SUSTAINABLE NATURAL LANDSCAPE MANAGEMENT WITHIN BUCHAREST METROPOLITAN AREA

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Sustainable natural landscape management within Bucharest Metropolitan Area.
Metropolitan areas must be considered as complex landscapes where different should urban and rural elements meet and interact leading to new challenges related to natural resources and providing new opportunities for integrative approaches to landscape management. By its position within the Romanian Plain, Bucharest Metropolitan Area (BMA) is exposed to several environmental challenges as a result of the physical peculiarities of this relief unit as well as its man-made changes determining a wide range of transformations with direct impact upon landscape quality and integrity. The authors analyse the main sustainable management measures for protecting and preserving natural landscape within the BMA: environmental legislation, scientific research projects as well as designation of areas with ecological and landscape value as protected areas, management plans of protected areas', urban plans requirements and development of green–yellow belts and forest management plans, in order to identify the ones most suitable for the study. Simultaneously, the paper aims to mirror the dynamics of natural landscape management measures related to two important historic events for the Romanians: the fall of the communist regime (1989) and accession to the EU (2007).
Key words: natural landscape, sustainable management, conservation, Bucharest Metropolitan Area

INTRODUCTION

Socio-economic transformation in the Central and Eastern European countries gave a start to intensive spatial development in the cities exerting a high pressure upon the environment of the neighbouring areas because of the tendency to widen the residential space, by dint of resource consumption. This pressure leads to a radical transformation of the terrestrial cover, the environmental impact being differentiated according to the distance from the metropolis and certain axes of anthropic activity concentration. (Bălteanu, ed. 2005)

The dimensions and the sphere of action of the Bucharest Municipality are directly conditioned by the size and functions of the polarizing urban centre. This is why, the continuous development of the city led to the enlargement of its influence upon the periurban area (*periurban level*) and then, upon the entire metropolitan area (*metropolitan level*) with implications for the quality of environmental factors. At the same time, after 1990, phenomena of uncontrolled development of built surfaces appeared near Bucharest along every major access route to the capital and around the lakes and outskirts (storehouses and commercial centres, dwellings, petrol stations etc.) to the detriment of certain agricul-

tural and forest terrains of high natural and landscape value. Therefore, the need for a strategy that would integrate planning and nature conservation for the so-called *metropolitan protected area*, in which the area under study is included, would be highly necessary. Such a category of management area is typical for intensively urbanized European countries (Minnini et al. 2001).

Most of the environmental issues faced by the contemporary European societies are related to landscape degradation, biodiversity loss and climate change requiring an integrated approach in terms of assessment and management. Landscape management means action, from a perspective of sustainable development, that should ensure the regular upkeep of a landscape, so as to guide and harmonize changes which are brought about by social, economic and environmental processes (Council of Europe 2000).

Generally speaking, natural landscape management is achieved by means of varied methods and tools, mainly related to landscape planning, policies, programmes, etc. In some countries, the landscape management concept is based on strategic approach community-business-government partnerships or larger scale partnerships able to accomplish the conservationist goals stressing the need to increase the non-governmental sector involvement (Binning and Fieldman 2000, Barsch and Schönfelder 2004). When dealing with natural landscape conservation, the focus is on the specific regions delineated and managed as protected areas (Farina 2006) but when discussing urban or metropolitan areas, the focal point is given by the concepts extracted from the urban planning documents such as green-yellow belts, greenways, etc. (Bryant 2006).

Considering the particularities of the area under discussion in terms of natural assets and the dimension of the environmental stressors, one can identify the following as the most appropriate sustainable natural landscape management measures: environmental legislation, scientific research projects, designation of areas with ecological and landscape value as protected area, protected area management plan, urban plan requirements and development of a green-yellow belt and forest management plans. The aim of this paper is to analyse the main sustainable management measures for protecting and preserving natural landscape within the BMA. Simultaneously, the paper aims to mirror the dynamics of natural landscape management measures related to two important historic events for the Romanians: the fall of the communist regime (1989) and accession to the EU (2007).

WHY IS SUSTAINABLE NATURAL LANDSCAPE MANAGEMENT NECESSARY IN THE BUCHAREST METROPOLITAN AREA?

