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Sustainable development of rural areas in protected territory – a case study from Strandzha, Bulgaria

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Abstract. Sustainable development is based on three pillars: sustainable economic growth, social well-being and environment protection. Sustainable rural development is regarded as a multidimensional concept including an equitable and balanced development within a rural area, an increased level of social cohesion and equitability, as well as the assuming of responsibility for using natural resources and revealing at environmental protection. The studied region is located into the Strandzha Mtn - the only Bulgarian territory included in the five priority territories for conservation in Central and Eastern Europe. We have identified some core problems that should be addressed aiming to achieve the sustainable development of this area. Some of them are as follows: the absence of developing projects and focus on the development of individual villages, the lack of willingness of local people to cooperate , local resources are not effectively used and the local community is not adequately involved.

Key words: biodiversity, rural tourism, ecotourism, SWOT analysis.

Introduction

As early as 1993, Strandzha's territory was declared as the only Bulgarian out of the five priority conservation areas of South-Eastern Europe by the European Council of Ministers of the Environment. The motive was defined as nature conservation and sustainable socio-economic development of the region. The Proclamation Order to declare Strandzha as Nature Park is the first administrative act in Bulgaria, through which "sustainable development" is presented as the state's will, a mission for the development of the most south-eastern region of the country, within the protected area's boundaries (Proclamation Order № 30, State Gazette 15/1995).

The UN World Summit in Rio de Janeiro (1992) and in Johannesburg (2002) emphasized the need for sustainable development as a common global challenge. Sustainable development is understood by the international community as a process of social design. The goal is justice between generations, peoples and cultures. In the global response to this challenge, the UN Decade of Sustainable Development (2005 - 2014) plays an important role due to the need to understand the economic, social and environmental aspects of

sustainable development (Agenda 2030 by UN, 2015).

Rural development is regarded as a dynamic process that seeks social change combined with sustainable economic development for the rural community, leading to an improvement of their life quality and environmental protection. The UN's Agenda 2030 and related programmatic documents reveals a path that can lead to good practices and reliable results even if they do not offer universal or global certainties (Mihai & Iatu, 2020). Furthermore, there is a diversity of situations at regional and local levels, so, the application of unified models is not necessarily a solution because of a wide spectrum of particular conditions that must be taken into account. However, it is obvious that some mechanisms must be further developed to comply the international sustainable development perspectives to regional and local scales including rural areas (Mihai & Iatu, (2020).

Based on above-mentioned, the aim of the present study was to identify some of the key issues that need to be addressed in order to achieve sustainable development in such a vulnerable rural area, which exists in the Strandzha Nature Park (Bulgaria).

Materials and Methods

Strandzha Mountain is one of the most interesting and with high biodiversity richness regions in Bulgaria and Europe. Probably due to the specific geographic position, its territory is a natural transition between the vegetation, flora and fauna of Europe and Asia (Fig. 1). The Strandzha Nature Park is the largest protected area in Bulgaria and is an example of successful coexistence of man and nature, of a preserved environment, preserved traditions and cultural and historical monuments. More than 90 types of natural habitats have been established in Strandzha Mtn, of which 62 are terrestrial or wetland and 28 are marine. Forests in the park are with a high protection values and occupy 80% of its territory. They are a remnant of the Tertiary vegetation, preserved due to its remoteness from the Quaternary glaciations, mild winters, high rainfall and air humidity.

Fig. 1. Map of Bulgaria and location of the Nature Park Strandzha.

Strandzha is a mountain with a thousand-year history that has preserved the heritage of several civilizations in its lands and spiritual spaces. The oldest traces of life in the mountains - stone axes and ceramic fragments, found on the Ahtopol Peninsula, date from the Neolithic and Copper Age (6-3 thousand BC). Today, there are 21 settlements with a population of about 5,000 people on the territory of the the Strandzha Nature Park (https://www.strandja.bg/).

