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NATURAL RESOURCE PROTECTION AND CONSERVATION MEASURES IN SERBIAN NATIONAL PARKS

Abstract

The topic of protection and conservation of natural resources is growing critical in today's society. The fact that national parks fall within the first category of protected natural assets (assets of national importance) in Serbia and that natural resources in national parks are becoming increasingly endangered served as the background of this paper, which uses the available data, legislative acts, and the research conducted by the authors themselves to highlight the most significant measures of protection and conservation of natural resources in Serbian national parks. The issue of sustainable use and conservation of natural resources is a priority, as it concerns the entire community with a fundamental and clear goal – present-day generations need to act responsibly and to rationally use all available resources in order to preserve them for the future generations.

Key words: *protection measures, conservation, natural resources, national parks*

JEL classification:Q56, Q57, Q58

МЕРЕ ЗАШТИТЕ И ОЧУВАЊА ПРИРОДНИХ РЕСУРСА НАЦИОНАЛНИХ ПАРКОВА СРБИЈЕ

Апстракт

Проблематика заштите и очувања природних ресурса је све актуалнија тема савременог друштва. Чињеница да национални паркови спадају у прву категорију заштићених природних добра од националног значаја и да јее све више израженије угрожавање природних ресурса националних паркова определила нас је да у оквиру овог рада на основу доступних података, законских аката и сопствених истраживања укажемо на најзначајније мера за заштиту и очување природних ресурса националних паркова Србије. Питање одрживог коришћења природних ресурса и њиховог очувања представља приоритет, који се тиче целокупне друштвене заједнице са основним и јасним циљем да садашње генерације морају да буду одговорне и да на рационалан начин користе све расположиве ресурсе како би их сачували за будуће генерације.

Кључне речи: *мере заштите, очување, природни ресурси, национални паркови*

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Introduction

The topic of environmental protection and natural asset/resource protection can be viewed internationally and nationally. Since Serbia is currently in the process of EU accession, Serbian legislation is being harmonized with that of the EU, so this paper will only include Serbian legislation.

Natural resource conservation measures are classified into measures for conserving renewable and non-renewable natural resources. Exploitation of non-renewable natural resources in national parks is prohibited by law, and even if such exploitation is present, it is minimal since national parks are protected primarily because of their natural wealth (flora, fauna, vegetation, etc.). Therefore, this paper highlights the measures for natural resource protection and conservation.

Renewable natural resource protection and conservation measures are classified into:

- legal measures (prevention of free access and uncontrolled use of resources),
- quantitative restrictions,
- restrictions to the amount of exploited resources, and
- economic measures (fiscal measures (taxes and subsidies) and the system of individual transferrable quotas) [10, 7].

The analysis of numerous legal and sub-legal acts, strategies, and management plans, which deal with the issue of national parks and the exploitation of natural resources, revealed that all natural resource protection and conservation measures are classified into:

- administrative (legal, economic),
- technical,
- technical and technological, and
- strategic.

A number of measures, methods, technical and technological solutions, and other activities are implemented in Serbian national parks in order to maintain the favourable condition of both natural resources and specific areas of importance in protected territories.

Legislative Measures of Natural Resource Protection in Serbian National Parks

Legislative measures of protection stem from legal, planning, and strategic documents that are based on legal regulations enacted to protect and conserve national resources in Serbian national parks.

In the process of creating the *Study of National Park Protection*, the evaluation of natural resources and the degree of their vulnerability is followed by the determination of protection regimes and levels in order to conserve and improve the state of the environment and natural resources in national parks [1]. Certain protection regimes defined for a given protected area need to be adhered to when creating plans and strategic documents. The most important planning document that regulates and defines the use of space within national parks is the *Spatial Plan of Special Purpose Areas*.

Protection regimes for national parks regulate:

- the prohibition of activities and actions within the protected area;
- the prohibition of activities and actions in a protected area for which a specific protection level has been defined;

- allowed activities and actions within the protected area for which a specific protection level has been defined.

