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BIODIVERSITY, NATURAL PROTECTED AREAS AND SUSTAINABLE DEVELOPMENT. CASE STUDY: BRĂILA COUNTY

ABSTRACT

Biodiversity is a huge variety of ecosystems, species and genes, which represent the natural capital, and provides services supporting the economy. The biodiversity values make up the natural heritage that must be used by the present generations without jeopardizing the chance of the next generations to enjoy the same living conditions. The protected areas represent the most important method to preserve biodiversity and to provide development patterns in harmony with nature, in the context of the fast economic development in the last decades.

Key words: biodiversity, natural protected areas, sustainable development.

JEL Classification: Q20, Q57.

1. INTRODUCTION

Biodiversity represents the primordial condition of the human civilization existence and provides the support system of life and of the socio-economic systems development.

From the conceptual point of view, biodiversity has its intrinsic value, to which ecological, genetic, economic, social, scientific, educational, cultural, aesthetic, recreational and last but not least, ethical values are also added.

The ecological value of biodiversity represents the mosaic created by the different communities of organisms and the set of functional relations governing present ecosystems.

The genetic value of biodiversity represents the variability of genotypes and genofund within the populations of a given species, throughout its spreading area. Man is also a creator of biodiversity and not only a factor that erodes biodiversity.

The economic value of biodiversity becomes obvious through the direct utilization of its components: the renewable natural resources (the fossil fuels, minerals, etc.) and the non-renewable natural resources (crops and animal species utilized as food or for energy production or for the extraction of some substances, such as those used in the pharmaceutical or cosmetics industry. We do not know all

the opportunities of any species and the way in which it can be utilized in the future, but the loss of any of these limit mankind's development opportunities as well as the opportunities of the efficient utilization of natural resources.

Biodiversity has an important role in the life of any society, being reflected in the society culture and spirituality – folklore, art, architecture, literature, traditions and practices in land and resources utilization.

The aesthetic value of biodiversity is a basic human necessity, the natural and cultural landscapes being the basis of the tourism and leisure sector development.

But maybe the most important value of biodiversity is of ethical nature, the human society having the obligation to ensure the preservation and sustainable utilization of all biodiversity components.

The present study intends to make an assessment of Brăila county biodiversity, of its preservation state, of the anthropic activities that have led or could lead to its degradation.

2. STATE OF KNOWLEDGE

The biodiversity concept was introduced by Walter G. Rosen[1] in the year 1986, coming into prominence on the occasion of the UN Conference for Environment and Development from Rio de Janeiro in 1992. Two years later, Harper, J.L. and Hawkworth, D.L. (1994), stated that "biodiversity represents in fact the biological diversity", which was defined by them by "including two kin concepts: genetic diversity and ecological diversity".

Leveque. C. and Mounoulou, J.C. (2001), considered that biodiversity "must refer only to the relations that regard the connection between man and nature, while the biological diversity should also refer to the evaluation and inventory of species". Most specialists consider that biodiversity means in a way "everything" (Cogălniceanu, D., 1999).

If biodiversity is everything, *i.e.* everything that composes it, ensuring the environmental services and the resources without which man could not exist anymore, biodiversity preservation represents the basic condition for maintaining life on Earth. Biodiversity conservation can be mainly achieved in two ways: in-situ and ex-situ (Fig. 1).

The in-situ conservation presupposes:

– Ecosystem conservation by establishing a system of protected areas or zones needing special conservation measures, in parallel with the creation of a proper management system;

– Species conservation within the natural or semi-natural habitats or ecosystems.

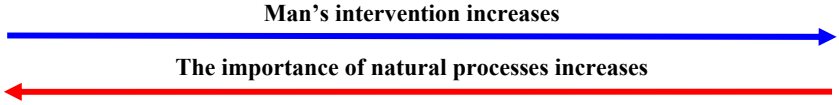
[1] Within the *National Forum on BioDiversity*, organized by the U.S. National Academy for Sciences, Washington D.C., 21–24 September 1986.

The ex-situ conservation consists of:

– Maintenance and propagation of living organisms in zoological and botanical gardens;

– Maintenance of seeds, embryos, genetic material, micro-organisms by freezing.

In-situ		**Ex-situ**	
Ecosystem conservation	Species conservation	Living organisms collections	Gene banks
Protected areas (national parks, biosphere reserves, natural parks, natural monuments) Marine sanctuaries	Sanctuaries for protected species and protected areas In-situ gene banks Hunting reserves Seed reserves	Zoological gardens Botanical gardens In captivity reproduction programs	Pollen and seed banks Genetic material banks Microbes cultures Tissue cultures



Source: Cogălniceanu, D. (1999), *Management of the natural capital*, Ars Docendi Publishing House, Bucharest.

Figure 1. Biodiversity management mechanisms.