For assessing the anthropogenic impact on the ecosystems, a transect along the Veleka River's course was chosen, including six of the bigger villages - Zvezdets, Gramatikovo, Bulgari, Kosti, Brodilovo and Sinemoretz (the mouth of Veleka River), as shown on Fig. 2.

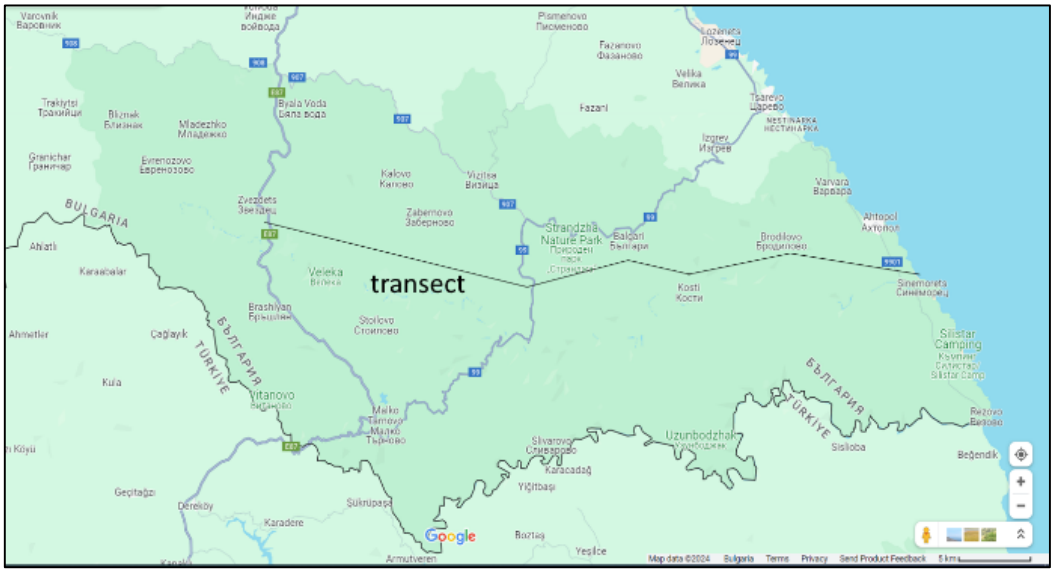

Fig. 2. The Nature Park Strandzha's territory and the transect used in the study.

The present study was done during the active summer season for tourism in Bulgaria (June-September 2023). Field surveys (5-7 days) were conducted monthly including various activities, such as:

i) soil, water and biota observations, as well as *in situ* measurements (soil and water physicochemical parameters) and sampling for further analyses;

ii) observations of tourists (number, activities, natural resources exploitation, ecological culture);

iii) interviews with local people (habit of life, social communities' dynamics, agriculture, husbandry, natural resources exploitation, etc.);

iv) interviews with local authorities and experts from municipalities, museums, lyceums, Directorate of the Strandzha Nature Park, etc.

All these activities aimed to obtain a plenty of data that could be analyzed in order to assess the current ecological status of this protected area, the trend of its future development, the potential threats and problems for achieving sustainability.

These data were clustered in two main groups – environmental indicators and socio-economic indicators.

In addition, in this study, we applied the SWOT analysis in order to provide more comprehensive screening and make some recommendations by analyzing the two sets of indicators and relating them to specific problems and objectives (Fig. 3).

The SWOT analysis is a classic method for strategic planning and as its analyses both the endogenous factors (part of the system that can be directly modified) and the exogenous factors (external to the system, but they can influence it), namely S - Strengths; W – Weaknesses; O – Opportunities; T – Threats (Dobson & Starkey, 1999; Comino & Ferretti, 2016).

