *et al.*, 1993, p.78). The concept of sustainable development represents a long-term approach that provides a destination with the opportunity of being competitive on the marketplace and meeting the requirements of nautical demand. There are two key factors that must be increasingly taken into consideration in defining the destination of the future: the environment and life styles.

The carrying capacity of a nautical destination represents the destination's ability to absorb boaters and to justify the construction and development of nautical ports, without degrading its total natural, built and socio-cultural environment to any significant extent. This refers to the presence boaters and their vessels, a factor impacting on the environment and residents. Initially, carrying capacities were identified in processes pertaining to developing and managing under-developed regions. Later, managers of recreational areas began to apply the carrying capacity concept. Recreational carrying capacity can be defined as: "the amount of recreational use allowable in a given area, providing measures have been taken to ensure the quality of services and facilities, the environment and the recreational experience".

3.2. Carrying Capacity Assesment

Carrying capacity is also defined as a manner of using space over a prolonged period and developing an area to a specific level without inflicting irreparable damage to the natural environment and without reducing the quality of experiences gained by tourists. Since the middle of the 1980s, approaches to understanding carrying capacity have developed from trying to identify an optimum number of users to working out complex methods involving resource management and the physical parameters of resources, as well as an analysis of tourist expectations and preferences.

Mathieson and Wall define carrying capacity as "the maximum number of people who may use a given area without causing unacceptable damage to the physical environment and without causing unacceptable declines in the quality of the tourism experience" (Mathieson, Wall, 1993, p. 21). In the documents of the United Nations Environment Programme UNEP) and the World Tourism Organisation (WTO), carrying capacity is defined as the "maximum number of users visiting a tourist resort at any one time without causing unacceptable

impairment to the physical, economic and socio-cultural environment, and without causing an unacceptable decline in the quality of visitor satisfaction". Now, the estimation of a number of tourists an area can accommodate without causing environmental damages, or Tourism Carrying Capacity Assesment (TCCA) has recently become an important issue for sustainable tourism development (Trumbić, 2005.). This issue is also very important for nautical tourism.

3.3. Aspects of carrying capacity

Based on contextual analyses of carrying capacity stated in the literature, the aspects of a nautical port's carrying capacity can be identified in terms of context. These include the physical, psychological, environmental, social and economic aspects of carrying capacity.

The ***physical aspect*** of carrying capacity refers to the amount of space available for the construction of a nautical port. It is necessary to determine the size and capacity of the port's sea area and land area to be used for accommodating vessels and to plan and manage development accordingly. Spatial plans impact greatly on this aspect of carrying capacity. In terms of a nautical destination, this refers to the size of the sea and land space being used for nautical purposes in a given destination. Considering that the interests of boaters today differ considerably from the "sea and sun" offering, focus should be placed on the capacity and size of facilities that can supplement the offering of a nautical port. This, in particular, refers to marinas that are capable of satisfying the needs and wishes of boaters through the supplementary offering provided by such facilities and services. The successful organisation and positioning of a nautical port offering is one of the elements examined in assessing physical capacity and the appeal of services provided at a given site.

The ***psychological aspect*** of carrying capacity is exceeded when there is a considerable decline in a boater's experience caused by the saturation of a destination. This aspect of carrying capacity is difficult to identify, because it implies an individual and subjective approach. To define it, an analysis must be made of the attitudes of target demand markets, and results linked to existing and expected trends. Also, the opinion of the local population regarding nautical tourism development should be investigated, because sustainable development emphasises the importance of taking into consideration the attitudes of residents and to plan development that is based on their preferences, rather than on economic considerations.

The ***environmental aspect*** of carrying capacity is exceeded when environmental pollution and degradation has been reported or poses a threat. Such issues should be addressed through the need to maintain the integral eco-system in equilibrium.

The ***social aspect*** of carrying capacity is derived from the idea that the entire local community should participate in the process of planning and sustaining nautical development. The objective is to define a level of development acceptable to the local population. From the standpoint of boaters, this means defining an occupancy level for nautical ports that does not cause boater satisfaction to decline.

