



Coastal protected areas and historical sites in North Bulgaria – Challenges, mismanagement and future perspectives



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ABSTRACT

Coastal protected areas and historical heritage sites in Bulgaria are established by national policy instruments/laws and EU Directives to protect a wide range of natural and cultural resources. This paper demonstrated the development of a detailed inventory based on GIS tools which is able to document a variety of protected areas and heritage sites along the North Bulgarian Black Sea coast with a landward extended zone 2100 m in width. The strip zone area is 182.6 km² and *circa* 67% has different protection status both for natural and historical heritage. Analysis concerned compliance of national and IUCN categorisation of coastal protected areas in North Bulgaria and the degree of spatial overlapping and complementarities between nationally designated sites and Natura 2000 areas. The greatest natural and human related challenges were considered for both protected areas and historical sites, *i.e.* impact of tourism, management conservation issues and perspectives for future development (ecotourism). Results help in providing the key issues of conservation value and proper visitation management, to managers of coastal protected areas, tourism operators, developers and visitors on, leading towards a goal of environmental, social and economic sustainability.

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1. Introduction

1.1. Protected areas: general aspects

Most countries in the world have already established terrestrial or marine protected areas, which often present added significant cultural and historical values under some form of legal protection. The number of protected areas has continued an upward trend since the 1960s, when they represented only *c.* 1.5% of the earth's surface, currently >12% is under some type of legal protection (Lausche, 2011).

In Europe, protected areas have been established under the Natura 2000 and Emerald networks with the aim of coherently protecting species and natural habitats across national borders. These networks complement nationally designated protected areas

to make up a combined protected area of 1,092,529 km², or 25% of Europe's land and inland waters. Marine protected areas, which include additional international designations, cover more than 340,000 km² or 6% of Europe's regional seas (EEA, 2012). The Natura 2000 network is further described in Subsection 1.2 and Table 1.

Protected areas are defined by the International Union for Conservation of Nature (IUCN) date as, “*clearly defined geographical spaces, recognised, dedicated and managed, through legal or other effective means, to achieve long-term conservation of nature with associated ecosystem services and cultural values*” (Leung et al., 2015, page 24). Furthermore, the foundations for Earth life and natural habitats and landscape diversity are provided by geodiversity. “*Geodiversity is the variety of rocks, minerals, fossils, landforms, sediments and soils, together with the natural processes which form and alter them*”. Thus, many protected areas contain also important geodiversity and some protected areas are designated primarily for their geodiversity values. Geodiversity is included under the term “*nature conservation*” in the IUCN's definition of a protected area (Dudley,

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Table 1
National, EU and international legislation.

National legislation		
Biological diversity Act	Promulgated in State Gazette 77/2002, last amended by State Gazette no. 62/14.08.2015	Aims to: conservation of natural habitat types representative of Bulgaria and Europe and habitats of endangered, rare and endemic plant and animal species within a national Ecological network; conservation of the protected plant and animal species of the flora and fauna of Bulgaria
Protected Areas Act	Promulgated in State Gazette 133/1998, last amended by State Gazette No. 61/11.08.2015	Aims to conserve and preserve protected areas as a national and universal human wealth and asset a special form of conservation of Bulgarian nature, conducive to the advancement of culture, science and public welfare. The next categories of protection, concerning forests, lands and waters, are defined under this Act: 1. strict nature reserve; 2. national park; 3. natural monument; 4. managed nature reserve; 5. natural park; 6. protected site;
Environment Protection Act	Promulgated in State Gazette 91/2002, last amended by State Gazette No. 62/14.08.2015	Aims to: regulate the social relations with regard to protection of the environment for the present and future generations and protection of human health. This includes regulation of the regimes of conservation and use of environment; control over the status and use of environment and of the sources of potential pollution and damage; environment management and of environmental factors; environmental impact assessment (EIA); designation and management of areas placed under a special regime of protection etc.
Cultural Heritage Act	Promulgated in State Gazette 19/2009, last amended by State Gazette No. 98/28.11.2014	Aims to: regulate the preservation and protection of the cultural heritage of Bulgaria. Cultural heritage encompasses intangible and tangible immovable and movable heritage as an aggregate of cultural values which bear historical memory and national identity and have their own academic or cultural value.
Black Sea Coastal Development Act	Promulgated in State Gazette 48/2007, last amended by State Gazette 61/11.08.2015	Aims to: creation of conditions for protection, sustained integrated progress and development of the Black Sea coast; ensuring free public access to seashore; protection, preservation and rational use of natural resources; prevention and reduction of pollution; protection of the seashore from erosion and landslides; and protection of natural landscape as well as of cultural and historical heritage. Two protected zones “A” and “B” are legally regulated in coastal areas.
Tourism Act	Promulgated in State Gazette 30/2013, last amended by State Gazette No. 14/20.02.2015	Aims to: regulate the social relations associated with the implementation of governance and control in tourism, the interaction of the State and municipalities in the implementation of activities related to tourism.
EU and international legislation		
Natura 2000 EU Network (Commission Working Document on Natura, 2000, 2002)	Consists of: - Special Areas of Conservation (SAC under 1992 Habitats Directive and having the basic sites of community importance (SCI); - Special Protection Areas (SPA) under 1972 Birds Directive	Aims to: building a network of sites across Europe on the basis of a common methodology, criteria and set of ecological features favours better ecological coherence than if the networks were only organised within each Member State (EEA, 2012).
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora	Aims to: promoting the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance.
Birds Directive	Directive 2009/147/EC on the conservation of wild birds (first adopted in 1979)	Aims to: provides a comprehensive framework for the protection, management and control of all wild birds naturally occurring in the EU.
Emerald Network	Consists of: Areas of Special Conservation Interest (ASCIs) set up by the Contracting Parties to the Bern Convention — the Convention on the Conservation of European Wildlife and Natural Habitats.	The Emerald Network, which applies a Natura 2000-like approach to other countries beyond the EU, is still in its initial phase (EEA, 2012).
Convention on Biological Diversity (CBD, 1992)	Entered into law on 29 December 1993	Aims to: - To conserve biological diversity; - To use biological diversity in a sustainable way; - To share the benefits of biological diversity fairly and equitably.
The Convention Concerning the Protection of the World Cultural and Natural Heritage	Signed in Paris on November 16, 1972 (entered into law in 1975)	Aims to: conserve a collection of the world's timeless treasures.
Ramsar Convention on wetlands	Signed in Ramsar, Iran, in 1971	Aims to: provide a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

2008, page 66).

Therefore, protected areas are fundamental in safeguarding species and habitats, ecological systems, geodiversity and landscapes, and improving the stewardship of natural resources in defined sites and areas (Crofts and Phillips, 2013). Coastal protected and heritage areas help preserve and therefore avoid further

degradation of important natural resources, habitats and ecosystems, e.g. sand dunes, beaches, wetlands, rare plants and birds, etc. together with preservation of sites with cultural and historical significance alongside geodiversity and biodiversity conservation and their sustainable usage. Such areas with protected status also provide numerous benefits for local economies and environments

including: conservation of biodiversity and ecosystems; protection against natural hazards, raising opportunities for nature-based recreation and tourism (ecotourism) and cultural/historical tourism. Well protected coastal sites also provide opportunities for research, education, training, conservation of heritage and culture (Kenchington et al., 2003; Dudley, 2008; EEA, 2012; Crofts and Phillips, 2013; Fonseca et al., 2014).

Protected areas are one of the most attractive coastal tourist destinations (Pedersen, 2002; Leung et al., 2015). The potential of such areas with conservational status must be carefully managed, ensuring maintenance of the natural/historical heritage, and environmental quality together with crucial elements of their attractiveness as tourist destinations (Fonseca et al., 2014). Therefore, whilst tourism and visits to these areas brings a multitude of benefits to local communities and economies, many negative impacts of environmentally concerned tourists could potentially have a devastating impact on the natural environment (Leung et al., 2015; Das and Chatterjee, 2015).

