

Implications of population and tourism development growth for Bulgarian coastal zone

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Abstract Coastal zones are comprised of a great variety of natural ecosystems and resources and for this reason they are highly attractive for many human activities including settlement and recreational tourism. This great societal interest has resulted in rapid development and even urbanization of the coasts. Coastal tourism is still a rapidly growing part of the economy in many nations including countries along the Black Sea like Bulgaria. Increasingly, coastal areas and ecosystems are pressured by population, tourism, pollution, habitat degradation and loss, overfishing and increased hazards. This study assesses the population changes during 1934–2011 and tourist growth over 1999–2011 in the coastal zone of Bulgaria as an example of human pressure on today's shorelines. The tourist boom over the last decade has resulted in substantial coastal population growth in Bulgaria. Results based on 2011 Census data show that population density in the zone within 10 km of the coast is 223 people per square km, while in 10–30 km and 30–60 km zones from the coast, the density is much less: 27 and 33 people per square km. Tourism has substantially increased over the recent years and it is expected to continue to grow despite the effects of global financial crisis after 2008. Coastal municipalities are also subject to major population influxes during peak vacation periods. Coastal population in summer can typically increase 20 %, but at some municipalities over 320 %. The existing facilities and infrastructure in these most crowded coastal municipalities are unable to meet this additional pressure.

These peak periods often overwhelm local treatment capacity resulting in heavy impacts on natural geosystems and natural resources. Obviously, this tourism is critical to many local economies, but in order to preserve the economic benefits, we must also preserve the coastal environment that the tourists so desire. This is the challenge for coastal managers in the 21st Century.

Keywords Coastal population · Coastal tourism pressure · GIS · Coastal zone · Bulgaria

Introduction

Globally, most coastlines are currently retreating due to rising sea level, yet human populations are still drawn to the coast for a variety of reasons. Now, more than ever, people tend to live on the retreating boundary between land and sea (Stamski 2005). About 11 % of world population currently lives within 10 km of the coast (Sherbinin et al. 2012). In Europe, the estimates based on the 2001 census data show that population living in the 0–10 km coastal zone is 86 million inhabitants or 19 % of the European Union (EU) total population (EEA 2006). Approximately 40 % of the EU's population lives within 50 km of the sea. Almost 40 % of the EU's Gross Domestic Product (GDP) is generated in these maritime regions, and a staggering 75 % of the volume of the EU's foreign trade is conducted by sea (EEA 2013).

For this reason coastal areas have always been crowded and they are becoming more so every day. This population growth and related development will place increasing pressure on the target coastal systems including: increased solid waste production and demands for water treatment, loss of beaches, dunes, green space and wildlife habitat, and an increased need for public utilities. Ironically, as the coastal population grows, the natural features that mostly attract people to the coast are

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lost or diminished (Culliton 1998). Therefore, policymakers and coastal developers are confronted with the daily task of finding a balance between benefiting from economic growth while mitigating the effects of this growth on coastal environments. As coastal population continues to grow in a very finite space, this task is becoming even tougher. Such a concentration of people not only impacts the integrity of coastal systems, but these populations are also increasingly threatened by coastal hazards from storms, erosion, and tsunamis. Thus, today the task of coastal managers is even more challenging of protecting both coastal ecosystems from a growing population and protecting a growing population from coastal hazards (Crossett et al. 2004; Crossett et al. 2013).

Coastal tourism drives much of this challenge. Tourism is the world's largest industry with a broad measure of economic activity, Travel and Tourism Economy (TTE), contributing \$5.4 trillion in 2007 to the world's GDP (Houston 2008). Over the past 6 decades, tourism has experienced continued expansion and diversification, becoming one of the largest and fastest-growing economic sectors in the world (UNWTO 2013). As widely supported by statistics, it is the largest service industry in the European Union, accounting for more than 4 % of the Community's GDP and employing about 4 % of the total labour force, when only hotels and travel agencies (the core businesses) are considered. If the links to other sectors, such as transport, culture, recreational activities etc. are taken into account, these estimates almost triple (Policy Department B: Structural and Cohesion Policies 2008).

Beaches and coastal zone are the world's leading tourist destinations (Houston 2008). Coastal tourism is by far the most significant in terms of visitor numbers and income generated (UNEP 2009a; Rangel-Buitrago et al. 2013). The land and sea interface offers amenities such as water, beaches, scenic beauty, rich terrestrial and marine biodiversity, diversified cultural and historic heritage, healthy food and good infrastructure. It includes a diversity of recreational activities that take place in both coastal zone and coastal waters. To support these activities substantial infrastructure is required including the development of hotels, resorts, second homes, restaurants and support infrastructure like ports, marinas, fishing and diving shops, and other facilities (UNEP 2009a).

Most of the economies of EU Member States with significant lengths of coastline are highly dependent on the incomes generated by sea-related activities. However, many of these uses can be in conflict as an attempt is made to balance traditional fishing and agriculture with tourism. This balance is made even more difficult in light of the pressures to natural resources as a result of global climate change (Policy Department B: Structural and Cohesion Policies 2008). Even if it is considered as a "soft" industry, tourism has a major environmental impact in many coastal areas, which are particularly vulnerable to pressures associated with its growth. Landscape degradation affects coastal scenery or the

appearance of an area immensely. Scenery is a very important component for beach tourism and drives the economy of many coastal countries as beaches are under pressure from anthropogenic development and utilization (Williams and Micallef 2009; Rangel-Buitrago et al. 2013). Large tourism developments have dramatically altered not only the visual aspect of many coasts around the world, but also the natural dynamics of functioning of coastal ecosystems (the irreversible destruction of sand dunes, beaches, coral reefs, wetlands and the loss of rare animal and biota).

Tourism can also negatively impact local society and culture through changes in traditional lifestyle, socio-cultural values and loss of identity of the local population. All of the above impacts may extend well beyond the coastal zone as the infrastructure needed to support coastal tourism can extend over a wider region that includes road and rail networks, airports, housing development for employees, large shopping centres, etc. (Cooper and McKenna 2009; UNEP 2009a).