The study of biodiversity was carried out in several stages. While in the late1960s only studies at local level were conducted (the Red list species – endangered, endemic, rare species), after 1990 the studies were characterized by a global perspective on biodiversity. The most important event was the Summit in Rio de Janeiro in the year 1992, when the bases of sustainable development principle were laid, and a number of 153 states, including the European Union, signed up the UN Biological Diversity Convention (BDC), which was enforced on December 29, 1993. In early 2010, BDC was ratified by 193 parties and nowadays represents the most important international instrument in the coordination of biodiversity policies and strategies at global level. Romania ratified BDC by Law no. 58/1994.

The three BDC objectives[2] are the following: conservation of biological diversity, sustainable use of the biological diversity components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. "The conservation and sustainable use of biodiversity in the natural capital structure is substantiated and instrumented within the protected areas network" (Vădineanu, A., 2004).

The protected areas represent the most important method to preserve biodiversity and to provide development patterns in harmony with nature, in the context of the accelerated economic development in the last decades. The International

[2] Convention of Biological Diversity, http://www.cbd.int

Union for the Conservation of Nature (IUCN) defines the protected area as being "a clearly-delimited geographical space, acknowledged, designated and administered on the basis of certain legal acts or through other efficient means, targeting the long-term conservation of nature, as well as of the environmental services and related cultural values".

Natura 2000 represents the keystone of the EU policy in the field of biodiversity and it represents a network of protected natural areas designed in order to implement the directives: *Habitats* (Directive on the conservation of natural habitats, of wild flora and fauna 92/43/EC) and *Birds* (Directive on the conservation of wild birds 2009/147/EC). Thus, this network protects the natural habitats and the wild species of endangered plants and animals at EU level, consisting of the following categories of protected natural areas of community interest (Natura 2000 sites):

- *Special preservation areas* that preserves habitats and species of plants and animals, except for birds, in conformity with the Habitat Directive; they are declared on the basis of the recognition of the Sites of Community Interest by the European Commission;
- S*pecial avifaunistic protection areas* for the protection of all wild birds species, in conformity with the Birds Directive.

By joining the European Union, Romania has the obligation to include a certain percentage of its natural space into this network, so as to ensure the conservation of it, if the respective areas accommodate habitats and species of community interest.

In conformity with Art. 5, paragraph (1) from the *Emergency Ordinance. no. 57/2007 on the regime of the protected natural areas, the conservation of natural habitats, wild flora and fauna,* the categories of protected natural areas in Romania are the following:

a) of national interest: national parks, natural monuments, nature reserves, natural parks;

b) of international interest: wetlands of international importance, biosphere reserves;

c) of Community interest or Natura 2000 sites: sites of community importance (SCIs), special preservation areas, special avifaunistic protection areas (SPAs);

d) of county or local interest: established only on the private/public area of the administrative territorial units.

3. MATERIAL AND METHOD

The study intends to present the ecosystems under protection regime on the territory Brăila county from the point of view of sustainable use of natural resources. The study is also an approach to the harmonization of aspects linked to nature conservation with those represented by the economic interests present in the zone, with the value of nature conservation, to facilitate the understanding that the existence of the protected natural areas can benefit the local communities on their territory or in their vicinity.

The characterization of the protected natural areas comprised two components:

– the theoretical component: identification of the national and international legislation into effect, description of the protected natural areas;

– the practical component: state of the protected natural areas from the components point of view (natural habitats, flora, fauna, etc.), of the management regime, the impact and tendencies of anthropic activities upon these.

4. RESULTS AND DISCUSSIONS

4.1. Biodiversity and the protected natural areas in Brăila county

In conformity with the Romanian legislation on the regime of protected natural areas, the protected natural areas in Brăila county are the following:

a) Protected natural areas of national interest: in Brăila county there are 3 protected natural areas of national interest with a total area of 24962.8 ha, the greatest part being located in the flood plain area of the Danube –Natural Park *Balta Mică a Brăilei* (Table 1).

Table 1
The protected natural areas of national interest in Brăila county

No	Name	Declaration act	Category of protected area	Area (ha)	Location/ Communes	Administrator
1	Balta Mică a Brăilei	Law 5/2000	Natural Park	24,123	Chiscani, Gropeni, Stăncuța, Berteştii de Jos, Mărașu	RNP Romsilva by specially established administration structure
2	Jirlău Vișani Lake	Law 5/2000	Nature reserve	838.66	Jirlău, Vișani and Galbenu	–
3	Camnița Forest	Law 5/2000	Nature reserve	1.2	Râmnicelu	Forestry Directorate Brăila

Source: Report on the state of environmental factors, Brăila Environment Protection Agency, 2011.

The Natural Park Balta Mică a Brăilei is located in the river plain with natural flooding regime of The Danube River, between Vadu Oii and Brăila municipality. We could say that this is an interior delta on the inferior part of the Lower Danube.