Nowadays, metropolitan areas face the growing problems of urban sprawl, loss of natural vegetation and open space, and a general decline in the extent of wetlands and wildlife habitat. Due to its position within the Romanian Plain (southern part of Romania) both the capital city, Bucharest, and its metropolitan area are affected by several environmental problems as a result of the physical peculiarities related to the main natural assets of this relief unit as well as its man-made changes as a result of the environmental stressors.

The *main natural assets* of the study-area are mainly related to its position at the biogeographic limit between mesophyllous deciduous forests and the sylvo-

steppe, which has been massively transformed by human activity in the last century. Forests have often been replaced by secondary meadow associations (natural pastures and hay-fields) with the tendency of expanding xerophyllous species to the contiguous vegetation belts. Thus, some vegetation types have contracted and almost disappeared, while others show changes in their floristic structure and composition favouring aridification in the context of climate change. Until the beginning of the 19th century, the central-eastern part of the Romanian Plain was covered by the Vlăsia Secular Forest, patches of which can be found within Bucharest Metropolitan Area as left-over witnesses of the one of the best-preserved forests in Europe (Muică and Dumitrașcu 2001, Dumitrașcu 2006).

The bio-pedo-climatic potential of the study-area which favours the development of different floristic and faunistic associations of different geographical origin and its location at the crossing point of many floristic provinces explains the biodiversity given by the large number of taxa ranks as well as a great number of endemic species (*Achillea getica, Dianthus trifasciculatus ssp. desertus, Viola jooi, Paeonia peregrina var. romanica*). Within the protected areas located in the BMA, it is also possible to find species with different geographical origins (*Ruscus aculeatus, Convalaria majalis, Crocus moesiacus, Iris graminea, Lilium perene, Dianthus deserti*), some representing the limit of their specific distribution areas (Fig. 1).

During the last period, the Bucharest Metropolitan Area has been facing new landscape-related issues as a projection of the main environmental stressors in terms of uncontrolled urban sprawl and land use – land cover changes determining land fragmentation, land transformation, habitat fragmentation, increase of extreme events phenomena, loss of natural resources, land degradation, pollution etc. affecting agricultural and forest spaces of high natural and landscape value.

Fig. 1. Protected species in Bucharest Metropolitan Area (*Ruscus aculeatus* and *Paeonia peregrina var. romanica*)

After 1990, the study-area witnessed uncontrolled spatial dynamics as a result of uncontrolled urban sprawl (sub-urbanization process) which is typical for the development of Bucharest in recent times. With the fall of the communist

regime the structural relocations of the different land use categories affected spatial development with direct impact upon the quality of the environment. Even more, within the last ten years, Bucharest Metropolitan Area experienced an increased urban sprawl mainly based on residential sprawl having as its main consequences land use changes and land/real-estate market dynamics (very expensive land, wealthy residents) and environmental degradation in terms of absent or insufficient environmental facilities. Before 1990, recently developed areas in the northern and north-western part of Bucharest (Pipera, Tunari, Corbeanca, etc.), had a mainly agricultural land use which, within the present context of uncontrolled urban sprawl, acquired other purposes: residential, commercial, public institutions, industrial use, etc.

Within the Bucharest Metropolitan Area one can identify 6 compact residential areas (Pipera-Tunari, Ştefăneşti, Mogoşoaia-Chitila, Corbenca-Otopeni-Baloteşti, Snagov-Periş, Pantelimon-Cernica-Brăneşti) and 6 residential nuclei (Dascălu, Buftea-Crevedia, Tărtăşeşti, Domneşti, Berceni, Comana) which trace the dynamics of the urbanization front from the traditional residential areas (north and north-west) to the newly developed residential areas (south and north-west) based on low land prices, attractive environmental features and the main transport infrastructure (Grigorescu 2008).