Protected area monitoring is essential to observe current conditions, document changes over time, and to evaluate the significance and success of mitigation. Comprehensive inventories of protected areas help assess their status within an environmental and management context. In the USA, the National Oceanic and Atmospheric Administration's (NOAA) and the National Marine Protected Areas (MPA) Centre, since 2001 has maintained a comprehensive inventory of the nation's MPAs. Developed through collaborations with MPA agencies and programs, the inventory reflects the best available information on U.S.A MPA boundaries, purposes and management approaches. Recently the inventory has been augmented by data from more than 1700 MPAs concerning the presence/absence of key ecological, physical and cultural resources, along with geo-spatial boundaries provided by the managing agencies (Brock, 2015). Natural and cultural heritage MPAs account for 1303 of the nation's 1700 MPAs, covering about 8% of all U.S. waters and about 18% of these MPAs are no-take, *i.e.* areas where no extractive activity (actions that removes, or extracts, any resource) is allowed. Such activities include fishing, hunting, logging, mining, and drilling; also shell collecting and archaeological diggings. Of these MPAs, 88% are primarily focused on natural heritage protection, with 12% focused primarily on the protection of cultural heritage; many MPAs have more than one conservation focus (NOAA, 2014).

In Europe, the inventory of nationally designated areas holds information about protected sites and about the national legislative instruments, which directly or indirectly create protected areas. The *Common Database on Designated Areas (CDDA)* is more commonly known as 'nationally designated areas'. It is the official source of protected area information from 39 European countries to the World Database of Protected Areas (WDPA) which includes a list of the types of protection applied in each country (EEA, 2012). The CDDA will be treated and described in details in Section 3.

While progress has been made in designating protected areas in Europe, there has been little in the way of comprehensive assessment of protected areas and there have been very few studies examining the actual effectiveness of protected areas in maintaining and restoring biodiversity (EEA, 2012). For example, no assessment of the adequacy of the UK protected area network as a whole has been undertaken. Croatia is setting up its regional protected area administrative structures, but there are still gaps in the spatial delineation of protected areas (Underwood et al., 2014). Similarly, although in Bulgaria, national and Natura 2000 designation of protected areas (some of them are also historical sites) are almost complete, yet no assessment of efficiency of protection status along the coast has been performed. In recent years very few studies have contributed information on the significance of

protected areas and historical heritage sites at the Bulgarian coast for ecotourism development (Bezlova and Doncheva-Boneva, 2011) and establishment of a marine protected Romanian-Bulgarian transboundary reserve along the North Bulgarian shelf (Trayanov et al., 2007). No detailed GIS analysis and assessments have been presented in these studies.

The research aims of the present paper are:

1. Based on comprehensive GIS surveys, this paper attempts to evaluate the protection status of protected areas, natural reserves, monuments, parks and onshore historical heritage sites along the North Bulgarian coast at Dobrich district NUTS III (Nomenclature of Territorial Units for Statistics) level. For each EU member country, a hierarchy of three NUTS levels is established by Eurostat; subdivisions in some levels do not necessarily correspond to administrative divisions within the country (Eurostat, 2011).
2. In order to identify and explore the overlap of protection features of sensitive sites, examination is carried out to investigate the compliance of national and IUCN categorisation of protected areas in the study region and the degree of spatial overlapping and complementarities between nationally designated sites (CDDA) and Natura 2000 areas.
3. The study aims to highlight current challenges related to natural processes, human activities and tourism impact, efficiency of national legislation and management regulations, and the significance of natural and historical heritage for the development of nature-based ecotourism.

In *Subsection 1.2*, a short review is presented on current national, EU and international legislation that support Bulgarian protected areas and historical heritage sites. The following Sections 2 and 3 describe the study area, methodology and procedure used. Section 4 discusses the main results found related to protected areas identification, compliance of CDDA and Natura 2000 areas, degree of spatial overlapping and main challenges, mismanagement and future perspectives. Finally, the main findings of this work are summarised in the conclusions.

1.2. National, EU and international legislative instruments

Coastal protected areas and historical heritage sites in Bulgaria are established by national policy instruments/laws and European Union (EU) Directives to protect a wide range of natural and cultural resources, most of which are given in *Table 1*.

Natura 2000 is nearing completion, as sites in the network account for 18% of the EU's land territory, providing invaluable protection for vulnerable wildlife and habitats. Bulgaria together with Slovenia accounts for the largest proportion of the national land territory covered by Natura 2000 sites, with respectively 35.5% and 34%, followed by Slovakia with 29% and Cyprus with 28%, (EEA, 2012). The progress of Bulgaria in implementing the Natura 2000 network and the country's designation of protected areas is almost completed. In 2007 Bulgaria reported to the European Commission the list of potential Natura 2000 sites, included 114 protected zones under the Birds Directive, covering 20.4% of the country territory and 228 protected areas under the Habitats Directive, covering 29.5% of the land territory. Since February 2015, 119 protected areas under the Birds Directive have been enforced, covering 22.7% of the territory and 234 protected areas under the Habitats Directive, covering 30% of country territory. As some of the Natura 2000 Birds and Habitats protected areas overlap, the terrestrial component in Bulgaria under protection represents 34.4%, *i.e.* over 1/3 of the country's land territory is covered by the Natura 2000 Network. However, practical application still poses major problems. Although

Bulgaria has come a long way with regards to implementation of EU nature conservation legislation, actual application is still facing difficulties, e.g. the compromised performance of Environmental Impact Assessments (EIAs) for plans and projects in the protected areas and, on the other hand, inadequate public awareness (Subsection 4.3.3) to environmental protection (Hristova, 2012).

2. Study area

The Bulgarian coast, located on the western part of the Black Sea, is 432 km long (Stanchev et al., 2013) and stretches from Cape Sivriburun in the north at the Romanian border, to the Rezovo River mouth in the south at the Republic of Turkey border (Fig. 1). There are 28 NUTS III level districts in Bulgaria, and three are classified as coastal (Varna, Dobrich and Burgas). The 97 km Dobrich district is the northern one, between cape Sivriburun on the north, and cape Ekrene on the south (Fig. 1).

The study area coast comprises a great variety of large sand beaches, vast sand dunes, spectacular high limestone cliffs, coastal fresh/brackish lakes, wetlands, etc. (Fig. 2a and b).

Cliffs comprise a total length of 60.2 km, whilst the sand beaches have a length of 37 km with 13.6 km armoured by hard protection structures and ports. Located here are some of the most attractive and visited tourist spots along the northern Bulgarian coast, such as, Yaylata and Kaliakra archaeological reserves, Balchik botanical garden etc. There are three meteorological stations along the Dobrich district coast: Shabla, Kaliakra and Balchik (Climate Reference Book, 1982). The coast is mainly exposed to winds from the NE, E and SE that generate the most intense waves. The highest average monthly and annual wind values are registered for Kaliakra (located on the cape jutting 2 km into the sea). The highest wind speed values are recorded in winter (8.5 m/s). For Kaliakra calm weather days occupy just 8.6%, comparing with Balchik, where the percentage of calm weather days is considerably more: 21%. The existing coastline orientation and wind direction determine the

wave regime. The significant wave height H_s (m) with one and ten return period is 6.29–8.70 for Cape Shabla and 7.13–10 for Cape Kaliakra (Grozdev, 2005).