Despite the changes in the structure of the integrating ecological systems and at its level, Balta Mică a Brăilei (Small Brăila Swamp) preserves important ecological values, being an important component of the Lower Danube System, located upstream the Danube Delta Biosphere Reserve. It is the only area that has remained under natural hydrological regime (floodprone area), after dyking, in a percentage of 75%, of the former swamp Balta Brăilei and the creation of the agricultural zone Insula Mare a Brăilei – Great Brăila Island. Out of the total area, 53.6% is covered by alluvial forests, 6% by pastures, 12.9% by wet zones and 27.5% by lakes (ponds and swamps).

Half of the identified ecosystems – swamps and forests specific for flood river plains – are natural, the greatest part of this area preserving the structure and functions of former Brăila swamp of the 1950s. These are also natural habitats of community interest for which conservation priorities have been established.

The zone is well-known for its ornithological importance, as it is located on the most important migration passage of the birds in the inferior basin of the Lower Danube, at the midway of migration routes between the nesting places in Northern Europe and the winter refuges in Africa. As a great part of these are aquatic birds, in the year 2001, Balta Mică a Brăilei (Small Brăila Swamp) was declared RAMSAR site, the second after the Danube Delta, in conformity with Ramsar Convention, by which the wet zones of international importance as habitat of the aquatic birds are protected, convention to which Romania is a signing part; in 2007 year, it was declared both special avifaunistic protection area and site of community importance.

The Nature Reserve Lake Jirlău Vişani is located in the western part of Brăila county, on the left bank of Buzău river, on the territory of communes Jirlău, Vişani and Galbenu, with a total area of 838.66 ha. In conformity with the Decision of the county council Brăila no. 20/1994, the Lake Jirlău Vişani was declared ornithological refuge and in conformity with Law *no. 5/2000 for the approval of the National Territory Management Plan* – section III – protected zones, was declared nature reserve.

The reserve is a less deep lake, with a vegetation typical for permanent swamp, mainly consisting of reed, bulrush and rush. The lake ensures passage habitats, habitats for feeding and nesting for a series of migratory and sedentary bird species from the wet zone. The presence of certain habitats and species of community interest was the reason for including this lake in the special avifaunistic protection area Balta Albă – Amara – Jirlău, as well in the site of community importance Balta Albă – Amara – Jirlău – Lacul Sărat Câineni. The rich precipitations in winter time determines an increase of the area and depth of the lake until the warm months, when these diminish as a result of high temperatures.

The Nature Reserve Camnița Forest – Camnița Forest has an area of 1.2 ha and it is located in the commune Râmnicelu, near the village Constantineşti, between the county road 221 and the Buzău River. This reserve is placed inside the Camnița forest; the forest has about 550 ha, mainly consisting of acacia, white and black poplar and willow trees.

The forest natural vegetation consists of a mixture of ash trees and acacias, of unknown origin, of approximately 45 years old. It was declared a nature reserve because the ash tree is a rarity in the landscape of Brăila county. At the same time, this protected area is also a seed reserve, mentioned in the "National Catalogue of the sources for forest reproduction materials in Romania", the selection goal being the quantity and quality of wood.

In conformity with the County Council Decision no. 20/1994, Camnița Forest was declared forestry reserve and in conformity with the Law no. 5/2000 for the approval of the national territory management plan – section III – protected zones,

it was declared nature reserve. The conservation is favoured by the absence of tourism practice on the reserve territory.

b) Protected natural areas of international interest

In conformity with the Ramsar Convention through which the wetlands of international importance are protected as habitat for the aquatic birds, convention to which Romania is a signing party, in the year 2001 Balta Mică a Brăilei (the Small Brăila Swamp) was declared RAMSAR site (position 1074 on Ramsar list) under he name Insula Mică a Brăilei (the Small Island of Brăila). 207 species of birds were inventoried, representing half of the species of migratory birds characteristic for Romania, among which 169 are internationally protected species, through the *Conventions in Berne, Bonn and Ramsar*.

c) Protected natural areas of community interest

In conformity with *Government's Emergency Ordinance no. 57/2007 on the regime of protected natural areas, the preservation of natural habitats, of wild flora and fauna,* approved with modifications and completions by *Law no. 49/2011*, the protected natural areas of community interest (Natura 2000 sites) are represented by the special avifaunistic protection areas (the sites of community importance) and the special preservation areas.

The goal of *the special avifaunistic protection areas* is to preserve, maintain and where appropriate, to bring back into a favourable conservation state the birds species and the specific habitats, designated for the protection of the wild migratory birds of community interest, in conformity with the Birds Directive. Thus, on the territory of Brăila county, 9 special avifaunistic protection areas have been delimited, totalling an area of 59,788.37 ha, which represents 12.5% of the county area (Table 2).