In most cases, the spatial expansion of residential areas has not completely solved the access to environmental facilities (transport infrastructure, water supply system, gas supply system, sewage system) especially as far as the individual residential development is concerned. Thus, as an important effect of suburbanization process in Bucharest Metropolitan Area is the absence or the insufficient access to public services such as: water supply system (only 44, out of the 94 settlements have a centralized water supply system, while the other localities get their water from the phreatic layer by means of village fountains); sewage network or water purification systems (only 24 settlements are connected to a sewerage network and only 7 of them have water purification plants); gas supply system (insufficient access to gas supply system determines the use of wood and coal heating in most individual households favouring abusive deforestation); waste management (most of the waste cesspools are inadequate, unauthorized or incompatible with the EU directives and standards and household waste is chaotically spread around settlements, forests, water bodies and agricultural land), etc.

The absence or inadequate connection to environmental facilities as well as the illegal waste deposits and their improper exploitation may have a major impact on the environment in the long term through: soil degradation; air pollution by a high level of dioxins, furans and acids which may affect people's health; underground water contamination with heavy metals, nitrates, nitrites, acids, organic substances; flora and fauna contamination; biodiversity and habitats losses; important fire sources etc.

Based on the above mentioned approach, one can identify important causes and effects of the metropolitan landscape changes: land use – land cover changes determining land abandonment and abandonment of land betterment works, land fragmentation etc. leading to an inappropriate way of managing agricultural land increasing the plot density especially in the case of individual

properties where agricultural land use no longer brings any profit (Fig. 2). In some situations the small plots of land are sold or when they have an attractive location they acquire several other purposes (residential or entertainment use) as in Snagov, Mogoşoaia or Corbeanca Communes (Bălteanu and Grigorescu 2006).

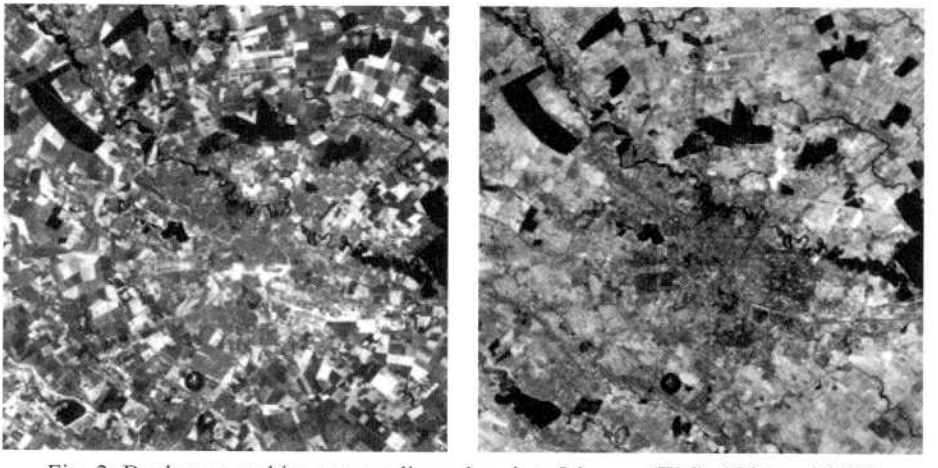

Fig. 2. Bucharest and its surroundings, Landsat 5 Image (TM), 1984 and 2001 respectively (www.unep.cz)

This situation is aggravated both by peasants' lack of interest in tilling the land and by the age structure of some communities with a high percentage of old people. Other effects of the agricultural practices are related to deforestation, soil erosion and pollution through agricultural pollutants.

SUSTAINABLE NATURAL LANDSCAPE MANAGEMENT MEASURES IN THE BUCHAREST METROPOLITAN AREA

Sustainable natural environmental protection within the BMA can be achieved through different measures in terms of legislation, protected areas declaration and proper management, urban planning stipulations and requirements including the green-yellow belt meant to limit the urban sprawl and its environmental effects as well as through forest management plans.

Legislation

The Romanian legislation, standing up for the environmental protection includes a set of organic laws and a wide range of legislative initiatives as a result of the legitimization of the proposals and suggestions made at the European level before and after the EU accession by transposing chapter 22 of the Community Acquis into the national legislation and the EU Treaties and Agreements, as well. The ratification of International Conventions and Conferences by means of different laws, decrees and government decisions can also be added. However, the diversity of legal documents and the lack of application tools determine an important environmental conflict in terms of laws versus

their efficiency in reducing or minimizing the impacts of human activity, both on the natural environment and on humanity itself.

