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BIOGEOGRAPHICAL RESOURCE IN THE REGION OF NORTHEAST BOSNIA AS A FACTOR OF ECONOMIC DEVELOPMENT

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ABSTRACT

Biogeographical resource in the region of northeast bosnia as a factor of economic development

The territory of northeastern Bosnia during the long geological past was under the influence of various ecological factors which caused a big variety of plant and animal species, i.e. biocenosis. From the touristic and geographical aspect, biogeographic touristic resources of northeastern Bosnia are a part of the overall geographic area and they represent comparative advantage in its economic development. Plant life on the area of northeastern Bosnia represents complementary tourist motives which are manifested by different formations, have significant aesthetic, health, unusual, relict, endemic and eminent characteristics of tourist attractiveness. Another element of the biosphere is wildlife. The attraction of the animal world is manifested through a rich and varied wildlife population.

The aim of the study was the identification and valorization of the biogeographic resources of northeast Bosnia, where the guidelines were given in the optimal use and their impact on economic development. The complexity of the research required the use of data that had to be taken from a variety of sources, in addition to literature, there were used planning documents, maps, field sketches and statistical indicators. The collected material and operating data were processed, according to their structure, by contemporary methods including also GIS technology.

Key words: *biogeographical resources, region Northeastern Bosnia, economic development.*

1. Introduction

According to the regional-geographic position northeastern Bosnia belongs to the NE part of North Bosnia. On the east and north it is bounded by the Drina and Sava rivers, on the west and south by the mountains Ozren, Konjuh and Javor. Within this territory, northeastern Bosnia covers the area 6.628 km², where an estimated 1,041,043 residents live. (Statistics Agency of Bosnia and Herzegovina, 2009) The average population density of the area is 157 people per 1 km². Northeast Bosnia has a favorable geographical position, it is connected by traffic to the Pannonian plain and the Adriatic coast. During the long geological history, it has been influenced by various environmental factors that have caused a great diversity of plant and animal species, or biocenosis. Through the study of area, a qualitative and quantitative characteristics of biogeographical potential are examined. They form a good basis for creation of new spatial image in marketing and for networking of economic activities. After the last war in Bosnia and Herzegovina (1992-1995), the territory of Bosnia and Herzegovina is *administratively organized* as a complex state with two entities, the Federation of Bosnia and Herzegovina, Serb Republic and one district of Brčko. The territory of the Federation of Bosnia and Herzegovina is regulated on a *cantonal basis*, Serb Republic is composed of six regional areas. Entities and Brčko District do not have national sovereignty, and the boundaries between them do not have the characteristics of the state border. (The Dayton Agreement, Annex 4 1995).

2. Methodology of research

The basis for the paper is long-term research of biogeographic resources (2006-2011) (Nezirović 2006 Čatović, 2008, Sofradžija, 2010), which allowed the identification of biogeographic resources of northeast Bosnia. Apart from scientific literature, planning documents, maps, field sketches and statistical indicators were also used (3,2001, 10,1981-1984, 13,2014). The second part of the study (Nezirović 2008, Nezirović 2011) includes the analysis of quantitative and qualitative characteristics of biogeographical resources, which are the basis for networking of economic activities. Here are included field research and interviews with representatives of institutions about the incorporation of biogeographical potential in the regional tourism offer. Analysis is complemented by strategic documents, which has given guidelines for the economic development of the area. The paper deals with the area of Northeast Bosnia which administratively includes Tuzla Canton, mesoregion Bijeljina and Brčko District.

2.1. Natural plant communities of forests

Although in nature there is a tight connection of flora and fauna, they manifest differently and therefore they are specially treated in this paper. Natural plant communities of forests, shrubbery and low-growing plants in the region of northeast Bosnia belong to moderately continental floristic area and take turns according to altitudes and floors. *Ecosystems along the Sava river* belong to Pannonian landscapes of forests and thickets where one can distinguish common hornbeam (*Carpinus betulus* L.), Downy oak, oriental hornbeam (*C. orientalis* Mill.), pedunculate oak and narrow-leaved ash; these communities in the southern mountainous area of *Brčko District* continue with forests of common beech, sessile oak and beech on Mount Majevisa. (Government of Brčko District BH in 2007.)