Table 2

Special avifaunistic protection areas in Brăila county

Crt. no.	Name	Code	Area at county level (ha)	Administrative territorial units from Brăila county where the area is located
1	Balta Albă – Amara – Jirlău	ROSPA0004	1,213.8	Galbenu, Gradiştea, Jirlău, Vişani
2	Balta Mică a Brăilei	ROSPA0005	24,821.8	Berteştii de Jos, Brăila, Chiscani, Gropeni, Mărașu, Stăncuța
3	Balta Tătaru	ROSPA0006	8,583.6	Dudeşti, Roşiori
4	Dunărea Veche – Brațul Măcin	ROSPA0040	6,228	Frecăței, Mărașu
5	Ianca – Plopu – Sărat	ROSPA0048	1,982.1	Ianca, Movila Miresii, Traian
6	Lunca Siretului Inferior	ROSPA0071	1,824.6	Măxineni, Siliştea, Vădeni
7	Măxineni	ROSPA0077	1,504.3	Măxineni
8	Berteştii de Sus – Gura Ialomiței	ROSPA0111	2,962.7	Berteştii de Jos, Victoria, Însurăței
9	Valea Călmățuiului	ROSPA0145	10,667.8	Bordei Verde, Cireşu, Însurăței, Surdila-Greci, Ulmu, Zăvoaia, Dudeşti

Source: Government's Decision no. 1284/2007 on the declaration of special avifaunistic protection areas as integrating part of the European ecological network Natura 2000 in Romania.

• Balta Albă-Amara-Jirlău is located in the counties Brăila and Buzău and it comprises the lakes that gave the name to the area. In the year 2011, its area diminished; in Brăila county, its area decreased from 1,898.5 ha to 1,213.8 ha, which represents 60% of the total area and it also includes the Nature Reserve Jirlău Vişani.

• Balta Mică a Brăilei (the Small Swamp of Brăila) partially overlaps the area of the natural park and site of community importance with the same name, a small area (4% of the total area) belonging to Ialomița county. In the year 2011, the area was enlarged by including the Danube dyke-bank zones, as well as some land areas in the eastern part of the localities Polizeşti and Berteştii de Jos.

• Balta Tătaru was also extended to county Ialomița in the year 2011, and its area increased from 521 ha to 9,981 ha. In the county Brăila, it covers 8,583.6 ha and comprises 5 lakes (Tătaru, Plaşcu, Chioibăşeşti, Colțea and Padina) and the forests Colţea and Tătaru, as well as zones from their vicinity, which make the connection between them. The lakes are salt lakes, with small depths, currently ranging from 0.5 to maximum 1 m; under the prolonged drought conditions, the water surface area very much diminishes, muddy beaches emerging.

• Dunărea Veche-Brațul Măcin (the Old Danube-Măcin Branch) is located in the counties Brăila, Tulcea (almost half of the area) and a very small part of it lies in Constanța county. In the county Brăila, it covers an area of 6,228 ha and it consists of the Măcin Branch of the Danube, its dyke-bank area, as well as the Lakes Blasova and Zăton from the Big Island of Brăila.

• Ianca-Plopu-Sărat is fully located on the territory of Brăila county and it comprises the lakes Ianca and Plopu, as well as the lakes Movila Miresii, Esna, Lutu Alb and Seaca. Except for the lake Movila Miresii, the other 3 lakes are fisheries.

• The Lower Siret river plain is located in the counties Brăila, Galați and Vrancea. Although its area diminished in the year 2011, in the county Braila it covers a larger area (1,824.6 ha) and comprises the river course and its dyke-bank area.

• Măxineni is fully located in the county Brăila. In the year 2011, water supplying did not work anymore, such that the largest area was dried, which enabled a rich growth of spontaneous meadow vegetation.

• Berteştii de Sus – Gura Ialomiței is located in the counties Brăila and Ialomița; in the county Brăila it covers an area of 2,962.7 ha, which accounts for 43% of the area.

• Valea Călmățuiului is located in the counties Brăila and Buzău and it partially overlaps the area of the site of community importance with the same name, having a larger area than this.

The sites of community importance represent those areas which significantly contribute to the maintaining or the restoration to a favourable preservation state of the natural habitats or the species of community interest and which could significantly contribute in this way to the existence of the "NATURA 2000" network and/or significantly contribute to maintaining the biological diversity. On the

territory of Brăila county, sites of community importance have been declared, totalling an area of 43,318.74 ha and representing 9% of the county area (Table 3).