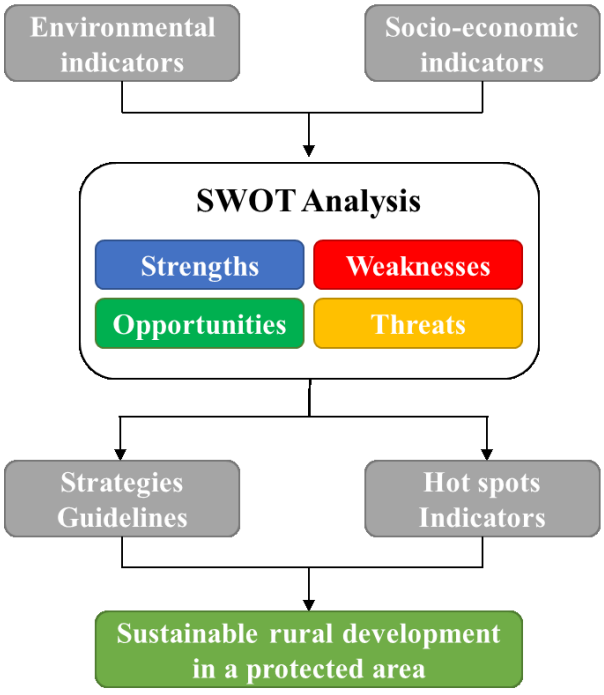

Fig. 3. Methodological flowchart for the SWOT analysis.

Results and Discussion

As highlighted before, the the Strandzha Nature Park represents a strategic protected area characterized by an extraordinary value, from both the naturalist, historical and cultural point of views. Due to these reasons, the adequate management and sustainable development of the park as a resource with multiple values represents both a priority and a challenge for the regional planning authority and the Directorate of the park.

As other authors previously stated (Comino & Ferretti, 2016), the complex territorial system of a natural park represents a challenge for the application of traditional SWOT analysis due to the aforementioned presence of multiple values and objectives. Furthermore, in this context one indicator might be considered as strengths/ opportunities to one value (e.g. recreational opportunities), but it could simultaneously be considered as a weakness/threat to another value (e.g. biodiversity). To address this challenge, some experts' discussions could be organized and the indicators categorization should be clarified as we have done through the field surveys.

Determining the strengths and weaknesses of both local natural and social ecosystems in the area of the Strandzha Nature Park is of high priority for its better management. The opportunities and threats to the sustainable development of this protected area are dictated by the external factors, which we suggest that should be measured and a way to evaluate their impact should be sought. Therefore, we consider that the SWOT analysis is a useful tool for making such an assessment due to its ability to represent in a rational and organized way the influence played by multiple factors on different decision contexts.

The results of the SWOT analysis (Table 1) allowed us to identify the most vulnerable components of the studied rural territories in this large protected area (Weaknesses) that need future intervention and/or monitoring measures, as well as the environmental and physical factors that suffer from higher anthropogenic impact (Threats).

The most valuable aspects of the surveyed rural areas (Strengths and Opportunities) are also revealed, for which monitoring and/or protection measures should be foreseen.

Table 1. Results from the SWOT analysis.

STRENGTHS (S)	OPPORTUNITIES (O)
✓ Farms' system ✓ Museums ✓ Recreational/sports activities ✓ Areas with high naturalistic value ✓ Eco-trails ✓ Cultural festivals ✓ Registered trade mark Strandzha ✓ SlowFood Strandzha ✓ Historical monuments	✓ Unique flora and fauna ✓ Proximity to the Black Sea coast ✓ Accessibility ✓ Bio certification of local producers ✓ Involving local rural communities ✓ Effective usage of local resources ✓ Focus on the development of local villages
WEAKNESSES (W)	**THREATS (T)**
✓ Anthropogenic pressure ✓ Wetlands ✓ Cultivated land ✓ Private areas inside the park ✓ Disposal from former mining activities ✓ Motorboats' trips ✓ Depopulation ✓ Public transport	✓ Natural vulnerability of species and habitats ✓ Parking areas ✓ Waste disposal ✓ Poaching ✓ Protected plants picking ✓ No development projects for villages ✓ Lack of will to cooperate
INDIGENOUS FACTORS	**EXOGENOUS FACTORS**

We agree that from the methodological point of view, the SWOT analysis is very useful tool as it allows to distinguish between the endogenous factors (i.e. variables that are part of the system and that can be directly modified) and the exogenous factors (i.e. variables that are external to the system, but that can influence it; these variables cannot be directly modified, but it is important to keep them under control in order to take advantage from the positive aspects and prevent negative consequences) (Comino & Ferretti, 2016).