In Tuzla-Spreča basin, along the valleys of the Spreča and Jala rivers, there are mostly forests of sessile oak and pedunculate oak within which there are special forest communities of sessile oak and Turkey oak (*Quercus cerris*), along watercourses there are forests of willow, poplar, alder and hazel. (Redžić, 2009) In the hilly parts there are communities of forests of subalpinebelt beech. (Nurković R., 2001)

In Bijeljina mesoregion, a narrowstrip of the Drina valley of Zvornik, Bratunac and Srebrenica area belongs to Hungarian oak (*Quercus frainetto*) ecosystem in which there are mostly forests of Hungarian oak and Turkey oak (*Quercus cerris*), sessile oak, Downy oak and ash, which according to Birač turn into an ecosystem of mountain beech-fir forests of European beech. (Lakušić R., 1981) *In the southeastern mountainous region* along with the beech forests there are also forests of ash, the Bosnian maple and elm. On the mountain Javor there are mixed forest communities of beech, fir and spruce. Dark coniferous forest biome prevails in Sušica, in which the ecosystem of eastern-Bosnian spruce omorica stands out. (Pedological interpreters, 1981-1984) The forests of white and black pine on serpentinites are distributed at ridges and steep slopes of igneous and basic rocks. Above the Drina river canyon are forests of hophornbeam, beech, fir and spruce. (Nezirović S., 2006) On the rock cliffs prevail Illyrian black pine, orientalhornbeam and mannaash. At the edges of mountain forests prevails low-growing vegetation. (Pedological interpreters, 1981-1984)

2.1.2. Medicinal herbs and mushrooms

In different ecosystems of mountain landscapes, there are habitats of many **medicinal herbs** of which these are nowadays used as supplementary nutrition or for treatments: *Gentiana lutea* - yellow gentian, gentian, *Teucrium montanum*- MountainGermand, *Valeriana officinalis* -valerian, *Sambucus nigra*

-elder, *Crataegus monogyna* –white hawthorn, *Rosa canina* – rose hip, *Hypericum perforatum*- St John's wort, *Juniperus communis*-common juniper, *Castanea sativa* - chestnut, *Cornus mas*- cornelian cherry. (Union of Hunting organizations BH 1997) On meadows one can find red clover, dandelion, buttercup and sorrel. The diversity of forest communities follow floral species such as wild garlic, strawberry, blackberry, blueberry, cowslip, hellebore, anemone, sweet fern, green hellebore. Edible and recognized **mushroom species**: *Cantharellus cibarius*-yellow chanterelle, *Boletus edulis*-bolete, *Macrolepiota procera*–parasol mushroom, *Lactarius deliciosus*-red pine mushroom, *Amanita caesarea*- Caesar's mushroom.(Sofradžija,1997)

2.1.3.Faunal characteristics of the region of northeast Bosnia

Another element of the biosphere is wildlife.(Big Illustrated Encyclopedia of Hunting, 1992) An attraction of the animal world *is manifested through a rich and varied wildlife population*. Northern parts of the region (***Bijeljina and Brčko District***) are inhabited by species that originate from the Pannonian plain. On flat terrains and deciduous forests the following animals have adapted to drier summers and moderately cold winters: *rabbit, fox, wolf, wild boar and deer*, except for the small game, birds (pigeon, pheasant, wild goose, partridge, quail and mallard) have their habitat near the rivers and lakes. In the mountain forests (Tuzla Canton) of Konjuh, Ozren and Majeвица its habitat has a bear, wolf, buck deer, doe deer, wild boar, fox and rabbit. Chamois and grouse live on Konjuh, and since recently the mouflon game, too. (Hunter economic basis of the special hunting ground of Konjuh) On flat terrain along the river Spreča and Tinja, its habitat has pheasant, partridge, quail, rabbit, fox and deer, along Lake Modrac there are *red heron, coot, egret, cormorant, grebe, wabler, whiskered tern, kingfisher and steppe thrush*. (Ćatović, 2010.)

The high and dense forests (Bijeljina mesoregion and narrow section of Podrinje) in the area of Bratunac, Srebrenica and Vlasenica are the habitat of a brown bear.In coniferous forests above the canyon of the river Drina and at the gorge formations, its habitat has chamois. On Sušica, Javor, Nesmotar, Kvarc, Pribičevac, Čauš and Loznik (Bratunac and Srebrenica area), widespread are deer, rabbit, wild boar and wolf. Along the Drina Liver, its habitat has a *wild duck, goose, stork, black kite and wild pigeon*. (Nezirović, 2008) The canyon of the river Drina is inhabited by birds of prey *eagle, falcon and hawk*. (Map 2.)