Table 3
Sites of community importance in Brăila county

Crt. no.	Name	Code	Site area at county level (ha)	Administrative territorial units in Brăila county in which the area is located
1	Balta Albă – Amara – Jirlău – Lacul Sărat Câineni	ROSCI0005	2,835	Galbenu, Gradiştea, Jirlău, Vişani
2	Balta Mică a Brăilei	ROSCI0006	20,872	Berteştii de Jos, Brăila, Chiscani, Gropeni, Mărașu, Stăncuța
3	Brațul Măcin	ROSCI0012	4,503.4	Frecăței, Mărașu
4	Lunca Buzăului	ROSCI0103	978.18	Făurei, Galbenu, Jirlău, Surdila-Greci, Vişani
5	Lunca Siretului Inferior	ROSCI0162	1,755.67	Măxineni, Siliștea, Vădeni
6	Valea Călmățuiului	ROSCI0259	8,603.04	BordeiVerde, Cireşu, Însurăței, Surdila-Greci, Ulmu, Zăvoaia
7	Ianca – Plopu – Sărat – Comănească	ROSCI0305	3,222	Ianca, Movila Miresii, Romanu, Traian, Tudor Vladimirescu
8	Lacul Sărat – Brăila	ROSCI0307	377	Brăila, Chiscani, Tichileşti
9	Sărăturile de la Gura Ialomiței – Mihai Bravu	ROSCI0389	172.45	Berteştii de Jos, Victoria

Source: H.G. nr. 1284/2007 regarding the declaration of the special avifaunistic protection areas as integrating part of the European ecological network Natura 2000 in Romania.

- Balta Albă-Amara-Jirlău-Lacul Sărat Câineni partially overlaps the special avifaunistic protection area Balta Albă-Amara-Jirlău, but it also includes Lacul Câineni (Lake Caineni).
- The Small Swamp of Braila (Balta Mică a Brăilei) fully overlaps the special avifaunistic protection area with the same name and partially the land area of the National Park Balta Mică a Brăilei (Small Swamp of Braila).
- Brațul Măcin (Măcin branch) partially overlaps the special avifaunistic protection area Dunărea Veche-Brațul Măcin, without comprising Lake Zăton.
- Lunca Buzăului (Buzăului river plain) included only areas in Buzău county until 2011, and with the enlargement of its area, 14% of the site is located in Brăila county.
- Lunca Siretului Inferior was also extended into Brăila county in 2011, where it is represented by 7% of the site and overlaps the special avifaunistic protection area with the same name.
- Valea Călmățuiului (Călmățui Valley) is located in Brăila and Buzău counties and comprises the river course Călmățui and its flood plain, up to the northern part of the town Însurăței. It partially overlaps the special avifaunistic protection area with the same name; in the year 2011, its area increased by 560 ha.

• Ianca – Plopu-Sărat – Comăneasca was declared site of community importance in the year 2011 and it is located only in Brăila county. It partially overlaps the special avifaunistic protection area Ianca – Plopu-Sărat, without Lake Seaca); it also includes a salt area in ATU Tudor Vladmirescu and ATU Traian.

• The Salt Lake (Lacul Sărat – Brăila) was declared site of community importance in the year 2011 and it is located only in the county Brăila.

• The salt marshes from Gura Ialomiței-Mihai Bravu – declared site of community importance in the year 2011, covering areas in the counties Brăila and Ialomița, partially overlap the special avifaunistic protection area Berteştii de Sus – Gura Ialomiței.

The Natura 2000 sites that had administrator in the year 2011 were the following:

• Balta Mică a Brăilei – The Small Swamp of Braila (as natural park, site of community importance and special avifaunistic protection area) was administered by the National Administration of Forests Romsilva, through a specially established structure, the Administration of the Natural Park Balta Mică a Brăilei.

• Insula Mică a Brăilei – The Small Island of Braila (wet zone of international importance) was administered through a specially established administration structure, the Administration of the Natural Park Balta Mică a Brăilei.

• Pădurea Camnița – Camnița Forest (nature reserve of national interest) was administered by the Forestry Directorate Brăila.

• Dunărea Veche – Brațul Măcin (avifaunistic protection area) was administered by the County Sport Fishing Association Galați

• Brațul Măcin (avifaunistic protection area) was administered by the County Sport Fishing Association Galați.

• Lunca Buzăului – Buzăului river plain (site of community importance) was administered by Bucharest Ecological University.

• Lunca Siretului Inferior (special avifaunistic protection area) was given into custody to the Association for Biological Diversity Conservation.

Balta Mică a Brăilei (as a natural park, as site of community importance and as special avifaunistic protection area) and Insula Mică a Brăilei (wet zone of international importance) were the only protected natural areas that in the year 2011 had elaborated and approved operating regulations and elaborated and approved management plans.

d) Protected natural areas of county interest

By Brăila County Council Decision no. 20/1994 on the protected natural areas and the natural monuments on the territory of Brăila county, the following zones were declared as protected areas: Balta Mică a Brăilei, Lake Jirlău, Camnița and Viişoara Forests, as well as Popina Blasova. Subsequently, the first three obtained the protected natural area of national interest status, declared by Law 5/2000 for the approval of the national territory management plan, and Forest Viişoara and Popina Blasova have the status of protected natural areas of county interest at present.