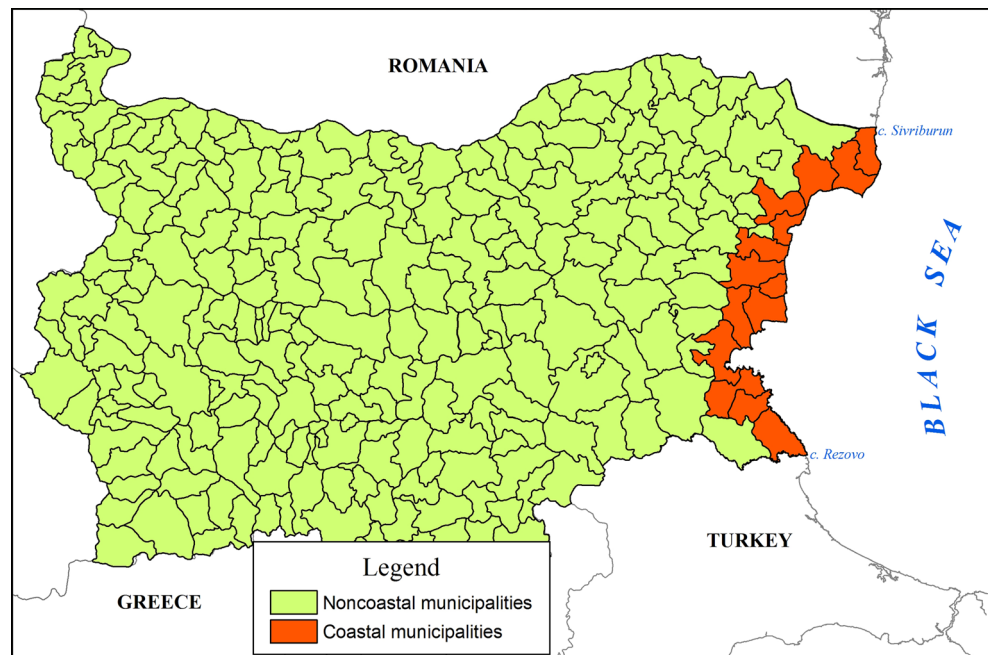
As with other near-shore areas in Europe, the coastal zone in Bulgaria has also recorded an increase of population growth compared with the inland areas (Palazov and Stanchev 2006). Over the last decade, the Black Sea coast of Bulgaria has experienced a huge tourism boom (real estate/property and recreational activities) with many of these new developments, such as hotels, residential or holiday homes placed too close to the shoreline or directly on the beaches and dunes (Stanchev et al. 2011; Young et al. 2013). Because the Bulgarian coastal zone is a very small area under great pressure from development it is helpful to quantify the population growth to examine the threat to coastal sustainability. For tourism to succeed, the growth in demand must come with a growth in protection for the amenities the tourists are coming to enjoy. For this purpose population changes during 1934–2011 and tourism development growth during 1999–2011 in the coastal zone of Bulgaria were investigated and analyzed with application of Geographic Information System (GIS).

Study area

Bulgaria is situated on the Balkan Peninsula, South-East Europe between 41°14'–44°13' N and 022°21'–028°36' E covering an area of 110,842 km². The Bulgarian coast, located in the western part of the Black Sea, has a 432 km long coastline (Stanchev et al. 2013), between cape Sivriburun to the north at the border with Romania and cape Rezovo to the south at the border with the Republic of Turkey (Fig. 1).

The coast is comprised of a variety of geomorphic types: rocky cliffs, sandy beaches, low-lying parts of bays and lagoons. Erosion and cliff retreat, both natural and human-induced, is one of the main hazards affecting the coastline. Cliffs of varying composition are the most common shore type along the Bulgarian coast covering 49.3 % or 213 km

Fig. 1 Locator map of the Bulgarian coast



of the whole shoreline. Sandy beaches constitute at least 34.5 % (149 km) of the coast and the armoured/engineered coast occupies 16.2 % (70 km) (Stanchev et al. 2013). In the past, the Bulgarian coast had many areas with large dune formations, however, due primarily to direct removal by development, the dune landscape is continually diminishing and today they are found only along 10 % of the entire country's coastline. Although sand dunes in Bulgaria are protected environmental areas, they have been exposed to significant anthropogenic pressure leading to their destruction (Stancheva et al. 2011).

This diversity of coastline features and the general affordability for other Europeans makes the Bulgarian littoral an attractive and popular destination both for residence/s homes and for domestic and foreign tourists. There are favourable natural conditions for the development of seaside holiday tourism—temperate climate, wide sand strips with fine-grained sand. There are more than 70 significant sandy beaches along the coast, covering an area of approximately 7 million m². The water in the Black Sea has a low salinity (16–18 ‰) and that, together with its moderate temperature during the summer (22–25°C) makes it suitable for swimming and bathing. Black Sea is almost tideless without strong water currents or any dangerous animal and plant types, which would pose a threat to the health and the lives of the tourists (National strategy for sustainable tourism development 2009).

The smallest administrative-territorial units in Bulgaria are municipalities (Fig. 1). There are 264 municipalities in Bulgaria (NSI 2012a) with fourteen of them classified as coastal. The total area of all 14 coastal municipalities is 5770 km² comprising about 5.2 % from the entire country's territory and accommodating a total number of 726, 923 of

local residents according to the last Census data in 2011. This is approximately 9.8 % of the national population.

Material and methods

Basic data for population in municipalities and settlements were obtained from the official Census records over the period 1934–2011 (Census data for 1934, 1946, 1956, 1965, 1975, 1985, 1992, 2001 and 2011, NSI 2012b). Tourist flow data were based on official statistics, supplied by Varna Territorial Statistical Bureau 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.

Official data for international tourist arrivals during 2005–2012 were obtained from NSI and Ministry of Economy and Energy of Bulgaria (International Tourism Bulgaria 2010 and 2012). Official statistical data from NSI were used for the newly developed residential buildings in Bulgaria at NUTS III level (Nomenclature of Territorial Units for Statistics) over the period 2004–2011. Data from all sources were collected, processed and tabulated. Population trends and tourist dynamics in 14 coastal municipalities were investigated with help of ArcInfo GIS. Specific GIS instruments were applied for determination of population in the three strip zones at different distance from the coast (0–10 km; 10–30 km and 30–60 km). Totally, there are 611 settlements within the zones meaning about 11.5 % from all 5302 settlements in Bulgaria in 2011. The populated sites are presented as points in ArcGIS shapefile format. The Censuses data were entered into the

attribute tables. Using a “*select by location*” tool, the spatial locations of these settlements situated in the three strip zones from the coast are determined. The results are presented in tables, graphics and maps.

Results and discussion

Overview of Bulgarian population changes (trends and density) country-wide and in coastal municipalities.

Population changes on a national level were analyzed for inland populations (including 250 municipalities and amounting to 94.8 % of the territory); and for coastal areas (including 14 municipalities that comprise just 5.2 % of the country territory). These population changes for the period 1934–2011 are shown in Figs. 2 and 3.

Data from 1934 census was used as a baseline for all population growth (Table 1). Between censuses of 1934 and 1946 (including the period of World War II) the total population in inland municipalities and in coastal municipalities showed almost equivalent rates of growth. After the 1950s, population within coastal municipalities showed a larger gain in comparison with inland population and this trend remained constant until the end of 1980s. After the political, social and economical reforms in the beginning of 1990s, the total population of Bulgaria considerably decreased as a consequence of lower birth-rate and emigration. Still, during this period coastal populations increased while inland populations decreased. This continuous rise is a consequence of expected growth, but also an expected migration of Bulgarians to the coast to take advantage of economic opportunities and coastal amenities (Palazov and Stanchev, 2006).

The difference in growth rates between inland and coastal areas is staggering. During the period 1934–2011 the population in coastal municipalities has increased by 154.3 % compared to the inland population increase which of only 9.3 % (Table 1).

The fact that coastal population is growing significantly faster than noncoastal population should be of increasing attention and importance for coastal planners and managers. One third of municipalities in Bulgaria experienced an increase in population for the period 1934–2011, but the highest rate was recorded in two coastal municipalities: those of Varna Municipality (348 %) and Burgas Municipality (296 %). Only two municipalities experienced population growth in all eight censuses from 1934 to 2011 year: Varna and Nessebar.