2.1.4.Fauna of the river flows

The Sava River (Brčko, Bijeljina) is the habitat for *carp, barbel, catfish, grass carp, zander*, the Spreča River (Tuzla Canton) for *trout, grass carp, carp, nase*. Mountain rivers (Bijeljina mesoregion) are inhabited by numerous species of *fish and amphibians*. In addition to brown trout, in the rivers Drinjača, Tišća, Zeleni and Studeni Jadar there are also grayling, chub, nase, Danubian roach,

barbel, Mediterranean barbell (*Barbus meridionalis petenyi*) and marble trout. The Drina River is inhabited by Drina's marble trout, trout, grayling, carp and nase. (www.ljipljan.com fish base 4.3.2016)

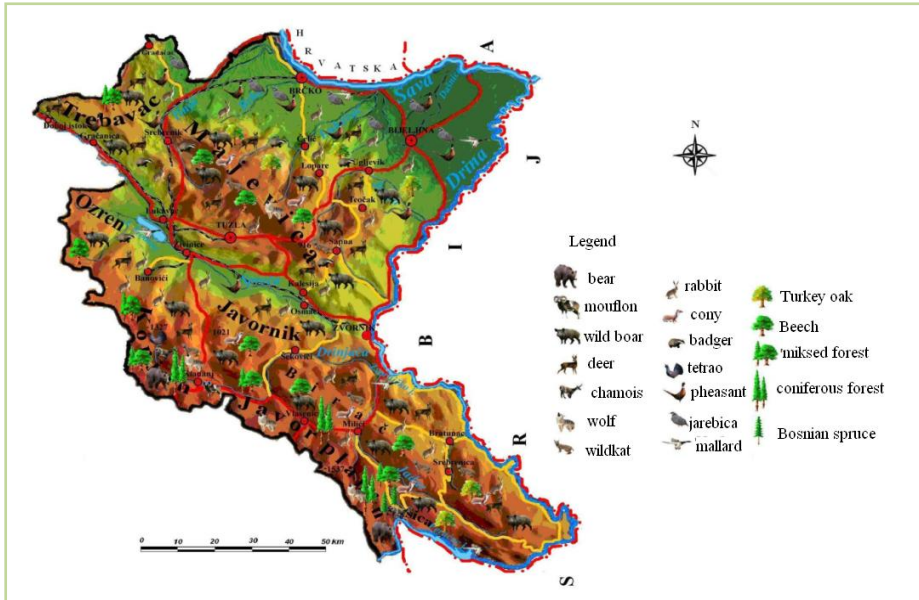


Figure 1: Fauna of the region of northeast Bosnia.

3.Research findings and discussion

As a natural and economic resource, forest areas by its generally useful functions stipulate a permanent relationship between man and the nature. (Union of Hunting organizations BH 1997) In steep mountainous area forests possess a protective function, nearby towns it is a function of welfare, forest purifies the air acting as a reservoir of water, and is ideal for the holidays. In easily accessible areas wood is economically exploited and forest fruit is a food source for humans and animals. In the mountains of northeast Bosnia there are plateau with predominantly forested vegetation and large grassy zones of meadows and pastures where there are different types of decorative, medicinal and aromatic plants.(Nezirović S., 2011)Areas under pastures are favorable for organized trips and walks. Mountain areas have meadows where ***picking herbs and mushrooms*** is more and more popular, which is a significant element of the economy. (Pedological interpreters,1981-1984)In the mountainous area of Kladanj, Vlasenica, Bratunac and Srebrenica one can organize collecting of aromatic herbs and secondary forest products (wild strawberry, blackberry,

blueberry, wild garlic and mushrooms) in limited quantities for commercial purposes in order to avoid distortion of the size and structure of the forest. Collecting of herbs and mushrooms besides its useful purposes and *substantial revenue*, serves the purpose of recreation of population. Walking through the meadows and mountain areas people become more and more nature lovers. (Sofradžija,1997)Plant life in northeastern Bosnia is rich, both with the quality and quantity, species, endems and relicts. It represents a complementary motives and gives great significance to the valorisation of mountains. Forest through its recreational properties affects the tourist movements towards mountains. It has various attractive features, e. g. beech trees are shady, birch forests are bright, while the coniferous ones are clean and fragrant. Mixed forests, small meadows and pastures are the natural habitat of wildlife.