Scientific research projects

Landscapes are subject to numerous requirements in terms of sustainable use and protection. Therefore, it is important to give greater consideration to the development of protection policies and strategies, able to improve understanding related to ecosystems functionality and provide decision support tools for landscape managers. For that matter, scientific research projects play an important role in gathering the human and financial resources to undertake national and international research.

By joining the Financial Framework adopted for the European Union (2007-2013), Romania has improved its capacity for absorbing the EU funds for two of the three community objectives: convergence and regional territorial cooperation. Under the convergence objective co-funded by the European Regional Development Fund (ERDF) and the Cohesion Fund (CF), Romania could accede to the structural funds by means of seven. *Operational Programmes* for *transport, environment, competitiveness, human resources, regional, technical assistance* and *administrative capacity*. For landscape conservation in the Bucharest Metropolitan Area, the most used financial tool is the *Operational Programme Environment (SOP ENV)*, which has the main objective of improving the living standards and the environment, focusing on meeting the European legislation in this respect. Under this financial measure, in 2009, Giurgiu County Council has gained one project for ecological reconstruction with a total value of 74 billion RON (about 17.5 million EUR), which is to be implemented in the Comana Natural Park. In 2010, the same protected area submitted a project proposal for the ecological reconstruction of wetlands, with the total value of 2.1 million RON (about 480,000 EUR).

The *regional territorial cooperation* objective, mainly financed by the European Regional Development Fund (ERDF), is aimed at supporting the harmonious and balanced integration of the EU territory by stimulating cooperation in regions of high importance by means of *cross-border cooperation programmes (Romania-Bulgaria)*, *transnational cooperation programmes (South East Europe)* and *interregional cooperation programmes (INTERREG IVC, ESPON 2013*, etc.). Thus, in the framework of the *Romania-Bulgaria Cross-Border Cooperation Programme 2007-2013*, the Comana Natural Park is about to implement a project together with a NGO from Bulgaria on the *"Restitution, prevention and management of populations and habitats of Blackstork (Ciconia nigra) and evaluation of reintroduction of the Greater Spotted Eagle (Aquila clanga) in Comana and Rusenki Lom Nature Parks"* with a total amount of 419,758 EUR.

Besides the above mentioned financial instruments, Comana Natural Park beneficiates of the *World Bank Project – Biodiversity Conservation Management's* results which were to be replicated to all natural/national parks in Romania.

PROTECTED AREAS

The most efficient way of natural landscape protection is the declaration and sustainable management of the protected areas (Fig. 3), both achieved before the fall of the communist regime (1989) through the decisions of the Council of Ministers and, especially after, through different regulations (Law 5/2000, Government Decision 2151/2004).

The first initiatives to give some valuable natural landscapes the status of protected areas before 1990, were taken through the decisions of Council of Ministers by declaring 5 natural reserves (remains of the Vlăsia Secular Forest) with a total surface of 2,612.5 ha (Ielenicz et al. 1986): Snagov Forest (1,727 ha), Ciornuleasa Forest (75.2 ha), Căldărușani Forest (125 ha), Comana Forest (630.5 ha) and Râioasa Forest (54.8 ha).

After 1989, through the provisions of Law 5/2000, the study area displays an important decrease in terms of protected areas (Fig. 3) totalling a surface of 663.2 ha.