The coast can be divided into four sections with regard to wave exposure (Fig. 1):

- Capes of Sivriburun and Shabla: waves approach from N, NE, E and SE directions;
- Capes Shabla and Kaliakra: waves approach from NE, E, SE and S directions;
- Cape Kaliakra and Balchik town: waves approach from SE, S and SW directions;
- Balchik town and Cape Ekrene: waves approach from E, SE and S directions.

At the northernmost part between Capes of Sivriburun and Shabla, the coast is linear with an eastern exposure comprised of loess sediments underlain by Upper Sarmatian limestones (Cheshitev et al., 1992). The average rate of coastal erosion of loess sediments is 0.30 m/y, but at Cape Krapets and Cape Shabla (Fig. 1), it reaches 1.2–1.6 m/y (Peychev and Stancheva, 2009). At this coastal section, cliff segments at the capes are alternated with several vast sand beaches and firth lakes with the same names: Durankulak, Ezerets and Shabla, which are protected sites, Natura 2000 areas, are important bird and Ramsar Wetland areas. Beaches are characterised by organic medium grain sized sands (0.25–0.50 mm) with high contents of CaCO_3 (up to 80–90%) due to the supply from destroyed shells from the large mussel fields found in the nearshore (Popov and Mishev, 1974; Peychev, 2004; Dachev et al., 2005). The nearshore (2 km seaward) underwater slope varies between 0.007 at Cape Sivriburun and 0.023 at Cape Shabla. Large dune systems are developed at the coast between Capes Sivriburun and Shabla, in particular near Durankulak beach, north from Cape Krapets along the sand beaches and at the coastal area of Shabla-Ezerets. At certain sites, dunes backing the beaches are smaller in



Fig. 1. Location map of study area.

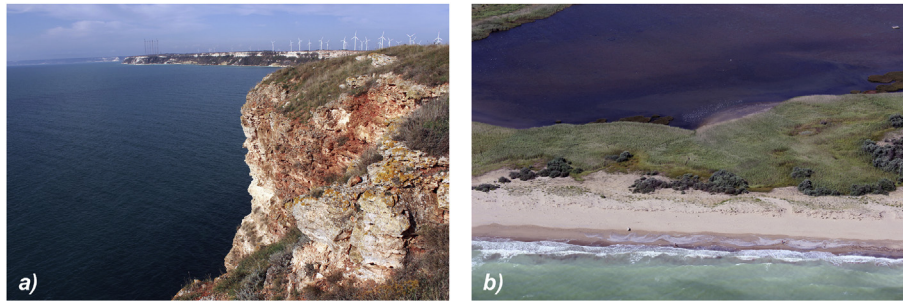


Fig. 2. a) Steep up to 60 m high cliffs of Cape Kaliakra built by cream-coloured detrital, biogenic and oolitic limestone; b) Sand beach and dunes with rare wetlands behind and fresh/brackish water lagoons (Photo source: IO-BAS and PSDS-UWC).

height (about 2 m), mobile and sparsely covered with a specific dune vegetation. North from Cape Krapets, large dune fields occur consisting of foredunes and a wide complex of fixed stable dunes spreading landward to a distance of 400 m. These stabilised dunes are densely vegetated with specific vegetation, as well as forests at some sites. They reach a maximum height up to 10–15 m. Along the coastal area of Shabla-Ezerets the largest dune complex is located north from Cape Kaliakra spreading over a length of 5000 m, covering a total area of almost 1 km² (Popov and Mishev, 1974; Stancheva, 2010).

Dense shells banks and oolitic Middle Sarmatian limestones outcrop at the coast between Shabla and Kaliakra Capes (Cheshitev et al., 1992) (Fig. 1), and the coastline has an ESE exposure with low crenulation. The coast exhibits an erosion-landslide complex mostly consisting of cliffs, whose height increases in a southerly direction from 5 to 7 m at Cape Shabla to 60 m at Cape Kaliakra. Cliff retreat is low as the coast is composed of strong thick limestones and erosion occurs mostly as cliff caves (Peychev, 2004). The underwater coastal slope varies between 0.023 at Cape Shabla to 0.017 at Cape Kaliakra.

Between Cape Kaliakra and Cape Ekrene the coast is built of dense shell banks and oolitic Middle Sarmatian limestones, Sarmatian limestones, clays, clayey sands and marls (Cheshitev et al., 1992) (Fig. 1). The coastline has an E, SE, S and SW exposure and the average rate of erosion is in the range of 0.11–0.22 m/y (Peychev and Stancheva, 2009). The underwater coastal slope in a 2 km zone seaward varies between 0.0065 and 0.0075. Here is located the large sand beach named Albena-Kranevo composed of medium grain sized sands (0.30 mm), (Dachev et al., 2005). It is one of the major coastal resort areas along the north Bulgarian coast because of the established Albena Resort. At cape Ekrene, is located one of the largest landslides (it occurred in 2012) along the Bulgarian coast.

The study area between Capes of Sivriburun and Ekrene is also subject to active seismicity, as a few strong historical and modern earthquakes with a magnitude of 7 plus occurred during the last two Millenniums. The most recent one occurred in 1902 with its epicenter in the shelf zone near Shabla (Matova, 2000).

The coastal section studied in this paper includes also one of the most important wetlands, a migration corridor for many protected birds in Bulgaria, that host one of the rarest ecosystem types with a national and international conservational value. Added to ecosystem values, the region is also an archeologically important area, where numerous underwater and coastal archaeological sites from different periods have been discovered – Prehistory, Antiquity (ancient Greek, Hellenistic, Roman), Mediaeval (Early Byzantium, Bulgarian), (Peev et al., 2014).

As the study area is still a low urbanised area compared to other over-developed coastal regions in Bulgaria (Stanchev et al., 2015),

such conditions provide a good ground for development of nature-based eco - and historical tourism.

3. Materials and methods

A precise area calculation is needed in order to assess to what extent the study area territory is covered by designated Natura 2000 sites. Geographic Information Systems (GIS) is a compulsory and useful tool to properly determine the extension and coverage of the Natura 2000 surface and to perform spatial analysis (Natura, 2000 database and GIS). The EEA report on protected areas in Europe (2012) is the first publication giving a comprehensive GIS based survey of protected areas in Europe and spatial overlapping between nationally designated areas in the EU Member States and implementation of Natura 2000. The authors assumed a similar general methodology and approach for mapping and analysing protected areas in the Dobrich district. The conceptual flowchart, represented on Fig. 3, summarises all components in the methodology used and highlights the different stages of the study process: from data collection, to GIS tools application, analysis and results interpretation.

The methodology and process of the study consist of the following components:

- **Acquiring GIS data layers for Natura 2000 and CDDA from different sources** (Fig. 3).
 - a) Data for Natura 2000 Network in Bulgaria available from the Ministry of Environment and Water of Bulgaria, on the location of the Natura 2000 network (Ministry of Environment and Water, 2013).
 - b) Data from CDDA for Bulgaria (EEA, 2015). As part of their contribution to the activities of the European Environment Agency within the EIONET network (European Environment Information and Observation Network), 39 European countries provide regular information on their nationally designated areas. This information is part of CDDA. This includes a list of the types of protected area designations applied in each country, clustered into three main categories (EEA, 2012):
 - i) statutory designations on biodiversity conservation;
 - ii) specific statutory designations, for instance forest protection against fire or coastal protection against urbanisation. Despite these designations may not aim at biodiversity conservation, they often have a positive effect on biodiversity;
 - iii) voluntary designation through private ownership, for instance by NGOs.