3.1.Agricultural production

Intensive cultivation of grains, a number of varieties of fruits, vegetables, medicinal plants and mushrooms contribute to cultivating steep meadows and pastures at high altitudes which is important for the survival of small farms. Recognizing the above resources can be economically worthwhile for implementation of various programs and projects. Production should be focused on environmentally healthy and demanded food, domestic products such as *pumpkin seeds, ground flour from mills in the creek, jam, honey, berries, blueberries and different types of juices*. According to the structure of agricultural lands and demands, guidance is given on the following orientations in the production of crops.

Table 1: Possible strategic orientations in the agricultural production of Northeast Bosnia.

Agricultural product	Municipality
Fruit (fruit tree)	Banovići, Brčko, Doboј Istok, Gračanica, Gračanica, Gradačac, Kladanj, Lopare, Lukavac, Sapna, Srebrenica, Srebrenik, Tuzla, Ugljevik, Živinice, Zvornik
Fruit(strawberry, raspberry)	Bratunac, Brčko, Čelić, Gračanica, Lopare, Osmaci, Sapna, Srebrenica, Teočak, Zvornik
Greenhouse	Bijeljina, Bratunac, Brčko, Čelić, Kalesija, Srebrenik, Teočak, Tuzla, Ugljevik, Živinice, Zvornik
Grains	Bijeljina, Brčko
Medicinal plants	Banovići, Srebrenik, Lukavac, Kladanj, Sapna, Milići, Šekovići, Vlasenica
Beekeeping	Čelić, Srebrenik, Lukavac, Brčko, Lopare, Banovići, Kladanj, Sapna, Šekovići, Milići, Osmaci, Zvornik, Bratunac, Srebrenica, Teočak

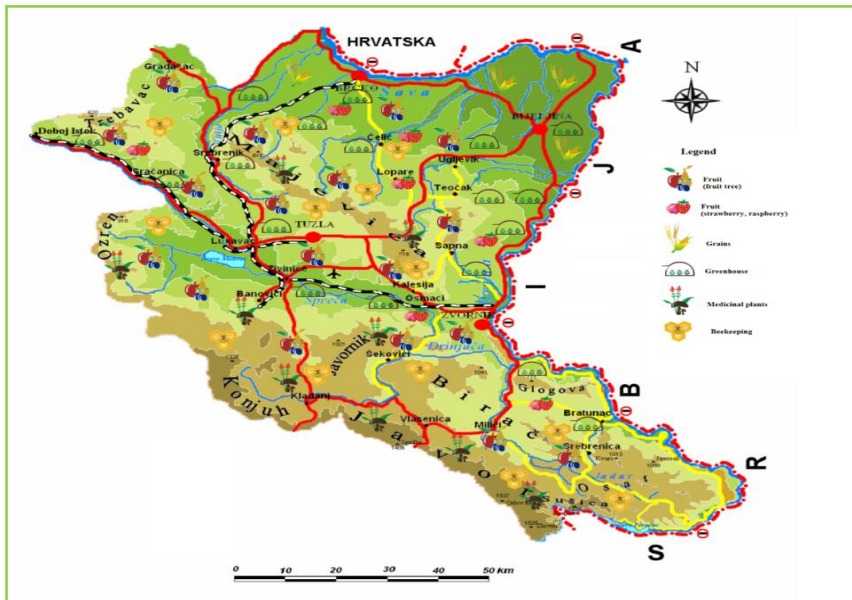


Figure 2: Possible strategic orientations in the agricultural production of Northeast Bosnia (Map done by Author)

3.3. Flower cultivation

Within complementary tourism industry, **the flower cultivation** is significant. This is especially true during the growing season, when gardening provides employment opportunities for seasonal labor. For now, greenhouse production of flowers is present in the area of Kalesija, Zvornik and Srebrenica, which can be significantly expanded. Presentations of flowers can be arranged in various exhibitions, tourist events and fairs with accompanying programs. Sustainable agriculture, ecotourism and sustainable forestry have great similarities and connections: basically all three branches of the economy are predominantly based on biodiversity.

Crop production and beekeeping in the hilly and mountainous region has the significance of additional earnings for rural population in the region of northeast Bosnia. Increasing production capacity and application of new technologies, acquiring new knowledge and healthy food production would allow opening of markets and product placement to catering industry.