The ***economic aspect*** of carrying capacity implies the ability of developing nautical tourism and the activities that support it without exerting pressure on the other long-term economic activities profitable and acceptable to the local population. Vukonić and Keča define economic carrying capacity as "a measure used to determine an area's level of saturation with tourism-related construction, above which point the economic cost-efficiency of such construction is compromised, together with the performance of facilities comprising the tourism offering (Vukonić, Keča, 2001, p. 112).

3.4. Identifying carrying capacity levels

Problems arise in identifying the carrying capacity of a given nautical destination because carrying capacity depends upon numerous interdependent factors that are subject to change over time. Planning nautical tourism development in a specific area (or in an established nautical destination) involves selecting sites for the construction of nautical ports and determining their size in terms of the number of boaters they can absorb and the number of new facilities the ports can accommodate. As the carrying capacity of nautical ports is not specifically discussed in the literature, this paper seeks to present certain assumptions and conclusions that have emerged as the results of research regarding the carrying capacity of tourism destinations (hotels, beaches, etc.)

3.4.1. Criteria in identifying the carrying capacity of nautical sites

According to Klarić, the following criteria should be taken into consideration in identifying carrying capacity (Klarić, 1994, p. 17-32):

- physical and ecological criteria and criteria relating to the infrastructure;
- socio-demographic criteria;
- political and economic criteria.

Physical and ecological criteria comprise fixed and elastic elements. In the category of fixed elements, Klarić includes physical capacity, ecological capacity, the capacity of natural heritage, the length of the coastline, weather-related and other elements, expressed in numerical values. Elastic elements are related to the infrastructure, the capacity of which can be easily measured and further increased through investments. In doing so, however, it is necessary to

take into account economic and political criteria that could impact on heightening constraints to the size of carrying capacity.

Socio-demographic criteria relate to residents and boaters, and how they interact. Demographic elements are easier to measure (the available workforce and its characteristics), and socio-cultural elements, harder (cultural identity of residents, tourism experience, etc.). Also, political and economic factors tend to impact of socio-demographic parameters. In terms of mentality and rules of conduct, differences between the local population, on the one hand, and the workforce and tourists, on the other, are of great importance, as well as the attitude of the local community towards tourism development.

Political and economic criteria relate to adapting economic measures regarding tourism and selective forms of tourism (nautical tourism) and investment planned. In making assessments, planned investments – for example, in the infrastructure – must be taken into consideration, because they can lead to a substantial increase in carrying capacity. Political and economic parameters are used in correcting physical and environmental parameters, as well as socio-demographic parameters. However, they can also have a key role to play, because they are the basis on which a specific development scenario (and, in turn, a carrying capacity) is selected. To conclude, in identifying the carrying capacity of nautical ports the above criteria should be taken into consideration. There are no considerable differences among these criteria and they can serve as a basis for further analysis

The author also looks at the problem of quantifying sustainable tourism development scenarios with regard to planning the size and types of tourism capacities and tourism traffic, depending upon the conditions at a given site or tourist destination. The author underlines that it is "necessary to assess, as objectively as possible, the value of predominantly fixed elements of carrying capacity (physical capacity, environmental capacity, capacity of resources, demographic capacity) and the value range of elastic elements such as the infrastructure and the socio-cultural capacity of the local community. The key correction mechanism lies within the sphere of the economic and political complex, that is, in the willingness of the state to encourage or discourage certain tourism projects through legal regulations or through direct investment. By taking into account all these elements, a sustainable tourism development scenario can provide a number of alternative carrying capacities and tourism development concepts, or it can opt for only one variant. Whether this variant will resemble more closely the intensive development scenario or the moderate scenario of alternative tourism depends foremost on the situation with a given location."