Coastal municipalities contain 9.87 % of the nation's population, yet, only account for 5.2 % of Bulgaria land. Population density in the 14 coastal municipalities is not equal. It is lowest in municipalities of Shabla and Byala, while the largest sea towns of Varna and Burgas have the highest population density of 1447 people per square km (Varna) and 416 people per square km (Burgas) (Fig. 4). Varna and Burgas

are important community centres and regional cores of NUTS II regions of Severoiztochen and Yugoiztochen. These two cities are also equipped with the largest harbours and they continue to grow due to diverse economic, service and labour opportunities, which attract more people to the shore (Stancheva, 2010). Furthermore, during the peak in summer seasons, the population in some coastal municipalities even tripled due to the expanded number of domestic and foreign tourists as previously described.

This increased population concentration at the coast along with a growing number of summer visitors has placed significant pressure on ecologically sensitive coastal systems and natural resources resulting in the destruction of sand dunes and beaches, reduction and loss of green areas, and degradation of coastal diversity. As this growth continues, many coastal municipalities with high concentration of local residents and increasing numbers of visitors in summer seasons will require additional facilities and infrastructure to face the augmented pressure on roads, electricity, water supply, sewage infrastructure and solid waste management.

Another way to examine the density of population along the coastal strip is to chart the density of settlement as one moves inland from the coast, ignoring municipal boundaries. This analysis was applied to three zones at a distance 0–10 km, 10–30 km and 30–60 km from the coast using the census data from 1934 and 2011 for all settlements into these zones (NSI 2012b). Fig. 5 shows changes of population density from different census results in the zones at a distance 0–10 km, 10–30 km and 30–60 km from the coast. In the entire 0–60 km zone the number of settlements is 611, and the number of residents is 1 061 191. At the same time there are significant contrasts between three zones. Within 0–10 km zone of the coast 106 sites are located, but the residents account 626 882 or 62.8 % of all residents within 60 km coastal zone.

According to the last census data in Bulgaria (NSI 2012b) it was found that the population density in 0–10 km zone from the coast reaches 223 people per square km, while in 10–30 km and 30–60 km zones, the density is only 27 and 33 people per square km respectively (Fig. 5).

Compared to 1934, population density in 0–10 km zone from the coast increased by 229.55 % (from 68 people per square km to 223 people per square km), while other two zones recorded a decrease from 14.2 % (from 32 people per square km to 27 people per square km) for the zone 10–30 km from the coast and by 25 % for the zone 30–60 km (from 44 people per square km to 33 people per square km) (Fig. 6). It is important also to underline that this trend of population growth in 0–10 km zone from the coast has been consistent since 1934.

It is somewhat ironic and problematic that the greatest concentration of population is also in the areas most vulnerable to coastal hazards including erosion, storms, and extreme

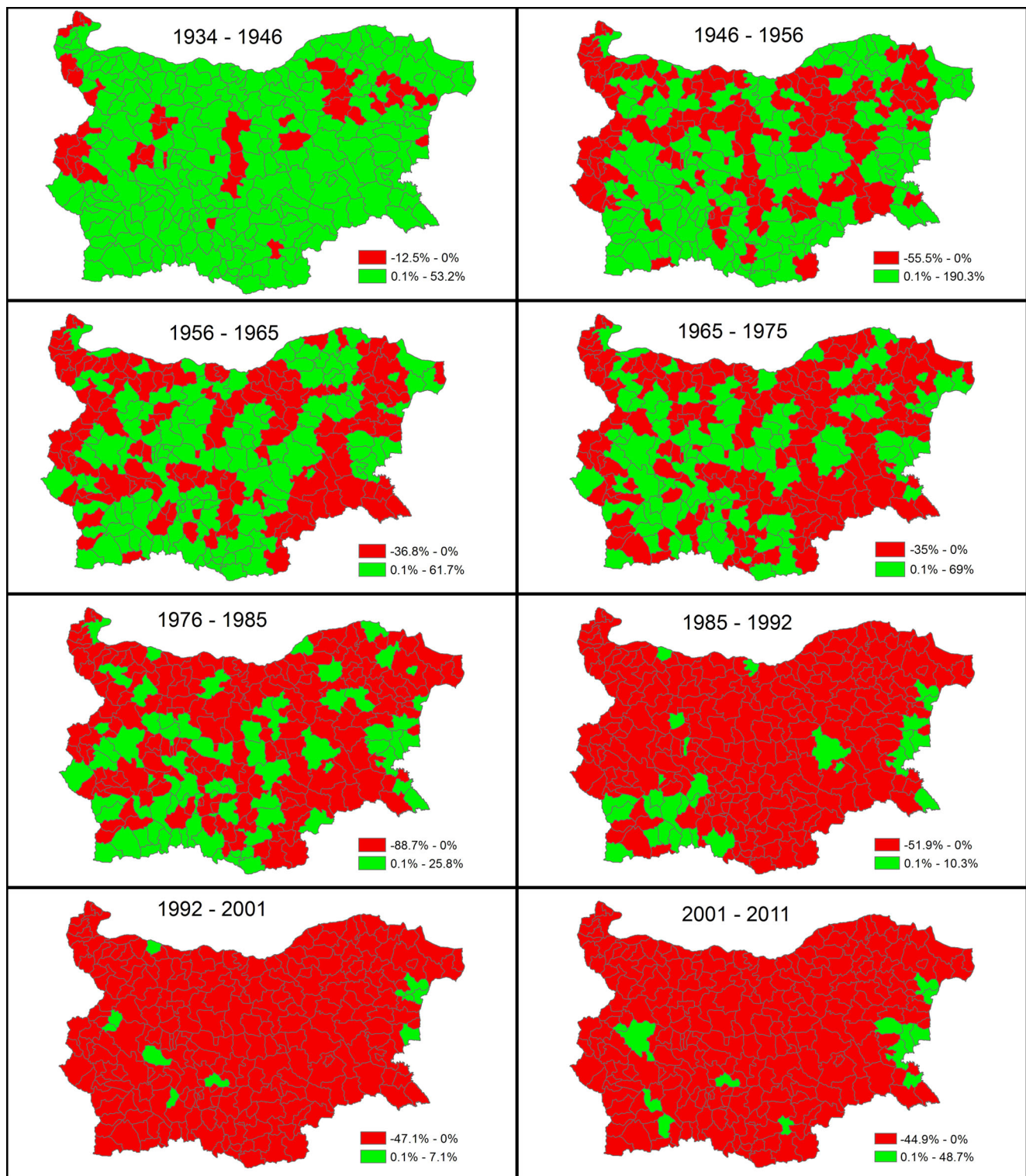


Fig. 2 Changes in population by all municipalities in Bulgaria during 1934–2011

sea level rise and floods. Commonly, low-lying areas including beaches and dunes, which are vital for coast-based economies, are the most vulnerable to sea level changes (from short – waves – to long period, including climate change), especially if they are human occupied (Carrasco et al. 2013;

Crosset et al. 2013). Around 20 % (83 km) of the Bulgarian coast has been identified as vulnerable to inundation at given scenarios of sea level rise (0–5 m). This included 14 towns, 17 villages, 13 sea resorts and 7 small campsites that would be potentially flooded by an extreme sea level rise of 5 m. The

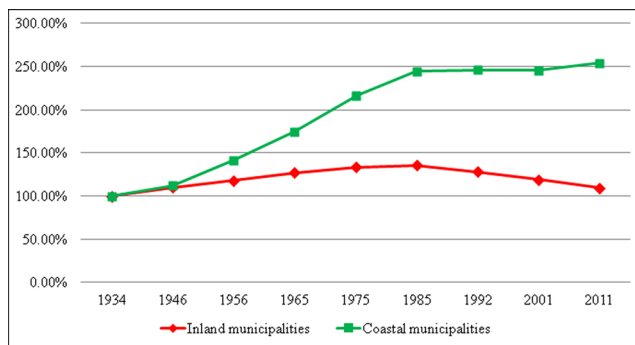


Fig. 3 Changes in population: coastal vs inland over 1934–2011

total number of local residents at these coastal sites constitutes almost 7 % of the entire country's population (Stanchev et al. 2009).