The *Rules on Interior Order* defines which activities and actions are prohibited or restricted for every national park. Prohibitions and restrictions vary between different national parks. The following activities and actions are prohibited and restricted in all national parks:

- activities that can diminish the ecological status of wildlife, their habitats, and the habitats of species that are important for preserving biodiversity;
- deforestation and removal of shrubbery and other vegetation that threatens forest borders, puts soil at risk of erosion, etc.;
- introduction of non-native plant species (except for preventing erosions or landslides);
- introduction of non-native animal species;
- game hunting (except for culling for sanitary and breeding purposes) and commercial fishing;
- construction of industrial and metalworking facilities, as well as facilities for oil and gas;
- construction of facilities that pollute the air, soil, and water and affect their quantity;
- construction of nuclear facilities and waste disposal and recycling facilities;
- disposal of construction waste, earth, debris, sawdust, or refuse;
- opening of open-pit and underground mines;
- exploitation of peat and other materials from rivers and river beds;
- motorway construction;
- use of forest roads for public transport;
- damage to notification and other signs;
- ploughing of meadows and pastures.

In addition to general prohibitions of conducting activities and actions across the entire national park areas, the areas of national parks for which the **protection regime of the first degree** has been established also include prohibitions of the following activities and actions:

- use of natural resources;
- exploitation of national resources (deforestation, grazing, extraction of minerals and other raw materials, as well as peat, spring catchment, water drainage, damming of water courses, and the like);
- destruction of and damage to plant cover (chopping, breaking, and excavating trees and shrubs, etc.);
- use of plant parts and products (collection and removal of humus, branches, and felled trees, picking and collection of fruits, flowers, and seeds);
- capturing, killing, and dispersing animal species;
- construction of buildings and other construction activities;
- uncontrolled visits and tours of the reservations;
- introduction of new plant species in the reservation flora [1, 21].

In addition to the abovementioned general prohibitions of conducting activities and actions across the entire national park areas, as well as prohibitions of activities and actions in the areas of national parks for which the protection regime of the first degree has been established, the areas of national parks under the **protection regime of the second degree** also include prohibitions of the following activities and actions:

- unplanned construction and altering of the use of a space;
- earthworks and altering of terrain morphology;
- construction of industrial facilities, warehouses, cold storages, etc.;
- disposal of municipal, industrial, or other waste;
- construction of additional infrastructure and transport systems and facilities, and construction of major roads;
- industrial exploitation of mineral and non-mineral raw materials;
- opening of borrow pits of earth and rock and construction of quarries;
- hydro-geological and hydro-technical works;
- wastewater discharge into water courses;
- spring catchment;
- collection of any plant and animal species listed in the Regulation on Imposing Control of the Use and Trade in Wild Flora and Fauna and the Rules on the Proclamation and Protection of Strictly Protected and Protected Wild Species of Plants, Animals and Fungi;
- game hunting and non-planned logging;
- introduction of foreign plant and animal species;
- use of chemical agents and lighting of fires [1, 21].

In addition to the abovementioned general prohibitions of conducting activities and actions across the entire national park areas, as well as prohibitions of activities and actions in the areas of national parks for which the protection regimes of the first and the second degree have been established, the areas of national parks under the **protection regime of the third degree** also include prohibitions of the following activities and actions:

- construction of buildings that threaten the integrity of cultural monuments or their protected areas;
- construction of hydro power stations and energy distribution infrastructure;
- expansion of existing residential areas in the direction of areas with protection regimes of the first and second degree [1, 21].

For the purpose of adequate national park protection, in addition to the abovementioned prohibited or restricted activities and actions, it is also necessary to establish activities and actions that are allowed, depending on the degree of protection regime.

Accordingly, the following activities and actions are allowed in national parks under the **protection regime of the first degree**:

- scientific research and monitoring of natural processes (climate observations, numbering of trees, or sampling of soil, water, plants, insects, and other animal species);
- renting of areas in which measurements can be performed or equipment installed;
- experimental interventions on vegetation and soil (planting, sowing, spacing, removal of moss, increase or decrease of soil moisture, etc.);
- regulation and provision of access to the reservation;
- enclosure of specific sections for direct physical protection;
- use of technical and biological protective measures against diseases or pests;
- use of technical fire safety measures and placement of fire lookout towers;
- implementation of protection, mitigation, and other measures in case of fires, natural disasters, accidents, diseases, and over-reproduction of plant and animal species;
- reconstruction and maintenance of existing facilities of special significance (high-voltage power lines) [1, 21].