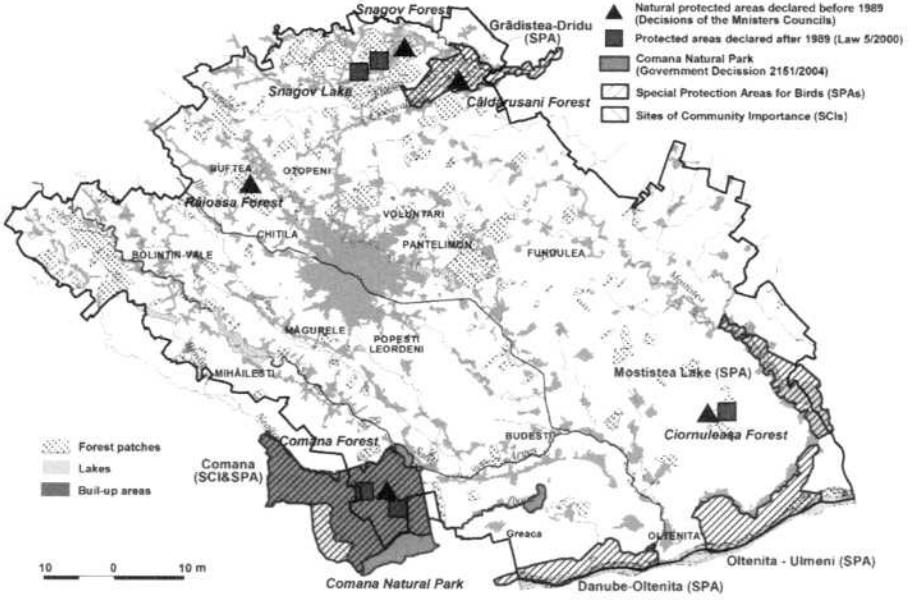

Fig. 3. Natural protected areas in the Bucharest Metropolitan Area

As it was necessary to reach a protected surface of 17% of the national territory after the accession to the EU; Romania had to extend the protected area surface from 7% by means of other important conservationist tools such as "Natura 2000" European Network and new legislative measures (*Romanian Government Decision no. 2151/2004 regarding setting up the regime of natural protected area for new areas in Romania*) leading to the extension of the natural protected areas surface within the metropolitan area, as well. Thus, by the Gov-

ernment Decision, the *Comana Natural Park* was established with a total of 24,963 ha, out of which 9,882.14 ha overlaps with the Bucharest Metropolitan Area.

METROPOLITAN AREA

Protected areas are created to shelter and preserve a wide variety of rare plants and animals, exceptional landforms, fossiliferous points and different geological sites based on different management objectives and measures according to each protected area's particularities. The IUCN has developed and defined six main international categories in order to assure a global standard for natural landscape planning and management. These categories are mainly based on the degree of human impact, out of which only the first 5 categories regard biodiversity conservation as the major goal. Therefore, the IUCN categories appeared as a compromise between conservation measures and the increasing resource demand of population.

According to the IUCN Categories and the law of habitats (*law no. 462/2001* for the approval of *OUG no. 236/2000 regarding the regime of natural protected areas*), the natural protected areas in the Bucharest Metropolitan Area are placed into (Bălteanu et al. 2003):

– 4th category – Natural Reserves: Snagov Forest, Ciornuleasa Forest, Oloaga-Grădinari Forest, Padina Tătarului Forest, Snagov Lake,

– 5th category – Protected terrestrial ecosystems: Comana Natural Park.

In some cases, the above mentioned IUCN categories are overlapping with the *Natura 2000 Network* represented by 5 *SPAs – Special Protection Areas* (Comana, Danube-Oltenița, Grădiștea-Dridu, Mostiștea Lake, Oltenița-Ulmeni) and one *SCI - Site of Community Importance* (Comana) aiming to protect wildlife and its habitats, whose area is not definitively established (Fig. 3 and 4).

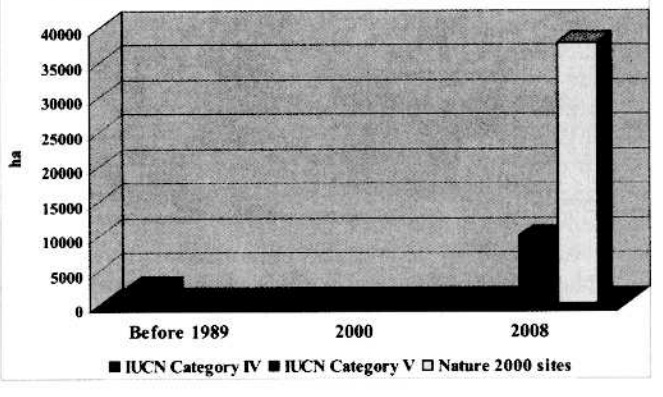

Fig. 4. The dynamics of the natural protected areas in the Bucharest

Protected areas' management plans

Protected areas' management plans are an important tool in guiding the development and sustainable management of a protected area by improving the use of human and financial resources, communication with stakeholders and the public, promoting monitoring and evaluation activities etc.