Forestry Reserve Viişoara. The reserve has an area of 1,897.8 ha, being located in the southern part of Brăila county, on the administrative territory of the communes Însurăţei and Berteştii de Jos. The forest is a relict of the oak tree forests that used to populate the sands on the right bank of the river Călmăţui. Being irrationally cut for hundreds of years, the forest was naturally regenerated. The forest consists of oak and acacia trees, and the reason of obtaining the protection status was the very existence of these oak trees, a rare species in Brăila forests. For the quantity and quality of the wood, an area of 39.4 ha of it is also a seminologic reserve, mentioned in the "National catalogue of resources for forest reproduction materials in Romania" (30.6 ha acacia and 8.8 ha grey oak).

Popina Blasova – natural monument. It is located in the north-eastern part of Insula Mare a Brăilei, near Lake Blasova. Popina Blasova was declared natural monument due to its singularity in the relief of Brăila county, with a height of 45 m and an area of 2.3 ha. Due to the soil conditions generated by the mineralogical composition of the area, the vegetal cover on the northern flank includes two endemic species: the blue bell and the milfoil with yellow flowers.

4.2. The situation of terrestrial and aquatic ecosystems

The county Brăila has a great variety of terrestrial and aquatic ecosystems (specific floodplain forests, meadows, swamps and lakes, canals with alluvial banks), characteristic for the bio-geographical steppe region. The steppe natural vegetation is also found at present on the versants of subsidence depressions, in the spaces between the agricultural parcels, on the road sides, on the temporarily uncultivated areas.

The natural habitats. The main types of habitats in Brăila county are represented by aquatic and terrestrial habitats (forests and meadows).

The aquatic habitats are represented by: salt and fresh water lakes, (permanent and temporary) swamps, moors, marshy areas and canals. These are rather diverse, being represented by the Danube branches arms and water surfaces from the floodplains to different fresh water or salt lakes located on the county territory, as well as by those which, despite the anthropic impact, have best preserved the natural biological diversity characteristic for the region.

The lakes in Brăila county are of three categories: clastocarstic (the lakes in the subsidence depressions in loess or hollows), also named hollow lakes, meander lakes and floodplain lakes. The meander lakes and the lakes on an abandoned river branch are mainly found in the Danube flood plain (Blasova), on Călmăţui terrace, as well near Brăila (Lacul Sărat Brăila – Brăila Salt Lake).

An important category of surface waters consists of the salt lakes used for therapeutic purpose, with sapropelic mud. These are: Brăila Salt Lake, Lakes Câineni Băi and Movila Miresii.

Brăila Salt Lake has a big salinity and the bottom of the lake is covered with therapeutic mud, being the only therapeutic lake in the county, whose resources are put into value at present.

The Lakes Câineni and Movila Miresii were exploited until 1990–1993; afterwards, the assets for the exploitation of the therapeutic resources were privatized (Lake Câineni) or the exploitation facilities were abandoned and even demolished (Lake Movila Miresii). As regards the Lake Câineni, under concession for a 20-year period, no exploitation activity has been initiated so far. This lake has the characteristics of a deposit of mineral waters and sapropelic mud, its exploitation consisting of the use of these resources for therapeutic purposes.

The terrestrial habitats, with forest vegetation, are in general small flood plain forests (5% of the county area) with the following locations:

– 80% in the floodprone river plains of the Danube and of the rivers Buzău and Siret (mainly poplar and willow);

– 20% are terrace forests on the county area, mainly consisting of acacia and oak trees, the most important being: Viişoara, Colţea, Tătaru, Râmnicelu, Romanu, Rubla and Lacu Sărat. The terrestrial habitats represented by meadows (steppe meadows, river plain meadows and bushes) are strongly modified, with gramineous plants and different grasses.

The meadows habitats are better represented in the area of the Natural Park Balta Mică a Brăilei – The Small Swamp of Brăila, in the past affected by the grazing of animals that were left in a semi-wild state (cows, horses and pigs in particular), as well as the grazing of sheep, through accumulation and decomposition of the sheep manure, only those species remaining that were resistant to soil acidification. The bushes have the smallest development, belonging either to meadows, or growing in isolated spots, on limited areas in the flood plain with sandy banks.

Among the habitats protected in EU for the conservation of certain rare flora or fauna species, or in danger of extinction, those characteristic to the wet zones are best represented, the greatest diversity existing in the flood plain of the Danube.

The wild flora. In the far off past, the vegetation characteristic to Braila county was represented by the steppe in the plain areas and by holm and swamp vegetation in the Balta Brăilei-The Swamp of Brăila. The steppe was turned up and replaced by agricultural crops in a 95% percentage. At present, it is found only in isolated sports, on natural pastures, as well as by the road side, along dykes and irrigation canals.

In Balta Brăilei – The Swamp of Brăila, only one third of the area remained under free flooding regime, the remaining part being the dyked agricultural area from Insula Mare a Brăilei – The Big Island of Brăila. The remains of the flora of this vast wet zone territory are now found in the 10 islets of the floodprone area representing the Natural Park Balta Mică a Brăilei-The Small Swamp of Brăila. The vegetation stands out by certain rare species, such as the white and yellow water lilies, which can be most often met only in the Danube Delta. There are two endemic species: the bluebell and the milfoil with yellow flowers, which are growing only on Popina Blasova (declared natural monument at county level), relict of a mountain chain consisting of the Măcin Mountains.