In the present study, the SWOT analysis was applied as an input to the creation of possible strategies, by asking and answering the following four questions following Comino & Ferretti (2016):

- How can we use each strength?
- How can we stop each weakness?
- How can we exploit each opportunity?
- How can we defend against each threat?

In particular, with reference to the Strengths and Opportunities to the sustainable rural development of the Strandzha Nature Park, the following aspects should be prioritized:

Unique flora and fauna

The flora of the Strandzha Nature Park is distinguished by its large number of species that were particularly widespread during the Tertiary – 63 Tertiary relicts. Seven of them are found only in Strandzha Mtn from all the European continent.

Amidst this variety, the *Rhododendron ponticum*, the *Daphne pontica* and more rarely the *Vaccinium arctostaphylos* and the *Quercus hartwissiana*, are often the key players and formers of the vegetative communities, while the rest are species of greatest conservation importance – *Ilex colchica*, *Veronica turrilliana* and *Epimedium pubigerum*.

Among the invertebrates in the park there are 164 species of conservation importance. The Strandzha Nature Park is considered as the protected territory with the richest vertebrate fauna in Bulgaria – 404 species. The park ranks among the first in Europe by virtue of its fishing resources. Its territory hosts 41 species of freshwater and passage fish, and another 70 species inhabit the coastal waters. The number of relict species is high – 9 Ponto-Caspian (preserved since the time of the ancient Sarmatian Sea) and 5 boreal relicts (species that originated from the northern regions and reached our latitudes during the Quaternary frosts) (www.strandja.bg).

There are 34 protected territories with independent status within the boundaries of the Strandzha Nature Park, of which 5 are reserves, 17 are Natural landmarks, and 7 are Protected places.

From the five protected Reserves two are object of greater interest:

- Silkosia Reserve (396 ha) is the first reserve in Bulgaria, established in 1933. It is situated 2 kilometers north of Kosti village and 1 kilometer east of Bulgari village. Around 260 species of plants have been found in the reserve. It conserves the most typical and relict beech and oak forests with undergrowth of evergreen shrubs – *Rhododendron ponticum*, laurel, *Ilex*, *Daphne pontica*. The average age of the trees is 120 – 130 years, and in some case – over 200 years. The ornithofauna is extremely diverse. The following bird species are typical for the reserve – jay, oriole, common nightingale, Sardinian warbler, common whitethroat, different species of woodpecker and rapacious birds. Tourist visits are only permitted along the marked trail and only with escort – the inspector-guard of the reserve.
- Sredoka Reserve (607.8 ha) is situated on the steep northern slopes of the lower stream of the Mechi dol River. Sredoka Reserve was created in order to preserve the vast century-old beech forests and the habitats of rare and protected plant species. The following endemic species, typical for Strandzha Mtn, can be found here – *Pyracantha coccinea*, laurel, and *Hypericum grandifora*. Particularly valuable is the large habitat of the laurel, which is located in the central part of the reserve, as well as the compact groups of *Ilex colchica*, individual species, of which can reach height of 6 m and diameter of 10 cm. The reserve permits research activities on its territories as well tourist visits along three strictly regulated and marked tourist routes.

Some further obswrvations across the territory of the protected area were also done:

- Veleka Protected Place (1546.3 ha) was declared a protected area in order to preserve the old oak-beech forests and the picturesque canyon of the Veleka River. It covers the middle stream of the river, the area where it passes through a karst region and forms numerous meanders. A large number of birds find shelter in the century-old forests and rocky slopes, such as *Aquila chrysaetos*

(with Strandzha Mtn being the only place on the territory of Bulgaria where it nests on trees), the black stork, the Egyptian vulture, and a lot of mammals. One of the best preserved populations of the otter is to be found in the Veleka River.