As coastal population increases along with increased coastal development, there will inevitably be an increase in the number of structures that have been placed too close to the coast, requiring almost immediate remediation of coastal erosion hazards. The developers and property owners typically call for a quick and strong response to their erosion problem. Large numbers of defence structures have been built since the 1980s to control erosion and landslide processes along the Bulgarian coast. These mainly include: coastal dikes or rubble-mound embankments, groins and seawalls. As a result, almost 10 % of the coastline has been occupied with shore protection and harbour structures. In most crowded coastal municipalities, the population growth has had also significant impact on coastal geomorphology because the higher population concentration has demanded a larger number of protection measures to mitigate coastal hazards. The most heavily developed coastline sections include in the municipalities of Aksakovo, Balchik, Varna, Nessebar, Pomorie and Burgas, which correspond indeed to higher population concentration in these municipalities (Fig. 4). These heavily occupied areas include as well the largest Bulgarian Black Sea bays of Burgas and Varna, which host a vast array of urban/land activities (transport logistics, industries, trades, etc.), coastal infrastructures, and tourist developments. The result of this population growth and unmanaged development is that the Bulgarian coast has experienced dramatic development and alteration of both active and relict dune and beach fields in areas. Much of this development has occurred with an inadequate coastal

setback, requiring the use of coastal engineering to protect the buildings and, in some cases, beach fill projects to add sand to the beach. In other areas of the coast, engineering structures have been used to halt the retreat of coastal cliffs even where there is little or no infrastructure to protect (Stancheva 2010; Young et al. 2013).

Coastal tourism development pressure

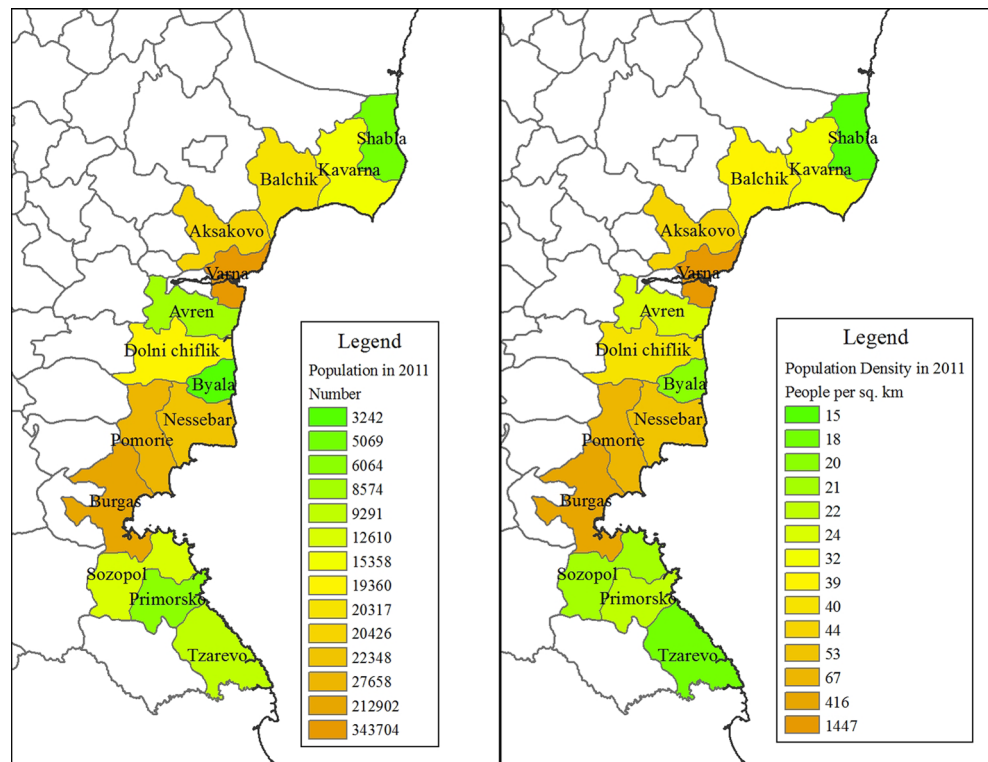
The growth of tourism in coastal areas has reached its peak in recent decades and the economic importance of coastal tourism is unquestionable (UNEP 2009a). Tourism also plays a key role in the Bulgarian economy, generating more than 10 % of GDP, thus being a prominent sector boosting the local economy. Thanks to its natural and historical diversity within a relatively limited space, Bulgaria has significant potential for the development of tourism. During the last couple of years, the tourism sector of Bulgaria has boomed and the potential for growth continues to be huge (National Strategy for sustainable tourism development 2009; Tourism Sector 2012).

Bulgaria's tourism industry is heavily concentrated in the Black Sea coastal resorts. The first large sea resorts were established during 1950s–1960s. The most significant influence from coastal tourism development began at the end of the 1990s, and has been expanding steadily since 2005 (Stancheva et al. 2011). It continues today although at a slightly reduced rate due to the global financial crisis after 2008. Bulgarian coast is a popular tourist destination for many nationals and foreigners as it is distinguished by beautiful landscape and existence of large sand beaches and dunes. Bulgaria is also a safe destination and travel to Bulgaria is still affordable from much of Europe. Bulgaria is one of the most rapidly growing tourist destinations in the EU. The majority of visitors come from the UK, Germany, Russia and Scandinavia. No matter where they are from, tourists are drawn to Bulgaria by the comfortable climate and the price level that, despite EU accession, is still very low, especially compared to traditional destinations in Western Europe (National Strategy for sustainable tourism development 2009; Tourism Sector, Bulgaria 2012). Due to the region's outstanding swimming beaches the country relies, and will continue to rely further, on the bathing tourism. Still, the range of traditional coastal tourism activities is becoming more

Table 1 Changes in coastal population over 1934 – 2011

	1934	1946	1956	1965	1975	1985	1992	2001	2011	Population change 1934–2011 (%)
Coastal municipalities	285,830	320,704	404,950	500,115	617,537	698,311	703,572	701,833	726,923	154.32
Inland municipalities	6,074,685	6,675,507	7,169,955	7,730,381	8,120,709	8,233,137	7,784,486	7,226,618	6,637,647	9.27
Total country	6,360,515	6,996,211	7,574,905	8,230,496	8,738,246	8,931,448	8,488,058	7,928,451	7,364,570	15.79