3.4.2. Different methodology – Lindsay' s and other authors work

Once an optimal development scenario has been identified, it is necessary to define the carrying capacity, as its size is not identical in the different development scenarios. When defining carrying capacity in terms of quantity, errors may occur if a simplified method is applied that views carrying capacity as the ratio of the number of residents to the number of tourists – or the number of boaters, in the case of nautical ports – without taking into account other crucial elements. Lindsay articulates the view of the American Association of National Parks in which carrying capacity is expressed as a function of the following factors (Vukonić, Keča, 2001, p. 112):

$$\mathbf{CC = f\ (Q, T, N, Ut, DM, AB)}$$

where:

CC - carrying capacity
Q - quality of the park's resources
T - tolerance of its resources to use
N - number of visitors
Ut - type of use
DM - design and management of the visitors' facilities
AB - attitude and behaviour of visitors and managers.

Considering the issue of defining a destination's carrying capacity, Inskeep points out that a series of factors need to be analysed at a tourism destination level. Some factors are assessed in terms of quantity, others in terms of quality. These factors fall into two basic groups (Inskeep, 1994, p. 64-65):

1. the physical and socio-economic environment;
2. the tourism image and tourism product.

The first group relates to the ability of the environment (natural and built), the socio-cultural setting and the economy to absorb tourism development from which the local community should benefit the foremost and which should evolve in balance with the environment. Exceeding the saturation point would lead to the permanent impairment of the physical and/or socio-cultural environment. From this aspect, the criteria for determining the optimum capacity for a nautical destination involve:

Physical criteria

- the acceptable level of impact on visual identity

Environmental criteria

- the point at which the eco-system does not yet show signs of impairment
- the conservation of flora and fauna

- the acceptable levels of noise, air and water pollution
- Environmental Impact Assessment

Economic criteria
- the level of nautical tourism development that will provide optimal economic benefits
- the level of employment in nautical tourism that suits the local community,
- arrangements for receiving vessels in areas that are not yet operative.

Socio-cultural criteria
- the level of nautical tourism development that is acceptable and does not substantially impair the life style and activities of residents
- the level of nautical tourism development that is capable of sustaining value systems, customs and traditions, without any damaging influences.

Infrastructure criteria
- traffic links with the nautical destination
- the boater safety system
- water supply, power supply, telecommunication, disposal of solid and liquid substances.

The second group of criteria in identifying optimum capacities is connected to tourism image and the tourism product. These criteria are related to the number of boaters and level of development that are compatible with the identity of a nautical product and services and with boater expectations. If the capacity level is exceeded, the boating experience will decline causing the destination to lose its quality and appeal. Vukonić and Keča assert that in today's tourism industry, saturation is commonly considered a state in which a specific level of tourism development results in increased adverse effects. The carrying capacity concept has emerged from a need to accurately determine the various options of tourism development in a destination, and it represents a more complete expression of tourism saturation. From this viewpoint, the criteria for determining the optimum carrying capacity of a nautical port include:

Physical criteria
- no crowding of a nautical port's surroundings, aquatorium and attractions
- attractive landscapes, including the quality of built features of a nautical port

Environmental criteria
- a nautical port's cleanliness and pollution level
- preservation of the eco-system, flora and fauna, and the seabed

- environmental standards pertaining to equipment and to the surroundings.

Economic criteria
- value (financial), the cost of berths, facilities and services included in the offering

Socio-cultural criteria
- interest in the local community and indigenous culture
- quality of repair and maintenance services and other services, and the typical food and beverage offering
- archaeological sites, the seabed, historical and cultural monuments
- the openness of residents.

Infrastructure criteria
- the minimum technical and technological standards required of a nautical port

3.4.3. Systems approach to identifying the carrying capacity factors of nautical sites

Carrying capacity depends on numerous factors that vary from one site to another, because of each site's specific attributes. An analysis of previous research and data collected shows that the factors that have substantial impact on a nautical destination's carrying capacity can be classified into two basic categories:
- boater attributes
- the attributes of a nautical destination.

The category of ***boater attributes*** includes all the vital characteristics of boaters, in particular, their socio-economic characteristics (age, sex, income), their motivations, attitudes, expectations, the ethnic group they belong to, and their life style. Boaters differ in how they impact on a destination; the way they relate to the environment also differs based on their educational level and the cultural circle they belong to. This category also includes the level of use, that is, the number of boaters staying in a nautical port and its surroundings at any one time and their length of stay.