- Marina River Protected Place (47 ha) is thefirst Bulgarian reserve (Gorna Elenitsa-Silkosia), which was established in the beginning of 1933. Its territory includes the Marina River area as well. Later, the Gorna Elenitsa area was taken out of the reserve region. During the 1970s, the Marina River protected place was declared over its most representative territory. Today, it is one of the most visited areas during specialized botanical tours in the Strandzha Nature Park. Avoiding the restrictions of the strict regime in the reserve, in just 30 minutes this "classroom in the open" provides the attendees an opportunity to get acquainted with all the emblematic species of the colchis tertiary flora.
- Veleka River Outfall Protected Place (1 511 ha) is is situated at the outflow of the eponymous river and the lower part of its catchment basin. It preserves the valley of Veleka, the sandy spit (around 500 meters long) and part of the Black Sea seaside. According to the assessment of the landscape indicators Veleka outflow, though in competition with Ropotamo and Kamchia, is undoubtedly the most picturesque spot along the Bulgarian Black Sea coast. It hosts a lot of interesting and rare species like the cotton weed plant (*Otanthus maritimus*), *Stachys maritima*, sea carrot, *Calystegia soldanella*, and this is the only place on the territory of the Strandzha Nature Park where one can see the endangered *Nuphur lutea*. The big migratory route ViaPontica passes over the protected area. Outside the nesting period, this area is used by birds for wintering or rest during migration – for example the little grebe and the great crested grebe, *Phalacrocorax carbo*, shag (a globally endangered species), and mute swan. The protected area is part of the Veleka-Rezovska complex, which is described as priority humid zone of national importance in Bulgaria.

This one was the most exploited by tourists territory of the Strandzha Nature Park during our field surveys.

Cultural festivals

Rural tourism, agricultural tourism, religious tourism, and ecotourism are alternatives or complementary economic activities that could stimulate rural entrepreneurship while decreesing rural community dependency on one main economic sector (agriculture, forestry, fishing, etc.).

There are more than 40 different events all year round, so some of them are mentioned below:

- Kukerovden and Palikosh – they are celebrated in the Kosti and Brodilovo villages, as well as in Malko Tarnovo, seven weeks before Easter.
- Festival of *Rhododendron ponticum* – in May (the flowering period of the Rhododendron ponticum), in different settlements on the territory of the Strandzha Nature Park.
- St. Iliya – July 20. It is the holiday of Byala voda, Gramatikovo, Kosti and Stoilovo villages.
- St. Pantaleon – August 9. It is the holiday of Brashlyan, Brodilovo, Kalovo and Slivarovo villages.
- Festival of the honeydew honey – the first ten days of August, Tsarevo.
- National commemorative gathering in Petrova niva area, in honor of the Ilinden-Preobrazhnie Uprising (1903) – the penultimate week of August.

According to local municipalities, there are some typical increments of the number of visitors for cultural festival up to 18-20 000 people.

Registered trade mark Strandzha

The regional brand of Strandzha aims to develop local products, local agriculture and tourist services based on the sustainable use of natural resources and the "green" public image of the region. Various sites are certified, including entrepreneurs in rural and ecological tourism, farmers, beekeepers, herb collectors, etc. The regional brand was developed by the Directorate of the Strandzha Nature Park and is a guarantee of quality for the tourist services and the goods produced there. The standards for evaluation and certification with the Strandzha brand were developed according to the model of the certification system of the Pan Parks Foundation.

This is an excellent opportunity to attract sustained interest in a saturated market and provide local businesses with a unique niche based on a different and original product.

Digital technologies are recognized as very useful tool for providing new ways to access price and market information, to coordinate

input/output resources (including transport and logistics, finance, and production techniques), which could help the rural agriculture as shown in several case studies (Duncombe, 2018).