The wild fauna. The non-vertebrates are represented by the greatest number of species, at the level of all types of ecosystems, having a relatively uniform distribution. The vertebrates are less numerous, both as number of species and as number of populations. In Brăila county, 305 species were inventoried, out of which 90 species are considered of community interest; for these, special preservation areas and special avifaunistic protection areas must be established.

Table 4
Species of community interest inventoried in Brăila county

No.	Group of species	No. of species	Species for which special preservation areas and special avifaunistic protection areas must be established
1	Fish	67	16
2	Amphibians	7	3
3	Reptiles	5	1
4	Birds	208	64
5	Mammals	18	6
Total		305	90

Source: GEO 57/2007 on the regime of protected natural areas, conservation of natural habitats, of the wild flora and fauna, approved with modifications and completions by Law no. 49/2011, Annex 3.

Birds are the most numerous among vertebrates, out of which 22 species are vulnerable. They have a non-uniform distribution and are mainly concentrated in the zone of mixed forests, swamps and marshy areas. Very many species are migratory birds, very few are sedentary, which remain in the interior islets of the Danube floodplain or on some swamps from the Danube terrace over the winter.

Table 5
The conservation of the vertebrates inventoried in Brăila county

No.	Group of vertebrates	No. of species	Status			
			Vulnerable	Endangered	Critically endangered	Almost threatened
1	Fish	67	4	4	1	–
2	Amphibians	7	2	1	–	3
3	Reptiles	5	1	–	–	–
4	Birds	208	22	13	3	–
5	Mammals	18	6	–	–	–
Total		305	35	18	4	3

Source: Report on the situation of environmental factors, Environment Protection Agency Brăila, 2011.

On percentage basis, the avifauna from the Natural Park Balta Mică a Brăilei – the Small Swamp of Brăila represents more than half of Romania's avifauna, 53% respectively. Out of these, 169 species are protected in the EU (by Berne Convention), 58 species are migratory birds protected by Bonn Convention and 6 species protected by CITES Convention. At the same time, 68 de species are found in Annex I from the Birds Directive.

4.3. Impact

The protected natural areas contain values that directly or indirectly benefit the communities and people, in general.

The benefit concept is used to indicate the fact that, by maintaining and sometimes by the appropriate use of the values of a protected natural area, an income can be gained or we could benefit from a series of advantages which would be seriously diminished if the area were not properly protected.

Economic benefits can result by the utilization of both intrinsic and extrinsic values. In general, the economic value of certain natural resources is easier to be determined, for example in the case of a cubic meter of wood exploited under the conditions imposed in a protected area. But the economic value of the ecologic services (water treatment, air quality ensurance, community health ensurance, the historical and spiritual value) is more difficult to determine.

Table 6
Classification of the values of protected natural areas

Category of values	Example
Intrinsic value	Fauna, flora, ecosystems, terrestrial and aquatic landscapes
Local goods and services	Plant products, animal products, leisure and tourism, Knowledge and scientific research, education
General goods and services	Life support for man, life support for other living beings, water quality and quantity, air quality, fishery resources protection, protection of resources for agriculture, the protection of human settlements
Values of communities (non-material)	Culture, identity, spirituality, social welfare, next generations inheritance
Individual values (non-material)	Existential satisfaction, experimented satisfaction, physical health, mental health, spiritual welfare

Source: Lockwood, Lookwood, M., Graeme, L., Ashis Kothari (2006), *Managing Protected Areas – A global guide*.

In the case of protected areas, it is important to try to assess values taking into calculation the directly measurable economic value as well as the non-economic one.

At present, the biodiversity conservation in Brăila county can be affected by the development of the economy and the over exploitation of natural resources. The biodiversity loss could affect the production of goods and services of the natural and semi-natural ecosystems, the economic welfare, people's health.

a) Plant species with economic utilization

The woody flora species found in the forests of the county that are used for commercial purposes are the following: the grey oak, *cerrus*, common ash tree, elm tree, acacia, white poplar. These species are commercially used as genetic resources, 89 ha of forests existing that were established as reserves for seed production and conservation of the forestry genofund.

The most important seed reserves are the following:

– The forestry reserve (nature reserve) with 1.2 ha under ash tree arboretum, located in the forest Camnița;

– The forestry reserve Viişoara (nature reserve) with 31.2 ha under grey oak forest.

The wild plants that are used for economic purposes (either by natural persons or legal entities) are harvested for being sold on the domestic market. These are plants used as food or for medical purposes, the largest harvested quantities being in the species horse tail, milfoil, calendula, mint, chamomile, nettle; these species are most often found in the spontaneous flora of Brăila county.

b) Timber volume in the economic circuit

In the year 2011, the timber volume in the economic circuit totaled 65.6 thousands m^3, a larger volume than in the previous years.