To determine the number of vessels and boaters that can be allowed to stay in a nautical port without exceeding its carrying capacity threshold, it is necessary to define the maximum daily number of boaters, which is connected to the number of vessels a nautical port can absorb. Although the total annual number of boaters and the number of vessels and vessel lengths represent significant data, primary importance is given to the maximum daily load of a nautical port's aquatorium. Upon defining a nautical port's carrying capacity, it is necessary to determine the maximum acceptable (or permissible) number of boaters and their vessels that can be present at any one time; with regard to vessel

size, this number is a variable. This is of special importance for marinas. The average length of stay in a nautical port is also important, as it relates a nautical port's carrying capacity to the maximum number of boaters that can stay at the port at any one time.

The attributes of a nautical destination and the local population describe:

- the features of the natural environment
- economic structure and development
- policy structure and institutional characteristics
- social culture
- the development of a nautical port.

The features of the natural environment are exceptionally important in assessing carrying capacity. They are considered to be fundamental factors in planning nautical tourism development. Spatial use has a crucial effect on carrying capacity, and it must be regulated in spatial plans. The regions and individual sites for constructing nautical ports should be determined through functional spatial management. This is important for the islands, the development of which should be coupled to the continuous control and monitoring of the marine and coastal environment.

Policy structure impacts on how a nautical offering is organised, as well as on the potential of a nautical port to absorb boaters. These features are linked to the ruling social system, the political openness of a country, and the safety and institutional organisation of a nautical port. Granting concessions may help to stimulate nautical port development and marina development, in particular, but it can also become a constraining factor.

Regional economic structure and development also impact on a nautical destination and its offering, as well as on the economic development of residents. This can also relate to the social structure of the population. A more developed society is more open towards different cultures and other people - boaters. In less developed societies or societies with particular cultural features, social conditions may play a vital part in determining the level of carrying capacity. More advanced economic development should entail better infrastructure facilities, a crucial factor that can have a positive influence on nautical port construction.

The term "social structure" refers to the general demographic features of the local population, local culture, social organisation, labour issues, employment for women, moral and religious beliefs, the level of hygiene standards, the health of the population, language, traditions, indigenous customs, and the attitude of residents towards boaters.

The achieved level of nautical development has a bearing on the psychological, physical, environmental, social and economic aspects of carrying capacity. From a psychological aspect, residents are likely to be more receptive towards boaters in the later, rather than in the initial phase of nautical tourism

development, because, with time, they will grow more open to boater arrivals. This effect is less manifested in advanced urban settings where residents are more willing to communicate with others. The development level of a nautical destination influences the physical aspect of carrying capacity with regard to the built receiving capacities and other services available to boaters. The physical aspect of space and natural resources does not affect carrying capacity regardless of the destination's level of development. As to the economic aspect of carrying capacity, the development of the economy (tourism included) will increase the potential to absorb boaters and enrich the nautical offering. This encourages infrastructure-related projects.

3.4.4. The importance of environment in determination of carrying capacity for nautical port

The environmental aspect of carrying capacity is one of the most important aspects and it is variable. If it is disrupted, it will decline. Because the concept of carrying capacity takes nautical resources into account, it is increasingly gaining recognition, especially now when the depletion of natural resources due to nautical tourism development is becoming visible at a destination level in Mediterranean countries.

The above attributes of boaters and nautical destinations represent a basis for further analysis in determining the carrying capacity of a specific cycle of destination development. Because the attitudes of residents change over time, carrying capacity is not a fixed dimension.

Nautical tourism exerts effects on society, culture, the environment and the economy, and it can easily reach its carrying capacity threshold in any of these areas. Boaters may impact adversely on the natural environment, but their negative influence on cultural identity and the indigenous and other segments of life within a nautical destination has not yet been observed. In this case, a nautical destination's carrying capacity will be seen as a constraining factor because of its impact on the environment.

The management of a nautical port can take action to increase the port's carrying capacity, primarily through efforts to reduce seasonality by improving its offering in terms of quality and quantity.