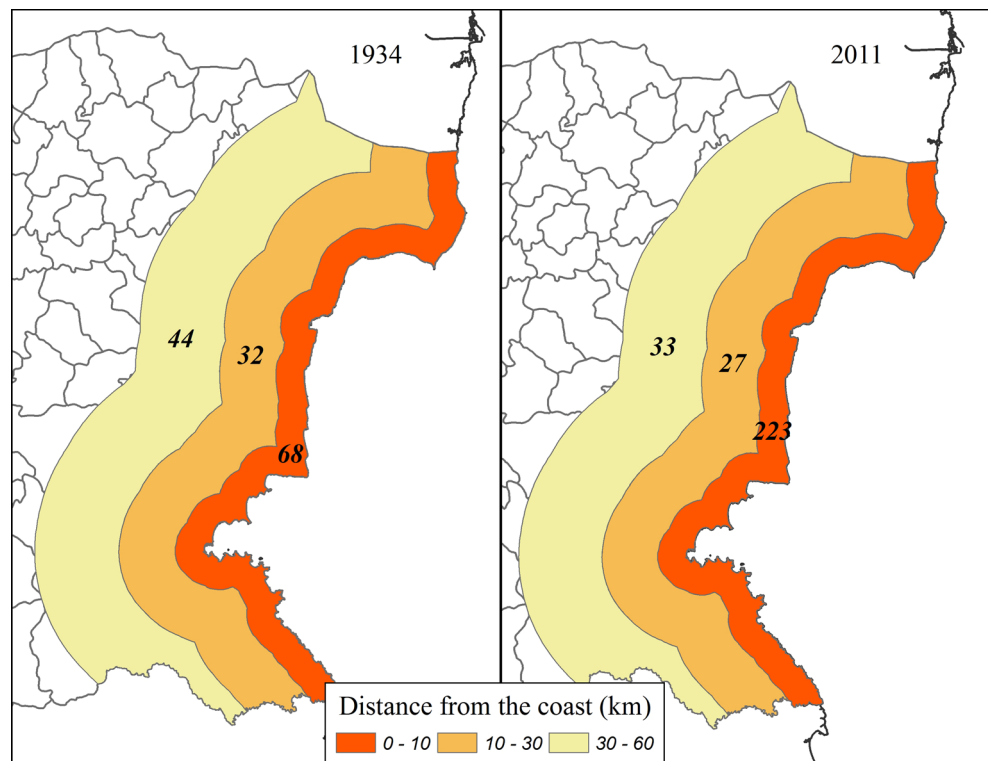
Fig. 4 Distribution of population at coastal municipalities



diverse including such activities as cultural tourism, health and wellness, and even wildlife viewing in some areas. The development of these aspects of tourism remains limited with swimming beaches driving the vast majority of visits.

As a result, the Bulgarian coast has experienced a dramatic alteration over the last decade due to real estate boom and increased impact of new developments, such as huge hotels or second residential homes located on the active beach and

Fig. 5 Population density (people per square km) at distance from the coast in 1934 and 2011



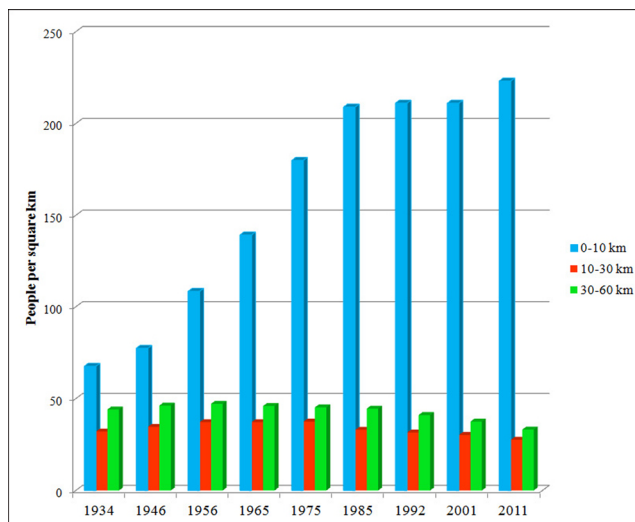


Fig. 6 Trend of population density in the three strip zones during 1934–2011

dunes. Consequently, large parts of wide beaches and dunes have been illegally built-up and most recreational resources are presently unmanaged thus being at risk of degradation (Stancheva et al. 2011). Natural coastal systems are not only impacted by the infrastructure and development of a particular coastal municipality, but the systems are also stressed by the continued, heavy, direct use by the tourists themselves. This pressure varies in intensity among the regions but also at different times of the year. The higher the density of tourism capacity, the heavier the pressure can be as these regions will be able to attract a substantial flow of tourists (EuroStat 2010).

In Bulgaria tourism capacity is denser in coastal municipalities compared to the inland territory. In 2011, the capacity of tourist accommodation in 14 coastal municipalities reached 184 165 beds, or almost 65 % of all tourist beds in Bulgaria. Over the period 1999–2011 the number of tourist beds in coastal municipalities increased from 74 277 to 184 165 or by 147 % (Fig. 7). For seven years period of 1999–2005 the number of existing tourist beds in coastal municipalities

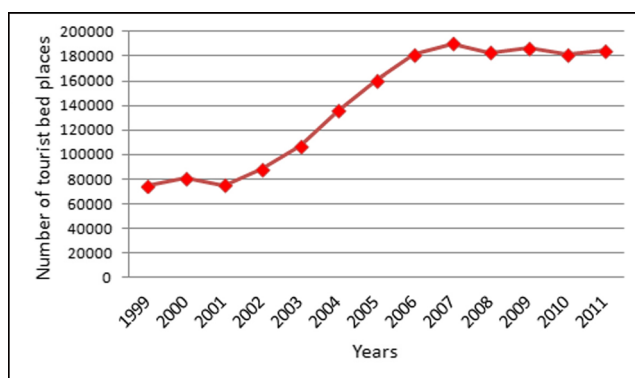


Fig. 7 Number of tourist bed places in 14 coastal municipalities (1999–2011)

almost doubled reaching 160 000 in 2005. Since then a growth has occurred, but at a lower rate. The increase of number of tourist bed places is not homogeneously spread across all coastal municipalities. Some municipalities like Aksakovo had no tourist beds were at all. Moreover, in Shabla Municipality, the number of tourist beds marked a decrease during that period, while the remaining 12 coastal municipalities recorded a continuous increase. The lowest growth rate is registered for the municipality of Balchik and it is 34 %, while the municipality of Pomorie get the largest share of this growth: the number of tourist beds rose almost by 1500 % during the period 1999–2011. Over 50 % of all tourist bed places in Bulgaria are located in three coastal municipalities (Nessebar, Varna and Balchik), but together they occupy only 1 % of the country's territory. A typical hot spot of tourism capacity growth is the municipality of Nessebar, containing 25 % of all tourist bed places in Bulgaria in 2011, whilst including 0.37 % of the country's territory at least.