Unfortunately, the protected areas in the analysed space do not possess management plans approved by the Ministry of the Environment as a result of the legal vacuum (the authority which prepares the plans for approval by the ME was only established at the end of 2009).

Under these circumstances, the only additional support is the National Forest Administration (for the Comana Natural Park administration) in terms of enabling management contracts with the Ministry of the Environment and providing extra budget financial support (e.g. 418,238 RON – about 100,000 EUR in 2010) for awareness raising activities, ecological education, wages (12 employees out of which 5 for office duties and 7 rangers), training, retracing the tourist routes, etc.

Another important issue in terms of protected area management is related to the conflict between the protected area managers and the land owners because of the lack of subsidies for the latter in exchange for respecting the restrictions imposed by resources exploitation.

Urban planning

Human activities inside protected areas can be controlled and managed by means of an integrated and reliable system of rules and laws in terms of landscape management, operational in a sustainable framework. Therefore, urban planning policies have a key role in sustainable management of natural landscape by restraining the uncontrolled urban sprawl and protecting the traditional and valuable landscapes. According to the provisions of *Law no. 350/2001*, the central and local public administration authorities are responsible for the territorial and urban planning activities.

On the national level, the territorial planning consists of the National Plan for Territorial Planning (PATN), Zonal Territorial Planning Plan (PATZ) and County Territorial Planning Plan (PATJ). At local level the Local Councils are the public administration authorities responsible for the entire activity of urban planning in the administrative-territorial unit area providing the Zonal Territorial Planning Plan (PUZ), General Urban Plan (PUG) and Detailed Urban Plan (PUD). All these include provisions aiming to reduce the urban sprawl with negative impact upon the natural landscape.

The Bucharest Metropolitan Area urban management policies based on sustainable development of settlements and environmental protection propose *green-yellow belt* policies to be adopted as a way of protecting the natural environment within the area under the direct influence of the metropolis. The National Institute for Research and Development in Urban and Spatial Planning (URBANPROIECT) studies proposes, as an important objective for sustainable regional development, a green-yellow belt for Bucharest covering 84 communes up to 30 km distance from the capital-city. Thus, according to this project, the

green-yellow belt does not totally overlap the metropolitan area, but it outruns it in certain spots.

Other green-yellow belt-related project, financed by the Ministry of Agriculture and Rural Development and SAPARD, aims to forest 6,000 ha preventing residential sprawl, providing recreation space and preserving valuable landscapes. This project will be included in the *Bucharest Metropolitan Area Master Plan* leading to green space-related management changes within the local master plans. The main problem of this project is related to lack of cooperation from local authorities, with each mayor stating that there is no available land to be forested, besides some small cesspools.

Hence, urban planning provides requirements aiming to reduce urban sprawl in terms of controlling new built-up areas, establishing green-yellow belts around cities, providing proper environmental facilities etc., and reducing its negative impact upon the natural landscape.

Forest management plans

The forest management plans are documents used by forest engineers in order to ensure the sustainable development of the forest vegetation by dividing it into functional groups, sub-groups and categories. Their provisions attempt to meet goals and objectives related to protecting natural resources, maintaining in balance the economic, ecological and social values of forested parcels, to preserving healthy forest ecosystems through active management, to increasing the economic, environmental, and social benefits provided by the property, to maintaining natural vegetation systems by addressing removal of noxious and invasive plant species etc.

For the protection and sustainable management of natural landscape within the Bucharest Metropolitan Area, the most important functional groups and subgroups are:

Forest vegetation with specific protection functions including five main subgroups: forest meant to protect water (forests located along water steams such as: Căscioarele Forest along Argeş River, Snagov Forest, Fundu Sacului Forest and Popeşti Forest along Snagov Lake, Căldăruşani Forest along Căldăruşani Lake, Comana Forest along Budeni marsh and Neajlov River etc.; forest meant to protect the soil (all forest patches); forest meant to protect from damaging climatic and industrial factors (those located in the proximity of Bucharest or other urban centres and those located along transport lines: Cernica, Pustnicul, Băneasa, Afumaţi etc.); forest with recreational functions (Snagov, Căldăruşani, Comana, Pasărea, Cernica, Pusticul, Afumaţi, etc.); forest of scientific interest, important for the preservation of forest genofund (Râioasa Forest for the protection of the species *Crocus moesiacus*, Ciornuleasa Forest for species characteristic of beech and steppe bents due to local environmental particularities, Oloaga Grădinari Forest for the protection of the thorn *Ruscus aculeatus*, Padina Tătarului Forest for the Romanian peony *Paeonia peregrina*, etc.).