Bio certification of local producers

In 2009, the Directorate of the Strandzha Nature Park financed the preparation of a Strategy for the sustainable development of agriculture in the region of the Nature Park, which led to the implementation of various activities.

In the field of agricultural production there are several producers with certificate for biological production of medicinal plants (herbs) (in the municipality of Malko Tarnovo).

In the field of beekeeping, the beekeeping association "Strandzhanski manov med" (Honeydew from Strandzha) is in the process of certifying a significant part of its members as organic honey producers. Since 2004, for more than two decades, during the first ten days of August, the Honeydew Festival has traditionally been held in the town of Tsarevo. The festival provides an opportunity for direct sales to beekeepers, as well as participation in various scientific, applied and administrative presentations and discussions.

One of the complex touristic product, combining unique food, culture and history is the Gastronomic and cultural tour "In the heart of Strandzha - mysticism, local flavors, honeydew honey". It presents the Strandzha Mtn – its nature (old forests, protected species, Dokuzak waterfall, Strandzha's tea plant), sanctuaries (the most ancient Thracian sanctuary Mishkova Niva, one of the oldest Strandzha churches - the church of "St. Dimitar" from the 15th century, the largest megalithic sanctuaries in Bulgaria - Beglik Tash, an ancient Thracian observatory), local producers of honeydew honey and traditional local foods (products from the best buffalo farm in Strandzha, fresh mountain trout, cabbage, etc.).

With reference to the Weaknesses and Threats for rural development of the Strandzha Nature Park (Table 1), the overlay shows that there are some warning spots needing adequate monitoring measures:

Private areas inside the park

This indicator can be regarded as a Weakness/Threat as the non-ecological agricultural practices could seriously damage the environmental state (pesticides application, intensive fertilization, etc.). However, it could be effectively transformed into an Opportunity if some adequate political measures take place.

Some studies showed, that small- and medium-sized enterprises in rural areas are based on local resource use, so they are contributors to the local public budget, job creation, as well to the development of local infrastructure, and engagement with community (Dudek & Wrzochalska, 2017). Furthermore, small-scale farmers using agro-ecological practices are well recognized to produce the food necessary for their diversified, nutritious, sustainable diets, while protecting environmental resources from further degradation (Anderson, 2015; Mihai & Iatu, 2020).

One of the preferred management practices is the long-term growth policies to be reoriented to favor small farmers instead of big agribusiness players to maintain food and environmental security (Boron et al., 2016). New urban-rural relations, in terms of organic food production, stimulate nearby farmers to adopt the best management practices and to develop non-farming activities (e.g., tourism and recreational activities, environmental conservation, forest restoration) or urban-rural migration (da Silva et al., 2017).

Lack of development projects for villages

Almost all of the villages along the Veleka River that we visited during the field surveys are depopulated, lacking public services (health and education centers, public bus transport, etc.) and infrastructure, as well as business and employment opportunities. Although some of the rural communities are engaged with cultural festivals, tourist accommodation, food production, etc., there are no common ideas and common will to cooperate, there are no projects for local development of villages, either.

Regional convergence aims to reduce the geographical inequalities in the distribution of wealth between large cities, towns, and rural municipalities, which are part of an administrative region. Such approach could strength the urban-rural relations in common projects regarding infrastructure, public services, mobility, business opportunities (e.g., start-up firms, employment growth) and tourism activities involving local stakeholders in community decisions (Mihai & Iatu, 2020). Also, rural-urban

linkages should be addressed as a pathway to stimulate rural development perspectives.