The number of overnight stays in 14 coastal municipalities also rose from 4 852 775 in 1999 to 13 156 483 in 2011 or by 171 % in total for the period, a 13 % growth rate (Fig. 8). The data show that the touristic use of the Bulgarian coast is dramatic, but it is also variable from municipality to municipality. As mentioned above, the municipality of Aksakovo has no hotel and therefore no overnight stay recorded during that period. In the remaining coastal municipalities a widely varying growth of tourist flow occurred: ranging from 19 % growth for the municipality of Balchik to over 2000 % in the municipality of Dolni Chiflik and 1000 % in the Pomorie Municipality. The largest number of overnight stays was recorded for Nessebar Municipality, with 5.33 million overnight stays in 2011 or over 28 % of all tourist overnight stays in Bulgaria. Approximately 70 % of the overnight stays in the whole country were recorded in the 14 coastal municipalities, with the three busiest municipalities of Nessebar, Varna and Balchik having 58 % of all overnight stays on a country basis were recorded. Data released by the NSI show that, in coastal municipalities, the average tourist stay in the period 1999–2011 ranged from 8 days in 2001 to 6 days in 2011.

Coastal municipalities in Bulgaria are also subject to major population or tourist influxes during peak vacation periods. Peak summer season mainly lasts from mid-May to mid-September. Total coastal population increase in summer due to tourists averages 20 %, but at some resorts this increase is greater than 320 %. As mentioned above, with such enormous number of people concentrated in a very limited space, there is a need for additional infrastructure and facilities, which may lead to even more negative effects on natural resources.

Another important indicator for coastal tourism pressure is the ratio between number of tourists and number of local residents. The analysis takes into account the number of local population based on last census data in 2011 and the number of registered tourists in 2011 by municipalities. In 2011 the

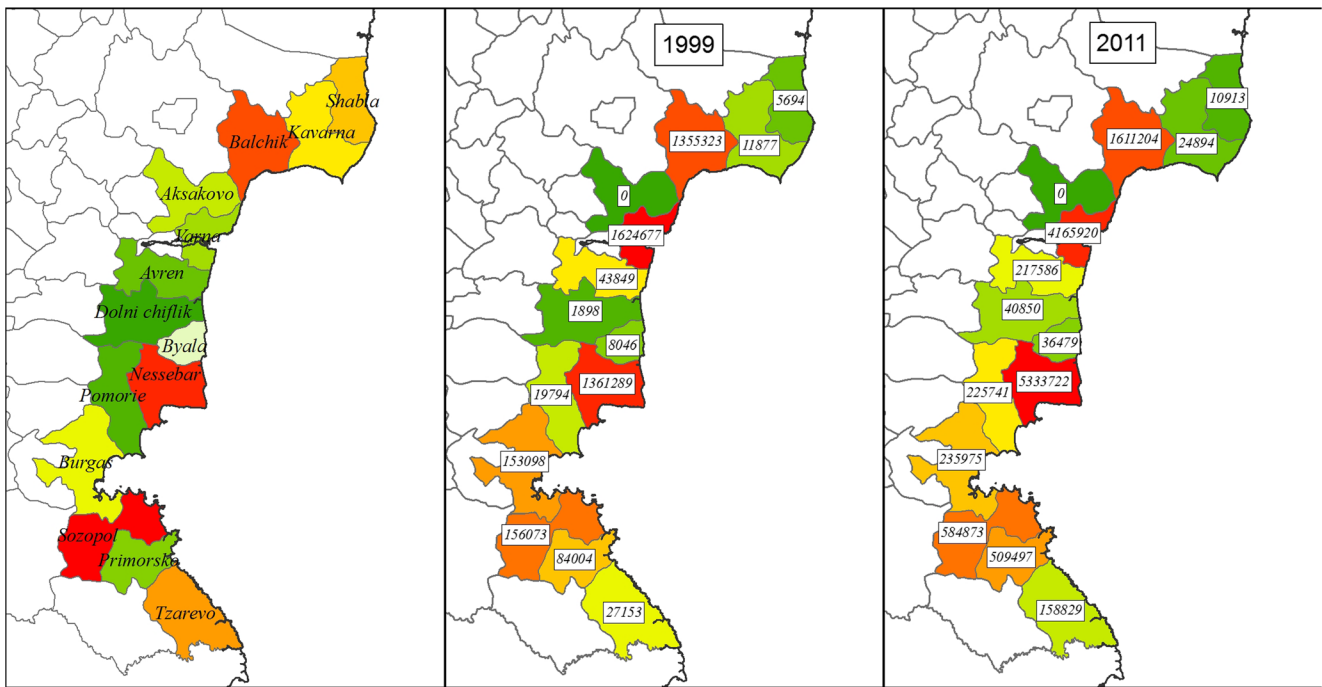


Fig. 8 Number of overnight stays in 14 coastal municipalities in 1999 and 2011

total number of tourists in 14 coastal municipalities reached 2.24 million people. According to the last Census data in 2011 the number of local residents is 0.73 million, meaning a 3.1 tourist per each citizen. In five of 14 coastal municipalities the number of tourists is smaller compared with the number of coastal residents, while in the rest nine municipalities the tourist number prevails. In the most tourist attractive municipality of Nessebar this ratio is almost 34 tourists per one resident, followed by municipalities of Balchik (12 tourists per one resident) and Primorsko (11 tourists per one resident), (Fig. 9). It should be noted that there is no official information on the number of visitors that come for seasonal work in the

tourism sector, and nor is the number of people staying in self-owned summer cottages, houses and apartments recorded.

As a whole, adverse impacts of coastal tourism on the Bulgarian coastal zone have resulted from expanded human pressure on limited land area and resources, and the conflicts between tourism development and protection of natural environment. Direct impacts are related to overbuilding of protected dune and beach areas (hotel and residential construction, roads, parking structures, and other related infrastructure), unregulated camping and “temporary” construction on the dune), destruction and loss of valuable dune habitats including the mining of sand, and loss of green areas (Stancheva et al. 2011). Also, water quality is degraded by pollution and because sewage treatment capacity is exceeded during the peak vacation periods. Finally, tourism and recreational activities are a major contributor of beach litter, as coastal cities (including seaside, resort complexes) and undeveloped beaches and river estuaries are the hot spots of marine litter for Bulgaria, (UNEP 2009b).

One of most affected by coastal tourism areas is the rapidly growing municipality of Nessebar which includes one of the famous tourist resorts in Bulgaria – the Sunny Beach Resort. This is an area of about a 10 km long along the southern portion of the Bulgarian Black Sea coast (Fig. 10). The geomorphology features large dune systems and beaches distributed along the coast of two small embayments, situated in the northern and southern parts of the Nessebar Peninsula (Fig. 10). The beach of the resort is one of the longest along the Bulgarian coast with a length of almost 6.0 km and an average width of 53 m. It is composed of fine-grained sands

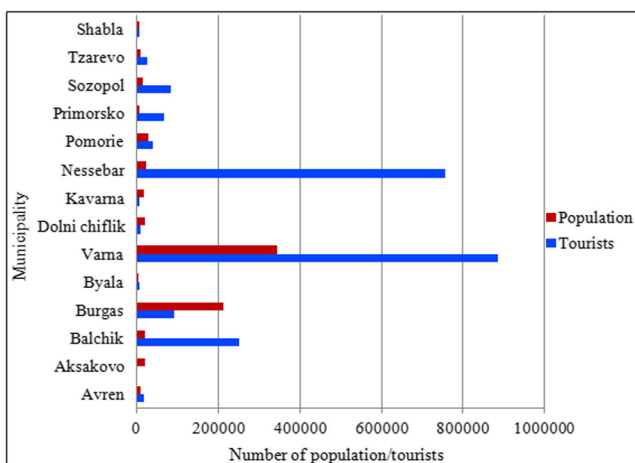


Fig. 9 Number of local population and tourist visitors in 2011 in coastal municipalities