The CDDA database mostly contains information on statutory designations and does not contain information on voluntary

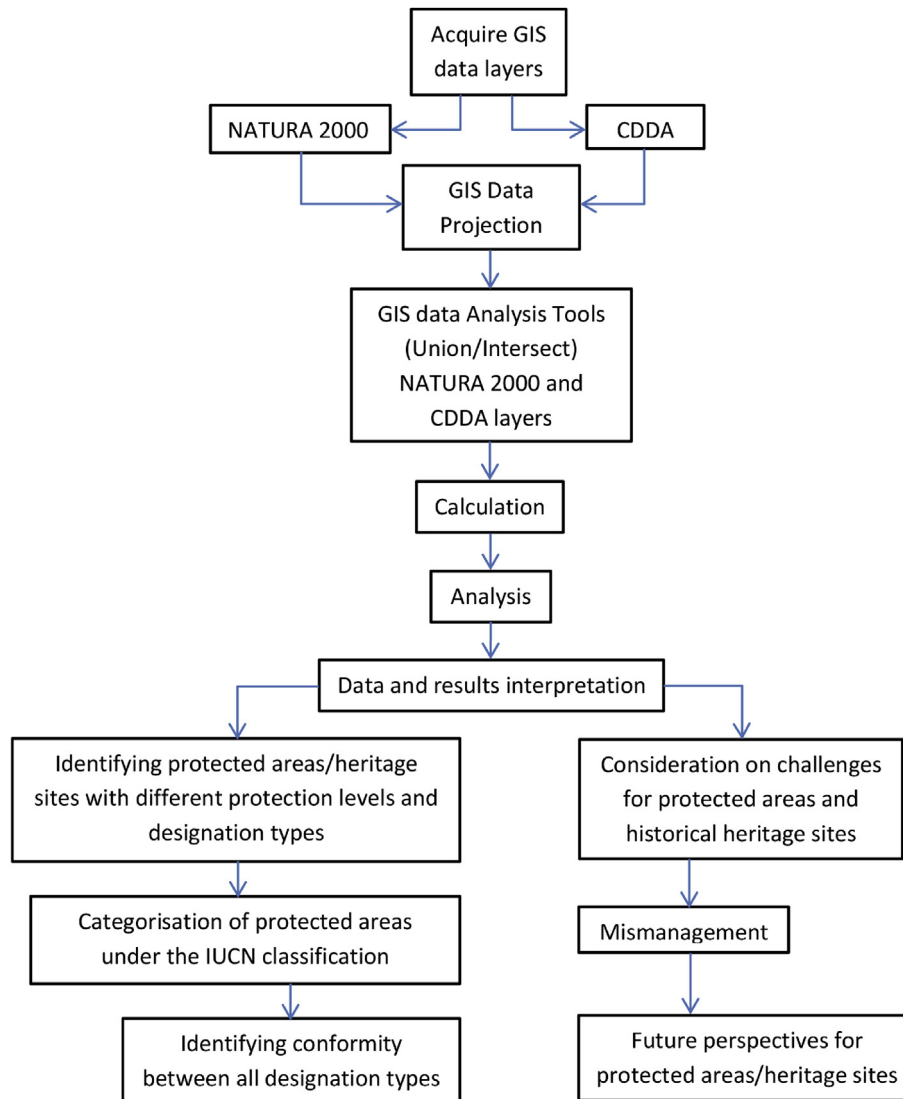


Fig. 3. Conceptual flowchart for methodology and process of the study.

designations, such as, those areas protected by conservation trusts. This is mainly due to the difficulty of aggregating this type of information from national to European level. The CDDA database also does not include many sites that have local designations.

- c) Data for tourist flow were based on official statistics of the National Statistical Institute (NSI) of Bulgaria, and contains the information for means of accommodation, number of tourist beds, number of overnight stays and number of accommodated people for the period 1999–2011.
- d) Data for the number of tourist visitors in the study area were provided by the Historical Museum in Kavarna town.

- **Spatial data projection** (Fig. 3):

As the spatial data for Natura 2000 Network and CDDA were in different coordination systems, it was necessary to re-project both data in WGS84, Transversal Mercator projection, zone 35 N.

- **Applying GIS Analysis Tools** (Fig. 3):

To make a distinction between terrestrial and marine surfaces of protected areas, a GIS overlay operation was executed with the

coastline extracted from orthophoto images in 2011. Using the ArcGIS tool *Buffer Wizard*, a 2100 m terrestrial strip zone along the Dobrich district coastline was mapped. This strip zone was chosen in accordance with protected zones as defined by the Black Sea Coastal Development Act (promulgated State Gazette 48/2007). Two protected zones are legally regulated:

Zone “A” covers part of the Black Sea waters (200 m seaward from the coastline), the coastline and part of the territory falling in a 100 m width, measured horizontally from the borders of the seashore or the sea beaches. Many restrictions to human activities are imposed to this zone, such as, forbiddance of solid fence construction, building fences restricting free walking access to the beaches and dunes, discharging waste waters, construction and exploitation of depots and other facilities and installations for use and treatment of waste, development of industries etc. In this zone construction is limited to 10% with at least 80% of land remaining a green area.

Zone “B” covers the territories, falling in the line with a 2 km width from the borders of “A” zone, with the exception of the urban territories of the populated places, determined on the enforcement date of the act. There are also restrictions for land use and human activities, in order to protect the environment and the resource

wealth of coastal areas. In zone “B” the construction density is limited to 30% with a minimal green area of at least 50%.

To serve as a coastal baseline the extracted vector line from orthophoto images taken in 2011 was utilised. Once the 2100 m buffer coastal zone was mapped, the next step was to identify Natura 2000 and CDDA areas within the buffer. For this purpose, the tools *Union* and *Intersect* were applied. A new GIS data layer containing the overlapping areas was exported as a separated layer.

- **Calculation and analysis (Fig. 3):**

The areas protected under Natura 2000 and CDDA features were calculated. The final analysis included the overlap between Natura 2000 and CDDA zones under IUCN categories I to VI (terrestrial parts).

- **Data and results interpretation (Fig. 3):**

After calculation and spatial analysis within GIS, this paper first provides results on identified protected areas/historical heritage sites in the studied 2100 m strip zone along the coast of the different types of protection, including categorisation under the IUCN management approaches. The paper then provides an outline on the conformity between all designation types in order to evaluate the protection status in accordance with national legislation, EU directives and international initiatives (Subsections 4.1 and 4.2), with a focus on spatial overlap of the Natura 2000 and nationally designated sites under the IUCN management categories. As terrestrial protected areas and heritage sites are not isolated and subject to many pressures, to complement this evaluation, Subsection 4.3 provides consideration and discussion on the main environmental and human-induced challenges, insufficient management and planning, and perspectives for future sustainable development.

4. Results and discussion

4.1. Protected areas and heritage sites at NUTS III level

All identified Natura 2000 protected areas (terrestrial parts only) in the Dobrich district accounted for 1121.8 km² or 24.2%, as 10 are Special Protection Areas (SPAs) covering an area of 664.4 km² and 11 are Sites of Communities Importance (SCI) having an area of 838.6 km². Compared to Natura 2000 protected areas in the entire country which account for 38,225.5 km² or 34.4% of the whole territory of Bulgaria, Dobrich district has less protection. GIS analysis showed that there was an overlapping both of SPAs and SCI areas in an area of 381.3 km². There are 18 CDDA sites at NUTS III level covering a territory of 55.8 km². Also, 25 historical heritage sites were identified in the entire Dobrich district, among which occur two large archaeological reserves. Some of them overlap with Natura 2000 and CDDA (nationally designated) sites (Fig. 4). The total area under some form of protection in the Dobrich district is 1137.1 km² or 24.5% compared to the entire country that accounts for 39,107.9 km² or 35.2% with a legal protected status.

4.2. Protected areas and heritage sites along the coast

The total area of the 2100 m strip zone along the coast is 182.6 km² and *circa* 67% of it is under various form of protection. Ten separate areas have been identified which are protected by national legislation (CDDA) accounting for 32.37 km². There are 11 unique Natura 2000 protected areas summing 121.28 km² (6 SPAs and 5 SCI respectively covering 116.33 and 64.55 km²), 2 Nature and Archaeological reserves and 1 Nature Park. Some of these areas are

also significant onshore historical heritage sites and archaeological reserves (Fig. 5).