3.4.5. General site standards and nautical port standards

Analysts have defined broad carrying capacities and standards for the individual natural areas, which need to be corrected and adjusted to the specifics of each individual nautical port. However, there are certain universal standards used in expressing carrying capacity. These are:

- ***Volume*** – annual, weekly, daily, per hour, in peak periods, expressed by the number of vessels

- ***Density*** – the number of persons/hectare or persons/m^2 engaged in various activities in different types of locations (e.g. people/hectare of beach; tourists, boaters/m^2 of aquatorium; vessels/m^2 of aquatorium, the distance between nautical ports, etc.)
- ***Relative values*** – the number of boater-related units relative to the number of resident-related units (e.g. the number of boaters relative to the number of vessels)

This leads to the conclusion that the primary parameters for determining the carrying capacity of nautical ports with regard to size pertain to watercrafts, their type and size, and the frequency of arrivals. Once a site for a nautical port has been selected, it is necessary to establish the typical type of watercraft expected in the port. In Croatia, these are vessels of up to 7 metres in length and yachts of up to 50 metres. Based on this assumed territorial fleet, the marina design provides for a so-called installed fleet, which, while not necessarily coinciding with the demand fleet due to the specific features of each site, nevertheless seeks to parallel it. The term 'territorial fleet' refers to the potential users of a marina, that is, the group of vessels sailing in that territory. Generally, these are vessels of up to 5 metres and yachts from 5 to 50 metres in length (Dundović, Kesić, 2001, p. 232).

Carrying capacity being a complex dimension subject to change, the application of these standards is possible in some but not all cases. These standards are used nevertheless because they provide for a more simple presentation of various dimensions.

These standards serve as a supplement to the legal categorisation of nautical ports and to the prescribed minimum technical and technological conditions. Carrying capacity is not a number but rather a set of values that must be coordinated with the special objectives of a nautical port's management. In formulating development polices for nautical tourism at a nautical port level, carrying capacity must be taken into account.

4. DEVELOPMENT SCENARIOS

In designing a development policy for nautical tourism that focuses on sustainable development, numerous different elements need to be analysed. A number of various alternatives are formulated, and each alternative is assessed in terms of how it leads to attaining the goals of nautical tourism development and achieving optimum economic benefits, while minimising adverse impacts to the environment and socio-cultural setting. In principle, there are several phases to determining carrying capacity (PPA/CRA: Guideline for assessing the tourism carrying capacity of Mediterranien Coastal Region, p. 14-32):

1. gathering documentation and creating maps
2. analysing data
3. building nautical tourism development scenarios
4. formulating carrying capacity.

The first phase defines the territorial boundaries of a nautical port, presents the basic features of the port and its development; underlines its appeal and attraction factors; analyses the relationship of nautical tourism, the economy and residents; assesses the state of the documentation; and gathers additional data as required. The analysis phase focuses on determining the design of the nautical port; defining its relation to the broader environment; presenting the prescribed constraints; assessing nautical resources, supply and demand; and proposing alternative solutions. In the third phase, alternative scenarios are constructed and analysed, and the best scenario is selected. To formulate carrying capacity in the fourth stage, a development model is designed, carrying capacity is calculated, and instructions are provided for its application. In the end, implementation takes place, which is followed up with continuous monitoring.

Carrying capacity is an instrument in planning nautical tourism development. The complexity of determining carrying capacity is compounded by the need to take into account all its aspects: physical (spatial), psychological, environmental, sociological and economic. After all aspects have been analysed, carrying capacity is defined according to the lowest assessed value (regardless of which aspect this value relates to). Despite the fact that carrying capacity should ultimately be expressed in numerical form, certain problems may emerge during its implementation.

The element that determines the lowest value of carrying capacity is the element that defines the total carrying capacity of a location. Providing this element is subject to change over a prolonged time period (e.g. the openness of residents towards boater arrivals), the carrying capacity threshold may be raised. However, should this be an element such as the existing spatial constraints that provide no possibility of expanding a nautical port's aquatorium and ability to absorb more vessels, then this element is the factor that determines the lowest value of carrying capacity.