Anthropogenic pressure

The main anthropogenic threats that we identified are as follows:

- Tourist load – the concentration of huge number of tourist (18-20000 people) during an event can significantly damage the ecological status of the territory because such are organized not only in the villages, but also in the natural environment.
- Waste pollution – this problem exists not only from the local population and tourists, but also from the migrants (illegal aliens), which already is taking dangerous proportions. In the forest areas and in the protected reserves one can see various household waste, clothes, backpacks, etc., which are potentially dangerous to human health and natural ecosystems.
- Motorboat trips in the Veleka River Outfall – there are two potential problems. The first one is the release of oils and waste products from the boat engines that can be seen as a film on the water surface. The second one is related to the waves caused by the motorboats, which can reach the banks of the river (when speed is more than 20 km/h) and undermine them.
- Agriculture – the usage of mineral fertilizers and chemicals for plant protection is a great problem because these substances can reach the underground waters or surface water bodies situated in the surrounding of agricultural lands and therefore damage the local ecosystems.
- Fishing - Among the fish found in the Veleka River, 7 are endangered species, included in the Red Book of Endangered Species in Bulgaria - *Anguilla anguilla, Cyprinus carpio, Rutilus rutilus, Atherina hepsetus, Chalcalburnus chalcoides*, etc. There are some parts of the Veleka River's course that are also considered as protected areas, but fishing is permitted into the others. So, the populations of endangered fish species could be negatively affected.

Production, hunting, fishing and recreational use usually bring disturbances, such as direct reduction of species populations, habitat degradation and fragmentation. These disturbances in turn may influence ecosystem composition and processes of change in behavioral patterns of species (Geneletti and Van Duren, 2008).

Natural vulnerability of species and habitats

According to the Strandzha's Nature Park Directorate, naturally vulnerable are all the species of fish and reptiles, conservation significant and other species of mosses, hundreds of stenobiontal invertebrates, a third of mammals, a quarter of conservation significant habitats, etc.

Vulnerability includes the sensitive biological and ecological characteristics of species that, in the event of habitat changes or anthropogenic pressures, increase the risk of extinction. The most important sensitive characteristics of species should include: close attachment to a habitat and specialization to a food base; the low reproductive rate, the late maturity and the social structure of the population; predation and interspecific competition; the possibility of hybridization with closely related species of wild and domestic animals.

Habitats of the Eastern beech are closely adapted to a specific environment. Their higrophyllic nature forced them during the Quaternary (and/or Holocene) droughts to seek moisture in the valley parts of the low mountain topography. Any new degree of xerophytization would cause the disappearance of the most characteristic elements from the beech forests.

The regime of the Strandzha rivers is characterized by prolonged low water during the warmer part of the year, and there are only a few rivers with constant water flow. The river biota has adapted over the last millennia to cycles of low water, but today global climate change and the drying of the local climate, intensified by the mass destruction of the old forests in the area, keep the water regime of the Strandzha rivers and the ecosystems that depend on it at a pre-critical level. The excessive and uncontrolled extraction of water from the rivers, as well as their industrial and domestic pollution, the destruction of the river banks and beds, as well as changing the water currents through engineering facilities, may lead to irreversible degradation processes of the modern, but still relict biota of the Nature Park.

Conclusions

For many years, protected areas have been an important tool for conserving nature. They have many functions: protection and maintenance of biological diversity, implementation of environmental aspects, conservation of cultural, architect-

tonic and historical values. These functions are rarely enclosed in the same area, however, when this happens, their management and planning requires great efforts.

This paper provides an attempt to evaluate a methodological framework for analysis, evaluation and definition of future actions needed, according to a comprehensive set of indicators, in order to achieve not only a nature conservation, but also a sustainable rural development in the biggest protected area in Bulgaria – the Strandzha Nature Park.

In order to increase the value of a protected area it's important to have a deep knowledge of the same and of the surroundings. We identified some core problems that should be addressed aiming at to achieve both the resilience and sustainability of this important area. Some of them are as follows: the absence of developing projects and focus on the development of individual villages, the lack of willingness of local people to cooperate, local resources are not effectively used and the local community is not adequately involved.

Sustainable rural development is based on the holistic approach where daily basic needs of rural population should be covered by reliable public utilities combined with technical, socio-economic, and environmental conditions to support regional economies and urban-rural linkages. Therefore, we consider that rural areas should receive the same attention and opportunities from decision-makers, academics, and experts regarding sustainable development policies and investments in infrastructure projects.

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