The diversity of different protected area designations is a result of different administrative frameworks in each country - or even regions within countries - and therefore many types of site designations exist, each having a specific aim, spatial boundaries and governance. As a consequence, certain sites of high biological value can be covered, partly or totally, by a number of different designation types applied at local, national, regional or international levels (EEA, 2012). While a designation type often provides information about the purpose of a protected area (e.g. protection of a group of species, or the sustainable management of resources), it does not provide information on the type of management applied in the individual site. Initially, each country developed its own approach to their management and no common standards or terminology existed. In an attempt to describe and categorise the different management approaches in individual sites, the IUCN identified six different protected area categories, based on management objectives (Dudley, 2008). These protected area management categories could serve as an important global standard for the planning, establishment and management of protected areas.

In the present paper a categorisation is made of all protected areas in the study region under the IUCN classification (Table 2).

Analysis showed that all CDDA terrestrial sites in the study area completely conform to the IUCN classification and to the IUCN management categories *i.e.* these protected areas are territories that should benefit from a certain level of governance and dedicated management planning.

The overlap of Natura 2000 terrestrial boundaries with the terrestrial boundaries of nationally designated (CDDA) sites under all IUCN protected areas categories shows that (Fig. 6):

- about 32.37 km² (17.75% of the 2100 m coastal terrestrial zone) is protected under 10 nationally designated (CDDA) protected sites;
- about 64.55 km² (35.36%) of the 2100 m strip zone is protected under 5 Natura 2000 SCI protected areas;
- about 116.33 km² (63.72%) of the 2100 m strip zone is protected under 6 Natura 2000 SPA protected areas;
- Natura 2000 SCI protected areas overlap with Natura 2000 SPA protected areas of about 61.28 km² (33.57%) of the 2100 m strip zone;
- about 121.28 km² (66.51%) of the 2100 m strip zone is protected under Natura 2000;
- Natura 2000 protected areas overlap with nationally designated (CDDA) areas on 29.5 km² (16.18%) of the 2100 m strip zone
- CDDA areas that not overlap with Natura 2000 into the 2100 m coastal terrestrial zone are 2.87 km² (1.57%).

Based on the values above it is remarkable to note that 67% of the 2100 m strip zone landward is subject to different protection types both for biodiversity and historical heritage. Along the 97 km strip zone a large proportion of the protected areas overlap and coincide at various levels for landscape protection or territorial development and biodiversity conservation, and this create a complex system of protected areas. Results indicate to what degree Natura 2000 and CDDA sites are overlapped in the study area – over 98%, - which is an important indicator that extension of the Natura 2000 Network almost fully reflects the existing nationally designated areas.

Following the EEA (2012) report on protected areas in Europe a further discussion can be conducted showing the share of spatial overlap between Natura 2000 and nationally designated sites under IUCN categories I to IV, and Natura 2000 and nationally designated areas under IUCN categories V to VI. Both Natura 2000

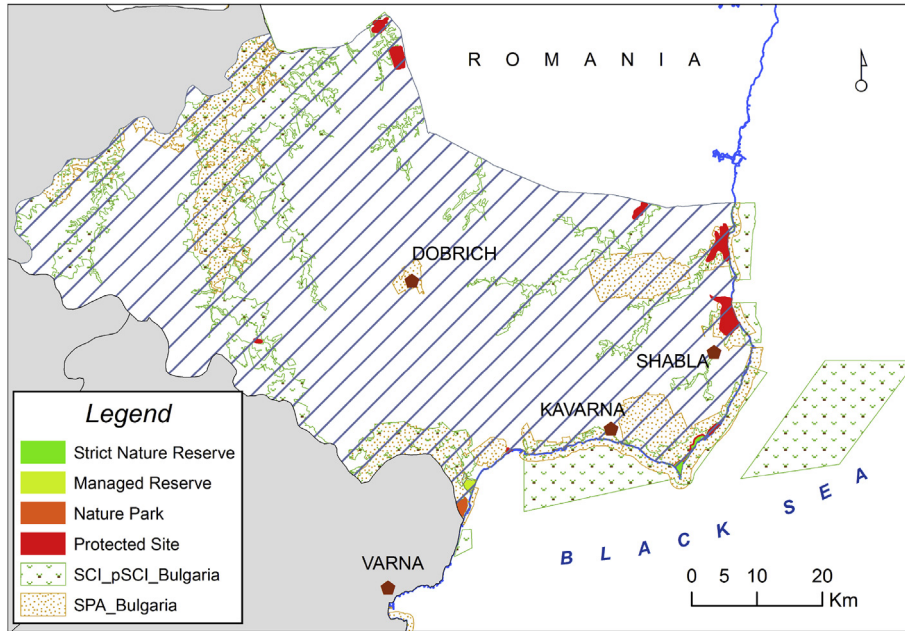


Fig. 4. Identified protected areas and heritage sites in Dobrich district.

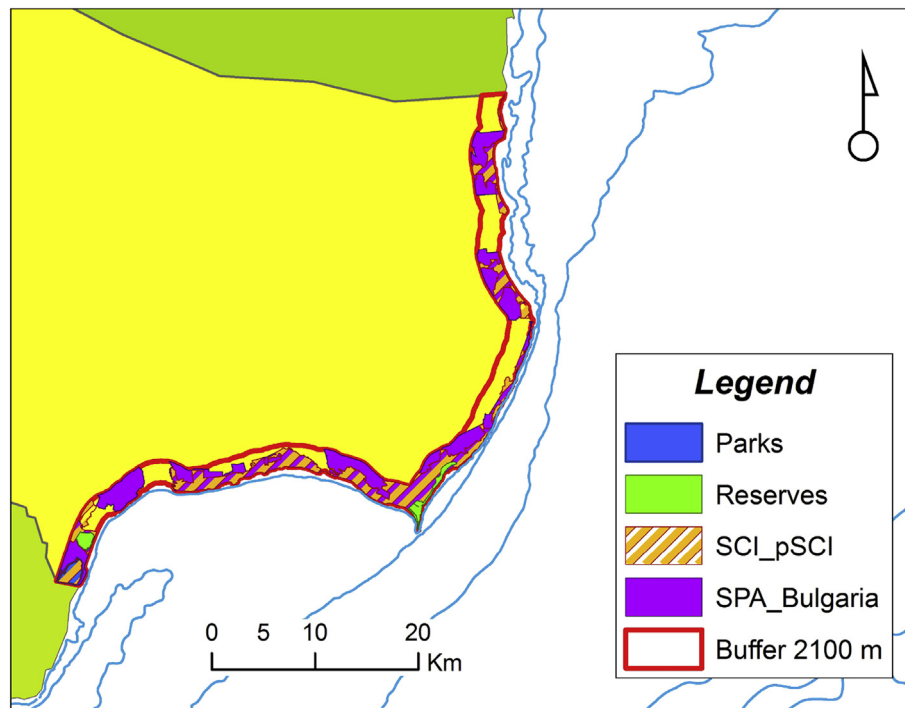


Fig. 5. Identified protected areas and heritage sites in the 2100 m investigated zone.

sites in the study area, under the Habitats and Birds Directives completely overlap with IUCN categories I to IV (categories focused on ecological processes and biodiversity conservation), which fully corresponds to the main goal of Natura 2000, *i.e.* to ensure a conservation of targeted species and habitats across Europe. Furthermore, the Natura 2000 Network, in particular under the Habitats Directive, also provides the opportunity for sustainable development approaches within protected sites (EEA, 2012), which corresponds closer to IUCN categories V to VI. More than 89% of the areas designated at national level that overlap with Natura 2000 are

managed as IUCN categories V and VI.