Carrying capacity, however, is not an unchanging, absolute value; its value varies depending upon the objectives set for a specific area and upon the development cycle of the relevant nautical port. Carrying capacity must be consistent with the development scenarios of a given nautical port. Therefore, although certain aspects that determine carrying capacity may impose strong constraints, some shifts are possible depending upon the objectives of nautical tourism development in a destination. Development scenarios can be considered through four basic forms:

- completely free development with no constraints;

- intensive nautical development but with some elements of control;
- the development of alternative or nautical tourism;
- sustainable development of a nautical port.

To ensure the optimum use of natural resources by nautical ports, an assessment of a site's carrying capacity should be introduced to the process of planning and managing nautical tourism development. Using the methodology of determining carrying capacity, changes to the natural and social environment caused by the use of a given area in nautical purposes are analysed. By identifying carrying capacity based on preset parameters and corresponding standards tied to individual parameters, a basis is created for constructing scenarios of possible development. Finally, the best development scenario is selected.

4.1. No-constraints scenario of nautical port development

The scenario of free development with no constraints is considered acceptable, and, in practice, it means exceeding the limits of carrying capacity in all its aspects. This type of scenario may yield short-term but high profits for a nautical port, but it will have disastrous consequences for the environment. Development of this kind is a blind force, due to the absence of any planning in building a nautical port. Typically, residents tend to offer resistance to this development scenario, and often, even the State may find it unacceptable, except in situations where there is only one goal – economic gain. Such a scenario needs to be analysed in the case of endeavours to implement it in:

- an area of developed nautical tourism,
- an underdeveloped area, and in
- areas in which it has previously been applied, that is, in the remediation of built locations.

4.2. Intensive-development scenario

Intensive development implies large interventions in space undertaken to gain high profits. The state plays a central role in this kind of development and imposes various control mechanisms. This scenario takes carrying capacity partially into consideration, but it tends to portray carrying capacity values as being higher than they actually are. While on the one hand taking account of economic and political aspects, on the other hand it minimises the importance of socio-cultural carrying capacity, which in some cases may have values that are lower than the capacity of the marine and coastal environment. The opinion of residents is marginalised. Calling for a middle-ground approach to relationships between boaters and residents, this scenario is offered as an alternative in all plans, except when dealing with highly vulnerable and valuable areas where it is not acceptable under any conditions. Examples of this development

scenario include the region of Languedoc – Roussilon in France, Poreč in Croatia, etc

4.3. Development scenario of selective tourism forms – nautical tourism

The development scenario of selective tourism forms and, in particular, nautical tourism has evolved as a response to the concept of mass tourism. In its extremes, this concept began to develop as the opposite of anthropological and ecological criticisms directed at tourism as such, causing the regions for which it was originally intended to discard it. Typically, the concept attempted to assert itself in moderately and less developed countries, imposing limitations and neglecting the economic growth needed. In implementing the concept of selective tourism, nautical tourism is very important. The lowest possible carrying capacity values are presented, and while socio-cultural and environmental aspects are overstated, the economic and political aspect is understated. This type of scenario is taken into consideration in the case of highly vulnerable areas, areas rich in cultural and historical heritage, and areas in which the local population has a specific identity.

4.4. Sustainable development of nautical tourism and nautical ports

The sustainable development scenario is positioned between maximum and minimum carrying capacity, that is, between scenarios of intensive and moderate nautical tourism development. In terms of planned values and types of nautical capacities and in terms of nautical traffic, quantifying a sustainable nautical tourism scenario depends directly upon the conditions at a given site. The values of the relatively fixed components of carrying capacity (physical capacity, environmental capacity, resource capacity, demographic capacity) are established, as well as the range of values for the more elastic components (infrastructure, a local community's socio-cultural capacity). The economic and political complex, that is, the willingness of the state to encourage or discourage a project through legal regulations or direct investments is vital in selecting and implementing a development option. This scenario offers several alternative carrying capacity values and development concepts. The carrying capacity threshold at which a model of sustainable nautical tourism development will be set depends upon the specifics of a given area, and the demands and considerations of decision-makers at a local and national level. For example, limitations imposed on boater arrivals to prevent the intended carrying capacity from being exceeded will depend upon the nautical port's capacity, which determines the maximum number of vessels and boaters.