Forest vegetation with functions of production and protection with two main sub-groups: forest for wood production (brushwood) and forests with the priority function of hunting production (Ciornuleasa Forest for hares, wild boar, deer and pheasants, etc.).

CONCLUSIONS

The analysis of the main natural landscape protection measures in the BMA revealed the dynamics of the protected areas before and after the fall of the communist regime and accession to the EU. Among the analysed measures one can identify *the declaration and management of protected areas* as the most efficient for the studied area. Taking into account the uncontrolled urban sprawl that Bucharest is facing, a *green-yellow belt* would also be very efficient but none of the proposed projects have been applied up to now. The other analysed measures are also important for sustainable management of natural landscape in addition to the ones mentioned above.

The land use changes related to the conversion of forest to agricultural, residential or commercial surfaces have major negative implications upon the landscape quality through: deforestation, enhancement of extreme events, habitats fragmentation, etc. Thus, sustainable management of natural landscapes justifies the complex functions it holds: recreation, aesthetic, soil protection, climatic, genetic, etc.

At national and regional level, the strategic plans are not very well coordinated and correlated; some domains/issues are covered by a great number of strategies, action plans, programmes and projects while others are almost neglected. Preservation of the natural capital of the Bucharest Metropolitan Area is required in order assure the appropriate living conditions for its inhabitants, under the sustainable use of the renewable and non-renewable natural resources.

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UDRŽATEĽNÝ MANAŽMENT PRÍRODNEJ KRAJINY V BUKUREŠTSKEJ METROPOLITNEJ OBLASTI

Po páde komunistického režimu došlo v Rumunsku k dramatickým zmenám vo všetkých sférach. Tieto zmeny mali priamy dosah na kvalitu a integritu krajiny. Svojou polohou v Rumunskej nížine je Bukureštská metropolitná oblasť (BMO) vystavená rôznym environmentálnym výzvam pre fyzické zvláštnosti reliéfu, ako aj pre ľudské zásahy.

Pôvodná vegetácia (mezofilné listnaté lesy a stepi) sa vo veľkom a rôznym spôsobom transformovali ľudskou činnosťou, v dôsledku čoho niektoré xerofilné druhy prenikli do oblasti mezofilných prvkov a na odlesnených plochách sa vyvinuli druhotné lúky (prírodné pastviny a trávnaté porasty). Takto sa stiahli do úzadia alebo takmer zmizli niektoré typy vegetácie, iné zmenili svoju floristickú štruktúru a zloženie dôsledkom aridifikácie v kontexte klimatických zmien. Súčasné zvyšky lesov v oblasti BMA sú už len pamiatkou na rozsiahle lesy, ktoré existovali popri rieke Vlăsia a patrili medzi najlepšie zachované lesy Európy s komplexnou floristickou štruktúrou. V minulosti pokrývali stredovýchodnú časť Rumunskej nížiny.

Ďalšie súčasné environmentálne stresové faktory v BMO súvisia s nekontrolovaným rozširovaním urbanizácie, so zmenami vo využívaní krajiny, ktoré vedú k fragmentácii pôdy, jej transformácii, odlesňovaniu, nadmernému zaťudneniu, znečisteniu životného prostredia, zvýšenému výskytu extrémnych javov a udalostí a strate prírodných zdrojov s markantnými účinkami na prírodnú krajinu.

Autori podrobne rozoberajú hlavné opatrenia udržateľného rozvoj, ktoré majú chrániť a zachovať prírodnú krajinu BMO: environmentálnu legislatívu, vyhlásenie ekologicky a krajinársky cenných oblastí za chránené krajinné oblasti, plány pre chránené oblasti, vedecko-výskumné projekty, urbanistické plány, zriadenie zeleno-žltých pásiem a lesnícke plány.

Preložila H. Contrerasová