Both CDDA and Natura 2000 sites have been designated at national level. The process of implementation of the Natura 2000 network is coordinated and managed by the Ministry of Environment and Water, while CDDA is managed by different institutions.

4.3. Challenges, mismanagement and perspectives for future developments

Major challenges that protected areas and historical sites along

Table 2
Nationally designated protected areas/sites (CDDA) according to IUCN categories.

Number	Name	Year of designation	Nationally designated sites	IUCN categories	Area (km ²)
1	Kaliakra	1941	Strict Nature Reserve	Ia	3148
2	Baltata	1978	Managed Reserve	IV	2046
3	Zlatni pyasatsi	1943	Nature Park	V	13,719
4	Aromatna matiola	2013	Protected Site	VI	0,001
5	Blatno kokiche	2009	Protected Site	VI	0,001
6	Botanicheska gradina - Balchik	2005	Protected Site	VI	0,604
7	Durankulak Lake	1980	Protected Site	VI	11,425
8	Shabla-Ezerets Lake	1995	Protected Site	VI	14,122
9	Stepite	2007	Protected Site	VI	1446
10	Yaylata	2002	Protected Site	VI	1754
	Total				48,266

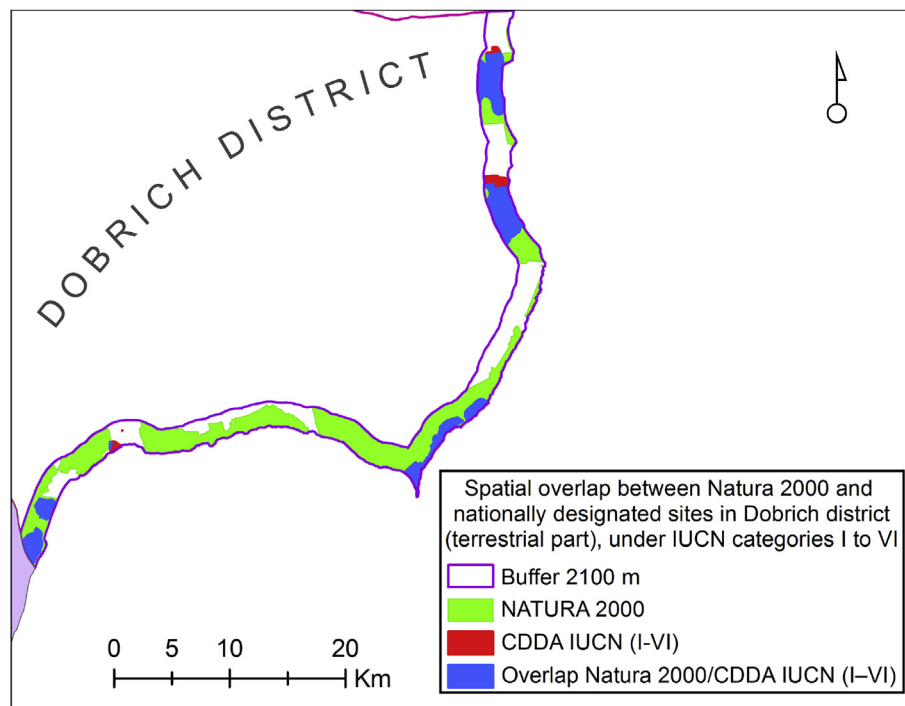


Fig. 6. Spatial overlap between Natura 2000 and nationally designated sites in Bulgaria (only terrestrial parts), all IUCN categories considered.

the North Bulgarian coast are facing today are related both to natural processes and human activities as observed in similar cases in the United Kingdom (Prosser et al., 2010; Bratton et al., 2013) and Portugal (Fonseca et al., 2014): direct physical impact by global climate changes, sea level rise, intense waves and storms, acceleration of coastal erosion and landslides, coastal infrastructures, tourism and visitors impact, and insufficient conservation management by decision-makers.

4.3.1. Challenges related to natural hazards

Coastal erosion is a natural process that is generally only of concern when threatening population or development and infrastructure, i.e. when it poses a risk to residential developments, roads, coastal structures, as well as to protected areas and historical sites (Cooper and McKenna, 2008; McLaughlin and Cooper, 2010; Rangel Buitrago and Anfuso, 2015). Intense waves and coastal geology are the main factors affecting the extent of coastal erosion in the section between Capes of Sivriburun and Shabla (Peychev, 2004), (Fig. 1). As pointed in Section 2, the coast is built of loess sediments underlain by limestones, which has resulted in accelerated cliff retreat (Peychev, 2004; Peychev and Stancheva, 2009).

The Cape Krapets and Cape Shabla section was also classified as highly hazardous to coastal erosion/cliff retreat by Stanchev et al. (2013), using a predictive model for cliff erosion vulnerability based primarily on the structure and geology of the cliff/bluff sections of the shore. One example of damages to historical sites caused by intense coastal erosion is Cape Shabla. The ancient fortified town and port of Careas occupied in ancient time the modern Cape Shabla and today only the northwest part of the fortress is still on land, the larger part being under the sea due to wave erosion (Fig. 7).

Attempts to solve the erosion/landslide processes along the Bulgarian Black Sea coast over the last decades, fostered implementation of many hard engineering and stabilisation schemes mostly groins with different shapes, coastal dikes and seawalls. Recently, results based on high orthophoto images from 2010 to 2011 indicate that along the entire Bulgarian coast, occur some 178 different types of groins; 31 coastal dikes; 26 seawalls; 73 embankments/rip-raps; 62 ports, marinas/quay walls and navigational channels; and 14 segments, representing artificial beaches (Stanchev et al., 2013). In the study area between Capes Sivriburun and Ekrene (Fig. 1) there were identified a total number of 58 port



Fig. 7. Remains of an ancient fortress at Cape Shabla.

and coast-protection structures, including 24 different types of groins, 8 coastal dikes, 11 rip-raps, 2 seawalls and 2 ports. In the most erosion-prone section between Capes Sivriburun and Shabla (Fig. 1), there are 5 hard coast-protection structures: 2 seawalls, 1 groin, 1 rip-rap and 1 dike (Stanchev et al., 2013). One seawall, being permeable, has been installed at the coast around Cape Krapets (Fig. 1), where the average rate of erosion reaches 1.2–1.6 m/y (Peychev and Stancheva, 2009). The structure has effectively protected the coast, but has caused beach reduction, particularly during storms (Parlichev, 1994; Marinski, 1998).

However, hard protection structures will inevitably result in the loss of protected sites (including beaches and dunes) behind walls and dikes protection schemes and as a consequence of engineered slope re-profiling and drainage. The disruption to active processes operating on the coast and on natural slopes is also likely to lead to loss of, or damage to, geodiversity interests. For example, seawalls reflect waves and reduce beach size, groins interrupt sediment supply, and both of these may also result in additional erosion occurring in down drift adjacent areas (Stancheva and Marinski, 2007; Prosser et al., 2010; Anfusio et al., 2012; Manno et al., 2016). Furthermore, hard defence structures have caused coastline armouring, which has altered the natural coastal environment (Stancheva et al., 2011).

Although it cannot always be assumed that soft engineering (such as beach nourishment and/or creating artificial beaches) will have less impact on the protected sites, they are preferable from a geo-conservation point of view for protected areas (Prosser et al., 2010). In the case of Cape Shabla potential solutions could be such soft defence measures, i.e. beach nourishment, as they have low scenery impact in contrast to construction of hard structures, as observed by Williams et al. (2012) and Anfusio et al. (2014).