4.5. Optimum carrying capacity of a nautical port – a systems approach

The carrying capacity methodology was initially developed for the management of natural attractions. In this case, the boundaries of a given area can be set, allowing managers to control its use and take corrective action if required. In practice, however, different stakeholders will have different opinions regarding the acceptable level of use of a site in nautical purposes. Also, limitations exist to the size of a nautical port, and in particular, a marina; these limitations are dictated by the size and design of vessels (Koelbel, 1999). Notably, environmental damage to natural resources may occur even at a low level of use. Based on the above, the basic criteria for determining the carrying capacity of a nautical port can be defined as follows:

1. The carrying capacity of a site or area must be defined in accordance with management objectives. The area of an aquatorium and its characteristics should be established prior to determining its carrying capacity.
2. Various frameworks for planning carrying capacity should be used, taking into account minimum and other standards and monitoring the conditions within the location selected.
3. The opinions and preferences of users (as well as non-users) should be collected to help in formulating objectives and suggesting possible changes to existing development policies.
4. A wide variety of environmentally-friendly supporting facilities and services should be made available to boaters
5. The techniques used by nautical port managers need to be selected in accordance with a port's carrying capacity, its development objectives and the importance of the area.
6. Upon analysis, the management should decide upon the optimum level of use in nautical purposes of a given area.

Although difficulties exist in determining carrying capacity, they do not diminish the importance of this concept in planning the future development of a nautical destination. These difficulties involve:

- the concept's multi-dimensional character
- difficulties in identifying critical limiting resources as a basis for assessing carrying capacity of nautical tourism
- the number of vessels a given area can absorb, depending upon the type of vessel and technological factors
- the existence of a number of differing explanations for environmental devastation, one of them being the impact of nautical tourism.

4.6. Experiences and propositions

Getz argues that the underlying objective is to encourage continuous adjustments to the planning process through detailed impact assessments. What is crucial is determining causal mechanisms and interrelationships (Getz, Vol. 10, No. 2, 1983, p. 260).

The limitations of carrying capacity methodology have imposed the need of using additional standards to help in expressing the mechanisms of load assessment for an area or environment. In this context, in addition to defining carrying capacity, it is necessary to determine: "the limits of acceptable change, conduct environmental impact assessments, and involve management in the decision process".

In the Mediterranean, PAP/RAC (Regional Activity Centre Split) has performed a number of documents and studies. Most of them experiences were presented and analysed in the Guide to Good Practice in Tourism Carrying Capacity Assessment (PAP/RAC 2003). Experience shows that, although the concept of carrying capacity for tourism is an attractive one, practical approaches to actually defining it are met with a number of difficulties. Some consider that TCCA's major output should be a "precise number" followed by the strict rules that would regulate the number of tourists in a certain regulation. This may be possible, but only in almost extreme circumstances, such as in the case of highly sensitive protected areas where there are strict management rules in place (Trumbić, 2005.).

5. CONCLUSION

The application of sustainable development entails defining the carrying capacity of a nautical destination, a concept depending upon a number of aspects. Carrying capacity is a managerial decision taken at a destination level following comprehensive and interdisciplinary research. The carrying capacity of nautical tourism is determined on the basis of a selected scenario of nautical development, taking into account the given limits of growth and development.

The carrying capacity threshold at which a model of sustainable nautical tourism development will be set depends upon the specifics of a given area, and the demands and considerations of decision-makers at a local and national level. Limitations imposed on boater arrivals to prevent the intended carrying capacity from being exceeded will depend upon the nautical port's capacity, which determines the maximum number of vessels and boaters.