The following activities and actions are allowed in national parks under the **protection regime of the second degree**:

- regulation and damming of water courses;
- creation of accumulations up to a total of 10 million m3;
- construction of mini hydro power stations up to 5 kW on smaller water courses;
- reclamation and other hydro-technical works on areas up to do 5 ha;
- construction of biogas-fired power stations up to 1 MW and solar power stations up to 50 kW;
- construction of roads and facilities for energy, public utility, and other infrastructure, which do not negatively impact the status of plant and animal species and their habitats, natural wealth, and the landscape aesthetics of national parks;
- construction of smaller buildings for tourist accommodation, hospitality services, nautical tourism, and for showcasing the traditional-style values or buildings in the designated areas;
- construction of residential and commercial buildings for agricultural and forest farms that will not negatively impact the status of plant and animal species in the national park;
- restricted exploitation of national resources (rock, clay, and other materials on a terrain area of 150 m2);
- construction of facilities for commercial breeding of domestic animals and small game with the capacity of 100 places for broilers, 500 for other poultry, and 10 for cattle;
- fishing for recreational and scientific-research purposes;
- sanitary game hunting;
- collection of fungi and wild plan and animal species only from private lots;
- forest and forested and management in accordance with the National Park Management Plan;
- maintenance of existing monocultures [1, 21].

The following activities and actions are allowed in national parks under the **protection regime of the third degree**:

- construction of energy facilities and mini hydro power stations up to 30 MW;
- construction of biogas-fired power stations up to 5 MW and solar power stations up to 100 kW;
- construction of wind turbines in border areas of third degree protection;
- construction of smaller industrial facilities for prevalently local needs;
- construction of infrastructure facilities, public ski slopes, etc. in keeping with sustainable use of natural resources and space capacities;
- construction of warehouses for industrial goods and construction material in the border zones of the protected area;
- construction of holiday cottages on the edges of the protected area next to existing residential areas, as well as construction within and around the existing residential areas;
- exploitation of mineral raw materials and geothermal resources, as well as processing of mineral raw materials, at a distance bigger than 2-3 km from the areas with first and second degree protection regimes;
- construction of smaller facilities for collection, storage, and treatment of inorganic waste;

- fishing for recreational, sanitary, and scientific-research purposes, as well as sanitary game hunting;
- maintenance of existing monocultures [1, 21].

The allowed activities and actions in areas with first, second, and third degree protection regimes

- are temporally and spatially restricted
- and are conducted within the scope and manner compliant with sustainable use of natural resources and space capacities

so as to prevent any threat to the fundamental values of the national park [1, 21].

The existing built energy and mining facilities and the already initiated work in areas under second and third degree protection regimes will be used according to the law.

Nature Protection Measures in National Parks

In order to conserve and improve the natural wealth of national parks, it is not enough to establish specific protection regimes that specify the manner and degree of protection, use, regulation, and improvement of protected natural assets, but also to implement nature protection measures.

Nature protection measures in national parks include:

- determination and assessment of states, phenomena, and processes in nature and the area;
- establishment and determination of protected natural resources;
- implementation measures of protection of nature, natural resources, and areas in plans and documents;
- sustainable use of natural resources and protected natural assets;
- creation of reports on the state of nature;
- mitigation of harmful effects due to activities in nature, use of national resources, or natural disasters;
- coordination and harmonization of the national system of national park protection with the international system of national park protection;
- scientific and professional work pertaining to nature protection;
- informing the public;
- incentives and promotions for national park protection;
- involvement of local communities in the national park protection system [1, 30].

Active nature protection measures are those that include protection of populations of species in their natural habitat, conservation of natural ecosystems, conservation, and recovery of populations in their natural habitat, as well as preservation of geodiversity at the place of origin or discovery of rocks, ores, minerals, crystals, and fossils [30].

Strategic Assessment of National Parks' Environmental Impact

Strategic assessment of national parks' environmental impact is conducted for plans, programs, and purposes pertaining to the protection of natural and cultural assets and wildlife and their habitats in national parks.

The procedure of strategic assessment of national parks' environmental impact comprises the following stages: preparatory stage, report on the strategic assessment, and the decision making [1, 29].

The *preparatory stage* involves decision making on the creation of the strategic assessment, selection of the person in charge of the creation of the report, and involvement of interested parties.