Other challenges are sea level rise and possible intrusion of salt water into the coastal fresh/brackish lakes existing in the study area, such as Durankulak, Shabla and Ezerets (Fig. 1). Durankulak Lake protected site is located 15 km north of Shabla Lake and 6 km south of the Romanian-Bulgarian border (Fig. 1). The lake has been established as a protected site since 1980. It is also a Natura 2000 SPAs Birds Directive and SCI Habitats Directive and has an area of

446.5 ha, and is one of the important Ramsar Sites and Important Bird Areas in Europe (Ministry of Environment and Water of Bulgaria, 2013). Durankulak Lake is a natural freshwater-brackish water lagoon with considerable vegetation cover. It lies in a former river valley, which gives the lake its specific 'S' shape. It is surrounded by arable land and steppe territories. Between the lake and the sea lies a strip of sand dunes and beach. The water balance of the lake is determined mainly by groundwater and precipitation (Black Sea Wet Initiative, 2013). Durankulak settlement commenced on a small island, approximately 5200 BC, the first inhabitants being the Hamangia culture, dated from the middle of the 6th Millennium to the middle of 5th Millennium BC (Todorova, 1984). Along with natural hazards (sea level rising and salt water intrusion), the potential increase of tourism may also have negative impact on the site and tourism and visitors impact are discussed below.

Geological events such as earthquakes, mass movement and landslides may occur and can cause damages to protected areas and historical sites. As pointed out in Section 2 the investigated coastal region is subject to active seismicity and the most recent earthquake occurred in the Shabla area (Matova, 2000). Therefore, possible earthquakes could be considered as a challenge to the natural and historical heritage. One example is the Yaylata Protected Site and Archaeological Reserve: it is situated 18 km away from Kavarna town in a north-eastern direction (Fig. 1). It is a seaside ledge covering 300 decares (45.3 ha) separated from the sea by 30–40 m high rock massifs and since 2002 has been designated as a protected site. From a geological view point Yaylata is an impressive block landslide with a length of 2 km and width of 250 m (Popov and Mishev, 1974; Peychev, 2004); (Fig. 8). The whole territory of Yaylata is a Natura 2000 SPAs Birds Directive and SCI Habitats Directive (Ministry of Environment and Water of Bulgaria, 2013). The Yaylata area was announced as an archaeological reserve in 1989 by a resolution of the Ministerial Council of Bulgaria. There are many monuments on the territory of the archaeological complex, belonging to different historical epochs - from 6th Millennium BC until the middle XIth Century. There are ruins of the early Byzantine fortress as the ceramics is dated IVth–VIth Century (Velkov, 1984).



Fig. 8. Yaylata Protected Site and Archaeological Reserve.

4.3.2. Challenges related to human activities

Tourism is a complex phenomenon. Its interactions with protected areas occur in unique historical, cultural and geographical contexts involving multiple values and stakeholders. Managing development and operation of tourism in protected areas is a series of challenges and assessment of the associated opportunities (Leung et al., 2015). Usually protected areas and sites, particularly when overlapped with major heritage sites and archaeological reserves, are some of tourist main attractions, and therefore subject to negative impact of visitation (Pedersen, 2002).

Bulgaria's tourism industry is heavily concentrated in Black Sea coastal resorts and tourism over recent years has been one of the fastest growing economies (Stanchev et al., 2015). Among the three coastal districts of Dobrich, Varna and Burgas, Dobrich marks the lowest growth rate for tourist numbers. For example, in 2011 the Dobrich area accommodated only 13% of all tourists along the Bulgarian coast, comparing with 53% in Burgas and 34% in Varna districts. The NSI (2012) in 2011 had 94 hotels in the Dobrich district accommodating a total of 23,000 tourist beds and the number of tourist arrivals amounted to over 260,000, with an average stay of 6.3 days. The number of overnight stays from 2007 to 2014 almost doubled, from 923,374 to 1,794,550. Within the Dobrich district, there is a large disproportion in the supply and implementation of tourist services. For example, in the Balchik Municipality about 91% of all tourist beds and circa 96% of all overnight stays were due to the existence of the Albena Sea Resort with 37 actively operating hotels as of 2011, (NSI, 2012).

Visitor information is essential for protected area management, which include resource protection, ensuring quality visitor experiences, participatory planning processes, and policy development (Leung et al., 2015). The amount, type and distribution of recreation and tourism visitation can provide fundamental data for protected areas, although such data are not routinely or systematically collected in many protected areas.

Despite a lower number of tourist infrastructures in the study area and low urbanisation, the existence of natural and cultural

heritage sites is a prerequisite for attracting large numbers of tourists and visitors. For the period 2007–2015, circa 950,000 tourists visited protected areas and historical sites in the municipality of Kavarna: Cape Kaliakra Natural and Archaeological Reserve, Yaylata Protected Site and Archaeological Reserve, and the Historical Museum in Kavarna (Town Historical Museum of Kavarna, 01 February 2016, data provided in email by Darina Mircheva, the Director). The largest tourist flow was recorded for Cape Kaliakra with more than 100,000 visits per year. A significantly lower number of visitors were recorded for the Yaylata Reserve with a mean value of 5000 tourist visits per year and the smallest number of visitors occurred at the Kavarna museum with only 500 visits per year. As visitor levels increased in the study area, the need for sound infrastructure rises accordingly: visitors need accommodation, roads, visitor and information centres. Different tourism activities can cause different impacts in protected areas. For example, the road construction, accommodation, ports, hiking trails, campsites, golf courses, and swimming pools that support tourism all have an inevitable environmental impact that includes mineral and energy consumption, habitat removal, water use, land-based pollution and aesthetic impacts on the landscape. Impacts from visitor use or management activities may occur out of the protected areas, or not be visible until later e.g. poor water treatment may result in water pollution downstream (Leung et al., 2015).

Other challenges resulting from human activities in the study region are illegal sand extraction from dune areas, unregulated campsites over the dunes and beaches, illegal hunting and fishing from adjacent coastal lakes. In recent years, golf tourism has increased in popularity and the number of golf courses has grown rapidly along the North Bulgarian coast, three golf courses have been built in the last decade at the coast or in close proximity i.e. in the studied 2100 m strip zone. Two are situated entirely both in Natura 2000 SPAs and SCI areas, and the third overlaps with a Natura 2000 SCI area. Golf courses require large amount of water, which can result in water scarcity and limitation of resources, as well as modifying completely the coastal landscape.



Fig. 9. a) Construction in Yaylata Protected Site and Archaeological Reserve in 2013; b) Removed construction in 2016.

4.3.3. Mismanagement

Subsection 4.2 showed that all CDDA terrestrial sites in the study area completely conform to the IUCN classification and apply to IUCN management categories, *i.e.* these protected areas should benefit from protection by national legislation and dedicated management planning. However, as pointed out in Subsection 1.2 practical implementation of the Natura 2000 Network in Bulgaria still faces critical difficulties. Although it is near to completion with respect to site designation, currently there are no completed management plans for Natura 2000 protected areas at national level. Presently, eight management plans exist for protected areas whose borders overlap with SCI and 4.3% of the Natura 2000 protected areas have drafted management plans (National Prioritised Action Framework (NPAF) for Natura 2000, 2014). None of the identified Natura 2000 sites given in Section 4.2 has an approved management plan and thus a large proportion of protected areas currently lack proper planning and management, being potentially vulnerable to many threats and impacts. There is a widespread misconception about Natura 2000 which seems to be perceived as problematic and an obstacle to economic progress (Hristova, 2012). Natura 2000 is mainly associated with restrictions as it has been presented as such and has failed to be presented in a meaningful way to the public. There is still scant information about the Natura 2000 network, in particular among local communities. The protected status of designated sites is not clear for a large population, who are highly sceptical about Natura 2000 and this creates a conflict of use of protected areas.