Fig. 10 Locator map of study area



rich in quartz. In the near past, the beach supported an extensive dune system built by the dominant NE and N winds. There were coastal dunes as high as 11 m (Popov and Mishev 1974), however, substantial parts of these dunes have been destroyed in the course of developing the resort's hotels. The Sunny Beach Resort was one of the famous Bulgarian Black Sea resorts established in the 1950s. Since that time, its tourism-based infrastructure has only grown larger and many large hotels have been built in the resort (Fig. 11a and Fig. 11b). According to the official data released by NSI, Sunny Beach had 137 hotels in as of 2012 with 59 840 beds and 3 962 509 overnight visits. This resulted in total revenues

of 85.5 mln Euro. The number of tourists visited the resort is 565 901 with an average stay of 7 days. Sunny Beach's 137 hotels represents 5 % of Bulgaria's 2758 total hotels. Yet, these hotels are so large and popular that they provide 20 % of tourist beds and 20 % of tourist revenue of the whole country.

These data show how important resort areas like Sunny Beach are to the entire economy of Bulgaria. Moreover, coastal population in the municipality of Nessebar has doubled over the period between 1934 and 2011, from 11,838 to 22,348 inhabitants. Based on the most recent Census data in 2011, the population of Nessebar town increased from 2065

Fig. 11 **a** huge hotels located just on the back side of the beach without any setback; **b** some buildings are located directly on active dunes; **c** and **d** huge hotels built on the active beach and dune areas and growing infrastructure of Nessebar town (Photo source: IO-BAS and PSDS – WCU)



residents in 1934 to 10,143 in 2011 (NSI 2012b). Additionally, during the summer peaks, the total population may rise to 95,000, an increase of 327 %. North and south of the Nessebar Peninsula, there are some remaining large dune complexes, but they are under continuing threat due to the increasing growth of the Nessebar town to the west with residence and tourist accommodation infrastructure (Fig. 11c). Stancheva et al. (2011) analyzed changes in the area and contours of the dune complexes of the coastal area of Nessebar Peninsula–Sunny Beach Resort over a 35 year period (1970–2005). A significant reduction of the area of dune ecosystem was identified. In the 1960–70s, the sand dune area was 2.26 km², while this area has decreased to 1.25 km² in 2005. On the other hand, the area that has been subject to new development has significantly grown: from 0.77 km² in 1970 to 6.5 km² in 2005. It is suggested that dunes situated around such a rapidly urbanizing area tend not to regenerate themselves once they are damaged or destroyed. In this particular case of Sunny Beach Resort, it is an open question as to whether scientists and coastal decision-makers will be able to preserve what is left of the dune complexes that still exist there (Fig. 11d).

The indirect and long-term threat of uncontrolled, large-scale development in Sunny Beach Resort is the risk that the existing beach may be substantially reduced or even disappear due to bad planning. Much of the development has been implemented without adequate setbacks i.e. distances that a structure or building should be located back from the sea or beaches and sand dunes (Young et al. 2013), (Fig. 11a and Fig. 11b). This case is not unique to Bulgaria or Sunny Beach. Many of the world's shorelines have been crowded with buildings built too close to the beaches that would naturally tend to migrate landward in response to rising sea level. However, instead of moving landward, developed beaches must be held in place because of buildings, shore protection structures and other developments (Pilkey et al. 2011). Consequently, this may lead to loss of the beaches, which are the most attractive asset for people and main basis for tourism development.

Implications of new residential building developments

The past decade has been a period of easy credit that fuelled a massive growth in property development all over the world. Throughout Europe, huge numbers of single and multiunit dwellings were constructed for sale as holiday homes (Cooper and McKenna 2009). Indeed, the ongoing global economic crisis since 2008, and the preceding boom have had profound impacts on coastlines worldwide. In Bulgaria, as with other EU countries, the increasing population and tourist visitors in the coastal zone has also generated a boom in the desire for coastal property development as residences and/or second

homes. This construction continues today, despite some decrease after 2008 due to effects of the global financial crisis.

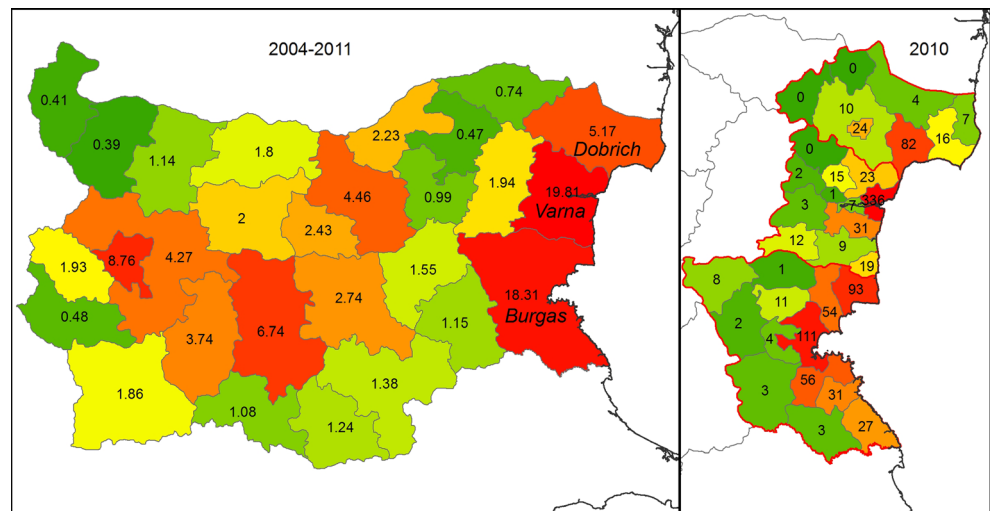
An analysis was conducted of the official data published by NSI for the newly constructed residential buildings during the period 2004–2011 at a NUTS III level. There are 28 regions at NUTS III level with three of them classified as coastal: Dobrich, Varna and Burgas (Fig. 12). Local population in these three regions constitutes 14.67 % of the total country population. However, over 2004–2011, 8363 new buildings were constructed in these area accounting for around 43 % of all new buildings in Bulgaria. These three coastal regions (Dobrich, Varna and Burgas) contain 33 municipalities and 14 of them are coastal municipalities. In 2010, NSI, data indicate that 2350 buildings were constructed in the whole country with 895 of them built in the 14 coastal municipalities. This number accounts for over 38 % of all new constructions in Bulgaria, but on a narrow coastal area occupying only 5.2 % of the country's land area. Thus, from 2004 to 2011 between 39 % and 48 % of all new building constructions in Bulgaria were located in 14 coastal municipalities (Fig. 12 and Fig. 13).

The development processes and concentration of residence buildings in a narrow coastal strip has the same significant destructive impact on the whole coastal ecosystem as discussed above for hotels and resorts. The vast majority of this development is in the form of vacation homes, investment property (hotels, condominiums) and the infrastructure to support tourism. As the value of coastal property has skyrocketed, the demand to protect these investments from coastal erosion and storms has grown. Coastal erosion is commonly seen as a problem rather than a necessary process on a sustainable coast. The result has been a massive transformation of the beaches and dune systems from fully functioning, geomorphic systems with high quality habitat to non-stop engineering projects designed primarily to function as erosion and storm buffers for infrastructure (Cooper and McKenna 2009; Young et al. 2013).