3.4. Development of hunting tourism

Natural conditions: geographic location, climate, water and land configuration are significant for the number and diversity of wildlife. Mixed forests, pastures and small clearings are the natural habitat of wildlife. Hunting grounds of northeast Bosnia have a favorable climate, vast forest areas and mountain meadows which provides conditions for development of hunting tourism. Rich high mountain *community hunting areas* in northeastern Bosnia are *Javor* and *Sokolina*, among wealthier lowland hunting area in Semberija are hunting associations *Jelen*, *Crnjelevo* and *Golub Brodac*. (Hunting organizations union BH 1997.)

At hunting grounds of northeastern Bosnia one can grow and sustainably use the economically valuable game preserves. Unfortunately the last war disturbed the biodiversity of hunting fauna and numerous hunting-technical facilities were destroyed. Rare and endangered wildlife species are disappearing, their sustainability requires entering the live game in their indigenous habitats. In recent years substantial measures have been taken to renew hunting areas related to growing and developing the hunting grounds. Positive examples are the introduction of new game of *mouflon and deer* in hunting ground Sokolina, *pheasant* in hunting grounds Konjuh (Public company, Forests of the Tuzla Canton) and *Fazan-Brčko* as well as *closed season on deer* in Semberija's hunting grounds. Freeing pheasants, besides enriching hunting grounds, the rest of the breeding game is saved and the quality of plant communities improved. (Government of Brčko District BH, 2007) In the hunting grounds, one should take greater measures in organization, sustainable management and protection



Figure 1. Mouflon game

Source: Special hunting ground of Konjuh

of indigenous species of *wildlife: bears, chamois, capercaillie or the wood grouse, grouse, quail, partridges* and other game species. Fauna as a complementary value enables development of hunting and fishing. In a special hunting areas (reserves), it is used to enrich the tourism offer that is manifested in the form of a photo safari tourism. Wild animals, such as chamois, roebuck and tetrao in the hunting ground Konjuh and Sušica, represent a special attraction for visitors. Development of hunting is slowed by the lack of receptive capacities for accommodation, poor transport links and a lack of culinary options.

3.4. The development of fishing

Fishing in northeastern Bosnia is organized through 20 sports - fishing organizations. The waters they include are the river Sava, Drina, Spreča and their tributaries. (Fishing union Ljipljen) Sport fishing is organized on salmonids (*trout, grayling, marble trout*) and cyprinid species of white fish (*barbel, grass carp, chub, common rudd, bream, zander, carp, nase*). From the sporting point of view, fishermen have a greater interest in salmonids. (Fishing union Bistro)

This especially applies to the flow of the Drina River, which abounds in extraordinary instances of noble species of fish, especially large specimens of *Drina marble trout and grayling*. (Fishing union Pastrmka) The natural beauty of the fishing areas and attractive species of fish make the motives for the possibility of leisure, recreation and entertainment provided by fishing. Especially convenient area for sport fishing is a coastal area of Bratunac gravel pit, covered with grass areas and tree-lined *alder, willow and poplar*. (Archive of the municipality of Bratunac,)



Figure 2: The coastal area of the Drina favorable for fishing in Bratunac (Photo by Author, May, 2017)

For those fishing enthusiasts, Milići along the Jadar river and Šekovići along the Drinjača river (Urbanistički zavod RS, 2008) favourable conditions. For the improvement of fishing in the mentioned rivers and their lakes' reservoirs, it is of great significance to increase the numerical strength of the noble species of fish. Fly fishing should be introduced as a form of fishing on the rivers, which causes more and more attention of lovers of this kind of recreation. In addition to fish stocking, one must protect the access to water and open access to the coasts, prevent illegal construction of houses and restaurants. (Mitar Novakovic, Mirko Novakovic, 2006)

4. Conclusion

The analysis of the whole area has highlighted the following conclusions. According to the tourist-geographical aspect, biogeographical tourist potential of North-eastern Bosnia is the part of the entire geographical area and represents a comparative advantage in its economic development. The implementation of various programs and projects in the agricultural production brings economic benefits to the population. Growing crops of grains, fruits, vegetables and herbs is important for the survival of small businesses. For the development of fishing, it is noted that accommodation capacity for receiving and longer stay of sport fishermen from remote areas is insufficient. Lovers of nature and fauna stated that the tourist industry lacks culinary specialties, and ethnic custom features such as prepared dishes and plum brandy (šljivovica). The wildlife in the region of North-east Bosnia has enormous economic value and therefore it is necessary to manage it in a sustainable way.

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