Inadequate decision-making and management of natural and historical heritage sites can also have potential adverse impacts. The following categories of protection, concerning forests, lands and waters, are defined under the Protected Areas Act (1998) in Bulgaria:

- Strict nature reserves;
- National parks;
- Natural monuments;
- Managed nature reserves;
- Natural parks;
- Protected sites.

As to the Act itself these protected areas are subject to different management regimes and visits are allowed as long as they conform to certain rules. Cape Kaliakra Natural and Archaeological Reserve is nationally designated as a Strict Nature Reserve and fully conforms to the Ia IUCN management category: Strict Nature Reserve. Such areas are strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphologic features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values (Dudley, 2008). Cape Kaliakra has been announced as a Strict Nature

Reserve since 1941. The reserve is also a Natura 2000 SPAs Birds Directive and SCI Habitats Directive (Ministry of Environment and Water, 2013). Since 2003, Cape Kaliakra and the architectural complex on its territory have been also announced as an archaeological reserve. Although Kaliakra has been categorised as a Strict Nature Reserve it is however subject to the largest number of unrestricted tourist visits. There is insufficient awareness by local communities about the value of conservation of protected areas and cultural heritage. Particularly vulnerable are places near parking areas, where some rare plant species such as *Paeonia peregrina* are threatened by tourists who pick flowers.

Another case of protected sites poor management was illegal construction in the Yaylata Protected Site and Archaeological Reserve, in this case a concrete building where construction started in 2007 continuing to 2013 (Fig. 9a). After public protests, at the beginning of July 2015, the Supreme Administrative Court in Bulgaria upheld the order of the Construction Supervision authorities, which deemed construction to be illegal and removal by the owners commenced with construction waste being removed from the reserve. In 2016 the construction was entirely removed from the territory of reserve (Fig. 9b).

4.3.4. Future perspectives

UNWTO and UNEP (2005) define sustainable tourism as tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities. This definition and sustainable tourism development guidelines and management practices are applicable to all forms of tourism in all types of destinations, including mass tourism and the various niche tourism subsectors, including ecotourism (Leung et al., 2015).

As most of the world's beaches become overdeveloped, there is a possibility for Bulgaria to highlight the tourist potential of those beaches and coastal areas that remain natural *e. g.* ecotourism and nature-based tourism (Young et al., 2013). The study area is an attractive destination from an ecotourism perspective due to its great biodiversity, pristine ecosystems and rich cultural and historical heritage. Ecotourism can help conserve and raise awareness of protected areas, promote the development of cultural pride and confidence in the local community, enhance investment in sustainable developments in construction projects and education, and contribute a net positive effect on their surroundings (Snyman, 2013).

As shown in Subsection 4.2, Natura 2000 protected areas overlap with CDDA areas on 29.5 km² (16.18%) of the 2100 m study strip zone. *i.e.* these areas are subject to double protection and regulations, which however might cause potential conflicts in their governance as different institutions are involved in managing CDDA and Natura 2000 areas. Therefore, there is an urgent demand for these overlapping areas to have drafted integrated management

plans and precaution measures dedicated to areas that coincide in various forms of legal protection.

Many forms of tourism (e.g. wildlife tourism, ecotourism, underwater adventure tourism, cliff rocky climbing, historical and cultural tourism) occur or could occur within the study area. Some future perspectives could include: development of balneo - and spa tourism in the area of Cape Krapets and Cape Shabla; bird-watching or ornithological tourism is already developed, though insufficiently around the area of Durankulak and Shabla Lakes (Fig. 1). This complex is a Ramsar site of international importance, which has an initial ecotourism infrastructure - a house - shelter for bird-watching and information center at Durankulak. The lakes are especially attractive for tourists in particular during migration and wintering waterfowl, as many birds, such as, pelicans, herons, cormorants and other species are gathered here and can be observed directly. Ecotourism infrastructure in the area can be further developed as the site can attract tourists for a day of recreation. Pedestrian historical and cultural tourism could be another perspective, as it is based on surrounding beautiful landscapes, open coastal areas and the rich cultural heritage. This may involve developing sustainable transportation systems such as biker-friendly routes, pedestrian routes, regulated campsites, supports

with education and guiding information for tourists and visitors.

In Subsection 4.3.2, it was stressed that one of the challenges to protected areas is unregulated camping directly on sand beaches and dunes. Over the last few decades, regulated campsites along the coast have been reduced mainly due to coastal over-urbanisation and expanded tourism developments (Stanchev et al., 2015). In turn, people that like this form of recreation have moved to places still undeveloped and having large natural beaches. The study area, in particular its northern part, is still lowly urbanised and there are vast sand beaches e.g. in the Municipality of Shabla an attractive destination for campsite tourism. On the other hand, many of these excellent camping sites are subject to protection of the Natura 2000 Network or CDDA. Such direct and uncontrolled camping, accompanied by driving and parking, pollution, campfires etc. threatens the protected flora and fauna in beach and dune ecosystems. In the northern part of Dobrich District around 15,000 people practise unregulated camping in the peak summer season (Marian Zhechev, Mayor of Shabla Municipality, 17 March 2016, Radio Darik Dobrich). Therefore, in 2015 Shabla Municipality took a decision to designate camping sites along the coast on a symbolic price of 1 Euro/10 m² per day and designated sites are shown on Fig. 10.



Fig. 10. Location of regulated campsites in the study area.

5. Conclusions

In addressing the research aims in introduction section, the main findings of the present paper are listed below:

1. Based on comprehensive GIS survey, evaluation was carried out of the protection status of protected areas, natural reserves, monuments, parks and onshore historical heritage sites along the North Bulgarian coast at Dobrich district NUTS III level. Results showed that 67% of an investigated 2100 m terrestrial strip zone between Capes of Sivriburun and Ekrene, (97 km) has different conservation status both for geodiversity/biodiversity and historical heritage. This value is nearly twice as large as the average value for the whole country.
2. The IUCN categorisation shows that all CDDA terrestrial (nationally designated) sites in the study area completely conform to the IUCN classification and they also apply to global standard management categories. The overlap between Natura 2000 terrestrial protected areas with terrestrial CDDA sites under all IUCN protected areas categories account for an area of 29.5 km² or 16.18% of the 2100 m coastal zone. Despite these areas being subject to double forms of legal protection, there is a lack of coordination among institutions for their governance or additional precaution measures. There is a need for integrated management plans and special preservation measures to be applied to areas that coincide in different forms of legal protection.
3. The main challenges related to natural processes that protected areas face are coastal erosion, other geological events, climate change and sea level rise. Protected areas, particularly when coinciding with historical heritage sites, are some of the main tourist attractions and subject to a growing number of tourist visits. Thus, tourism in protected areas can cause many adverse impacts to natural environment and historical heritage and are very current problems. The largest tourist flow was found for Kaliakra Protected Site and Archaeological Reserve with more than 100,000 tourist visits per year. This protected site is nationally designated as a Strict Nature Reserve which completely conforms to the Ia IUCN management category. Results show that while good progress has been made in terms of designating Natura 2000 areas and it is near completion, significant policy and management challenges of protected areas still remain in an issue. At present, there are no completed management plans for Natura 2000 protected areas in the study area and large proportions of protected areas suffer from lack of proper management, planning and sufficient public awareness.

In conclusion, protection of natural and historical heritage and promotion of sustainable use must be integrated and be mutually beneficial from the best management practices that can be more widely used. Education and information programmes, as well as regulations aimed at restricting visitor behaviour, may be necessary in addition to limits of use. New skills and tools need to be developed by management authorities in Bulgaria to address the challenges that emerge from planning, monitoring and managing protected areas and historical sites along the coast.

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