Table 7
Timber volume in the economic circuit
in the period 2009–2011

Year	Timber volume (thousand m^3)
2009	56.8
2010	56.2
2011	65.5

Source: *Report on the situation of environmental factors*, Agency for Environment Protection Brăila, 2009, 2010 and 2011.

The wood was sold to the population as heating wood and mainly by the economic operators for industrial purpose. We speak mainly about soft species (willow tree and a larger quantity of poplar), mainly resulted from the main products (as a result of plane and regeneration cuttings) and also from the secondary products (from forest hygienic and cleaning operations) and accidental cuttings.

c) Animal species with economic utilization

The commercial use of the species of animals in the wild fauna consists either by hunting certain species of game interest or by fishing. The game species of interest in Brăila county are in general the species characteristic to the plain, wet zone and river plain forest fauna. The game fund of Brăila county[3] has a total area of 462955 ha and it is delimited into 50 game funds, administered by the National Company of Forests Romsilva –Brăila Forestry Directorate and 7 hunting associations.

[3] Annex 1 of Ord. M.A.W.F. no. 193/2002 *regarding the updating of the delimitation of the Romanian game fund into hunting funds*, with further modifications.

Table 8
The harvest quotas authorized for the hunting seasons in the years 2009, 2010 and 2011

No.	Game species of interest	No. of heads authorized in the season 2009–2010	No. of heads authorized in the season 2010–2011	No. of heads authorized in the season 2011–2012
1	Mammals	8252	7801	2687
2	Birds	92902	102570	27205

Source: *Report on the situation of environmental factors*, Environment Protection Agency Brăila, 2009, 2010 and 2011.

In the hunting season 2011–2012, the hunting of a smaller number of mammals and birds was authorized, compared to the previous hunting seasons, because only 5 administrators of hunting funds out of the total 10 funds who administrate these funds in Brăila county have asked for game licenses. The species of piscicultural interest in Brăila county are the following: mackerel, local cyprinids and the raptor fish species. In 2009, a quantity of 66.02 tons of fish was harvested, in 2010 the fish harvest reached 62.35 tons and in 2011 – 25.72 tons.

5. CONCLUSIONS

Land conversion for the urban, industrial, agricultural, tourism or transport development purpose can result in the degradation, destruction and fragmentation of habitats. In previous years, in Brăila county, the growth and intensification of the agricultural production systems took place through the transformation of certain natural or semi-natural ecosystems into arable land areas, which were equipped with facilities for the intensive production technologies application; thus, the Danube Flood Plain was partially dyked and transformed into agricultural ecosystems, as well as a great part of pastures with steppe vegetation on land areas with excess moisture.

The dyking consequences are the following:

– The modification of the hydrological regime of the Danube by increasing the intensity of floods;

– Diminution of the capacity to retain nutrients by the floodprone areas;

– Desiccated land salinization due to the fluctuations in the level of the phreatic water in soil;

– Diminution of reproduction areas for the semi-migratory fish species;

– Diminution of fish harvests.

The drainage of many aquatic ecosystems as effect of deepening the communication canals with the Danube years ago, for piscicultural purposes, has induced significant changes in the water circulation regime. Naturally, the Danube used to flood the land and feed the swamps; when the flood stopped, the water surfaces stagnated for a longer period, being affected only by the excessive evapotranspiration in time of drought. The digging of the canals for piscicultural purpose

determines the premature flow of water into the Danube; this phenomenon is also favoured by the fact that in time, the bottom of the swamps increased by deposits of alluvia brought by the river.

The ecosystems modification was also caused by the utilization of certain inappropriate agricultural methods and techniques, such as the use of pesticides, the intensive or unorganized grazing, burning the stubble fields.

The replacement of the natural alluvial forests in Balta Brăilei by poplar and willow crops, the dykings, desiccations and the large agricultural monocrops practiced in the last 50 years of the last century have brought about deep qualitative and quantitative modifications of the county biodiversity.

A negative impact upon biodiversity in the last decade was produced by the replacement of the autochthonous species by alochtone species or clones with high productivity, obviously chosen according to economic criteria. The result was the disappearance of certain typical forests of willows, white and black poplars and of some steppe habitats due to afforesting the largest land areas possible that were not suitable for farming.

At the same time, the anthropic pressure upon the natural ecosystems in the last decades has induced the change of the ecological composition and structure, of the production and biodiversity support capacity respectively.

However, human activities destroy biodiversity and affect the capacity of the healthy ecosystems to produce this wide range of goods and services. The land destination modification, including agriculture intensification and urbanization, the over exploitation, pollution, the climate changes and the new species that compete against the indigenous flora and fauna generally contribute to the destruction of the natural ecosystems.

After the destruction, their rehabilitation is an expensive process, or most often impossible.

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