BIBLIOGRAPHY

[1] Act on maritime domain and sea ports, Official Gazette Zagreb, No. 158, 2003.
[2] Chandler J., P. Cockle P, Techniques of scenario planning, Oxford, McGraw Hill, 1982.
[3] Cooper, C., J. Fletcher, et al., Tourism: principles & practice, Harlow, Longman, 1993.
[4] Mathieson, A., G. Wall, Tourism: economics, physical and social impacts, Harlow, Longman, 1993.
[5] Getz., D., Capacity to absorb tourism: concepts and implication for strategic planning, Annals of Tourism Research, 10(1983), 2.
[6] Dundović, Č., B. Kesić, Tehnologija i organizacija luka, Rijeka, Pomorski fakultet u Rijeci, 2001.
[7] Filipić, P., I. Šimunić, O ekonomiji obalnih područja, planiranje i upravljanje, Split, Ekonomski fakultet Split, 1993.
[8] Inskeep, E.: National and regional tourism planning: methodologies and case studies, London, Routledge, 1994.
[9] Klarić, Z., Određivanje prihvatnog potencijala u Sredozemlju i njegov utjecaj na poimanje održivog razvitka turizma: prema održivom razvitku turizma u Hrvatskoj, Zagreb, Institut za turizam, 1994.
[10] Koelbel, W. H., Boat Design Reflected in Marine Design, United States, 1999., http://www.icomia.com/library/introduction.asp, 25.12.2006.
[11] PAP/RAC: Guide to Good Practice in Tourism Carrying Capacity Assessment Priority Actions Programme Regional Activity Centre Split, 2003.
[12] PPA/CRA: Smjernice za procjenu prihvatnog kapaciteta sredozemnih obalnih područja za turizama, Split, 1996.
[13] Regulations on the Classification and Categorisation of Nautical Ports, Official Gazette Zagreb, No. 142, 1999.
[14] Trumbić, I.: Tourism Carrying Capacity Assement in the Mediterranean Coastal tourist destinations, Proceedings of the 14th Biennial Coastal Zone Conference, New Orleans, Louisiana, July 17 to 21, 2005.
[15] Vukonić B., K. Keča, Turizam i razvoj: pojam, načela, postupci, Zagreb, Ekonomski fakultet u Zagrebu, 2001.

Sažetak

INTEGRALNO PLANIRANJE RAZVOJA NAUTIČKOG TURIZMA

Autori u ovome radu sustavno i pregledno iznose metode scenarija za integralno planiranje smještaja luka nautičkog turizma, odnosno marina. Predmet istraživanja su luke nautičkog turizma, odnosno marine koje su najznačajnije za razvoj nautičkog turizma i nautičare. Utvrđuje se optimalni scenarij njihova razvoja te se određuje prihvatni potencijal marina uz uvažavanje zadanih granica rasta i razvoja. Prihvatni je potencijal jedan od važnijih činitelja za primjenu koncepcije održivog razvoja. Iako se posljednjih nekoliko godina veći broj znanstvenika bavi ovom problematikom, ipak još nije pronađena jedinstvena tehnika kako na najjednostavniji način utvrditi prihvatni potencijal destinacije. Novija istraživanja upućuju i na nove probleme koji se javljaju pri određivanju potencijalne destinacije, a posebno se to odnosi na planiranje lokacije i izgradnju novih nautičkih luka te određivanje njihova kapaciteta. Nautički turizam i nautičke luke, odnosno marine su kompleksno područje koje zahtijeva opsežno interdisciplinarno istraživanje u koje moraju, uz ekonomiste biti uključeni tehnolozi prometa, tehničari, prostorni planeri, sociolozi, biolozi, ekolozi, a u zavisnosti od konkretnog slučaja i stručnjaci drugih profila.

Ključne riječi: *integralno planiranje, razvojni scenariji, održivi razvoj, optimalni prihvatni kapacitet luka nautičkog turizma, marine*

Mirjana Kovačić, M.Sc.
Primorsko-goranska županija
Upravni odjel za pomorstvo, promet i veze
Adamićeva 10
51000 Rijeka
Croatia

Čedomir Dundović, Ph.D.
Pomorski fakultet u Rijeci
Studentska 2
51000 Rijeka
Croatia

Desimir Bošković, Ph.D.
Institut za poljoprivredu i turizam
C.Hugues 8
52440 Poreč
Croatia