In addition to the environmental impact of residential and tourist developments, there is a socio-economic affect as well including changes of lifestyle and social culture of local population due to tourist jobs and tourist influence. Development along Bulgarian coastal zone also includes construction of blocks with apartments that were mostly built in the large sea resorts as Golden Sands and Sunny Beach, but also in many sea towns and villages. Most of these apartments were purchased by foreigners (primarily from Russia and EU) as their residence or vacation homes. Media accounts indicate that some small towns have experienced significant development. For example, in Byala Municipality 4000 homes have been sold so far, which are primarily seasonal inhabited by foreigners.

This process of overbuilding can lead to unsustainable development of coastal areas which not only impacts heavily

Fig. 12 Developed residential buildings between 2004–2011



on the environment and society but, in the long term, is also eroding the economic benefits of tourism since it destroys the basis of the tourism activity in coastal areas, namely the variety of the landscape and the ecosystem - in the sea and on the land.

Spatial development policy for coastal zone in Bulgaria

As part of the efforts to develop a programme for Integrated Coastal Zone Management (ICZM) in Bulgaria, development of coastal areas is legally regulated by the Black Sea Coast Development Act. The Act has been in force since January 1, 2008 and has been amended few times afterwards (Black Sea Coast Development Act 2008). These activities within Bulgaria were enhanced by the need to harmonize the legislation between all EU countries. The Black Sea Coast Development Act aims for: the creation of conditions for protection, sustained integrated progress and development of the Black Sea coast; ensuring free public access to the sea

shore; protection, preservation and rational use of natural resources; prevention and reduction of pollution; protection of the sea shore from erosion and landslides; and protection of the natural landscape as well as of cultural and historical heritage. Two protected zones are legally regulated in coastal areas. The first zone "A" covers part of the Black Sea aquatory, the coastal line and part of the territory falling in a line of width of 100 m, measured horizontally from the borders of the seashore or the sea beaches. Certain restrictions and specific requirements to human activities are imposed for this zone, such as forbiddance of construction of solid fences, building fences restricting free walking access to the beaches and dunes, discharging unclean 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 % and at least 80 % of land remaining green area.

The second zone "B" zone covers the territories, falling in the line with width 2 km from the borders of "A" zone, with the exception of the urban territories of the populated places, determined on the date of the enforcement of the act. Specific conditions for land use and human activity are stipulated for zone B as well, in order to protect the environment and the resource wealth of coastal areas: construction and exploitation of depots and other facilities and installations for use and treatment of waste, development of industries, also the territories of "B" zone, falling in the borders of protected territories or of protected zones, shall keep their regimes of protection, use and management. In this second zone density of construction is limited to 30 % with minimal green area of at least 50 %.

Although the law has been amended several times, there are still many ambiguous sections including the definition of coastal beach zone, sea coast, seashore, sand dunes, coastal protection and geo-protection structures; as well as to the passportization of shore protection structures. There is still a

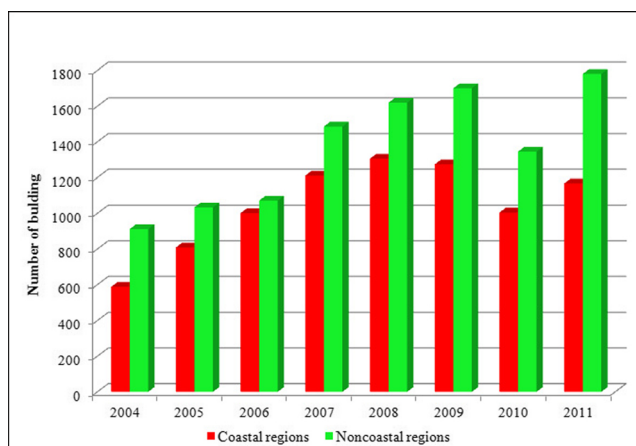


Fig. 13 Constructed residential buildings in coastal and noncoastal regions (2004–2011)

need for accurate delineation and territorial planning for the development and preservation of beaches and coastal dunes, which need to be further outlined in secondary legislation instruments (Marinski et al. 2008). Currently, the Black Sea Coast Development Act determines only management regulations of the coast, but not the extent of protection. And finally, even a good law can fail if there is no mechanism for adequate enforcement of the law's provisions. In Bulgaria, as with many coastal areas of the world, enforcing the existing coastal regulations is difficult and many illegal development activities have occurred despite the existence of the law.

Conclusions

1. In 2011, of the 7 364 570 people that lived in Bulgaria, more than 726 923 people lived in Black Sea coastal municipalities. Coastal municipalities contain 9.87 % of the nation's population, yet, only account for 5.2 % of the Bulgaria land area. Coastal municipalities average 126 persons per square kilometer, compared with 63 persons per square kilometer population density of noncoastal municipalities.
2. In 2011, the number of overnight stays in Bulgaria were 18 855 331, with 13 156 483 (or near 70 %) in coastal municipalities.
3. Due to tourism, the total coastal population increases in summer by 20 %, but at some resorts over 320 %.
4. During 2004–2011 around 43 % of all new residential buildings in Bulgaria were built in the three coastal regions (Varna, Burgas and Dobrich).
5. As of 2011 14 coastal municipalities contain 184 165 tourist beds, or about 65 % of all tourist beds in Bulgaria. During 1999–2011 the number of tourist beds in coastal municipalities increased from 74 277 to 184 165 or by 147 %.

As coastal population in Bulgaria continues to grow, the implications for coastal zone will be even more challenging for planners and decision-makers. With this constant increase of population under the influence of rising sea level there will be more needs for additional infrastructure and defence of properties against erosion, storms and floods. This demand of new measures inevitably will lead to more intensive and adverse impacts to coastal geosystems and ecosystems. Thus, existing facilities and infrastructures in the most crowded coastal municipalities will not be sufficient to meet this increasing pressure of population, tourism and developments.

The main issue of coastal tourism in Bulgaria which needs to be solved is the conflict between the benefits that tourism provides for the economy of the country as a whole and its heavy impact on coastal physical environment in terms of

urbanization, beach and dunes destruction, pressure on sensitive areas, production of waste, and on the social environment, in terms of loss of social and cultural identity and values of the local people. Given that the beach is of key interest for the majority of coastal tourists, destinations largely rely on the beauty and availability of natural beaches. There are many areas along the Bulgarian coast that remain natural and unaltered. As most of the world's beaches become overdeveloped with degraded ecosystems, there remains the possibility for Bulgaria to highlight the touristic potential of those beaches and shorelines that remain natural (ecotourism). This would include development set far back from the sea and very natural and pristine coastal dunes and beaches. However, development pressures are great. In order to preserve these remaining natural coastal areas, Bulgaria will need to develop a detailed Coastal Management Policy with enforceable regulations. And, all facets of Bulgarian society must understand that this protection will preserve not only Bulgaria's natural environment, but also preserve the long-term sustainable economic development of the coastal zone.

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