The *report on the strategic assessment* describes, evaluates, and assesses the potential significant environmental impact due to implementation of the plan and program, and defines measures for reducing the negative environmental impact. The report comprises:

- Starting points (plan and program, review of the existing state, environmental quality of the analyzed area, solution options, etc.);
- Aims and objectives (harmonization with other plans and programs established on the national and international level);
- Potential impact assessment (presentation of assessed solution options, improvement of those options, data on protected natural assets, etc.);
- Guidelines (creation of strategic assessments and environmental impact assessments);
- State of the environment monitoring program (plan and program, monitoring indicators, indicators for response in the event of unforeseen negative impact, etc.) [1, 29].

Decision making involves the participation of interested bodies, organizations, and members of the public, report evaluations, agreement on the report, availability of information, etc.

Assessment of National Parks' Environmental Impact

Since national park protection regimes are of the first, second, or third degree, to which prohibitions and restrictions of activities and actions that could diminish basic and other features of national parks apply, it is necessary to perform a mandatory assessment of their environmental impact [1, 28].

The Law on Environmental Impact Assessment specifies that impact assessment is performed for:

- projects related to industry, mining, energy industry, transport, tourism, agriculture, forestry, water management, waste management, and public utilities;
- projects planned for national parks and their protected areas [1, 28].

The Regulation on Determining the List of Projects for Which Impact Assessment Is Obligatory and the List of Projects for Which Environmental Impact Assessment May Be Required defines two lists:

- List 1 – projects for which environmental impact assessment is obligatory and
- List 2 – projects for which environmental impact assessment may be required.

Projects for which environmental impact assessment is obligatory (List 1) include:

- Plants (e.g. for oil processing, gasification, smelting, hazardous waste treatment, wastewater treatment, etc.);
- Facilities (hydro-technical, dams, gas and oil pipelines, poultry breeding, oil storage, etc.);
- Activities (construction of railroads and associated facilities, groundwater exploitation, oil and natural gas extraction, burned overhead power lines, etc.) [1, 28].

Projects for which environmental impact assessment may be required (List 2), are divided into 15 subgroups (agriculture and forestry, extractive industries, energy production, pipelines, storage of flammable liquids and gases, metalworking and metal production, mineral processing industry, chemical industry, food industry, textile industry, leather industry, pulp and paper industry, rubber manufacturing industry, infrastructure projects, tourism and recreation, and other projects). All projects included in Lists 1 and 2 that are carried out in national parks and protected national park environments are subject to obligatory environmental impact assessment [1, 28].

Therefore, leaders of projects that are planned for national park areas have to submit a request for an impact assessment study.

Project impact assessment study for projects to be carried out in national parks contains the following:

- Information about the applicant;
- Description of the project and the project location;
- Presentation of the state of the environment at the location (micro- and macro-location);
- Description of possible environmental impacts of the project;
- Environmental impact assessment in the event of accidents;
- Description of measures for preventing, reducing, and removing any significant detrimental environmental impact;
- Environmental impact monitoring program;
- Data on technical deficiencies or the lack of adequate professional knowledge and skills or the inability to acquire appropriate data [1, 28].

After the completed procedure, the authorized body either:

- consents to the impact assessment study for projects in national parks or
- denies the request for the impact assessment study [1, 27].

Establishment and Determination of Protected Natural Resources in National Parks

In order to preserve biodiversity and the gene pool, i.e. species that hold special significance for Serbia in terms of ecology, ecosystems, biogeography, science, health, economy, and other aspects, wild species of plants, animals, and fungi are categorized as

- strictly protected wild species and
- protected wild species.

Accordingly, protection of *strictly protected wild species* and *protected wild species* is carried out in national parks (Table 1.).

Table 1. Protection of strictly protected wild species and protected wild species in national parks

Protection measures for strictly protected wild species	Protection measures for protected wild species
Prohibited use and destruction Prohibited activities that threaten wild species and their habitats Population management (habitat protection, monitoring of the state, biotechnical measures, recovery and revitalization of damaged habitats, scientific research, educational activities, popularization of species conservation and protection, etc.)	Restricted use Prohibited destruction Prohibited activities that threaten wild species Population management

International Union for Conservation of Nature (IUCN) established degrees of vulnerability of plant and animal species through its Red List categories of taxa (Table 2) [4, 1].

Table 2. IUCN Red List categories of taxa [1, 4]

Red List category	Criterion
EX – Extinct	The last known individual is dead.
EW – Extinct in the wild	The taxon is no longer present at a specific time (time of day, season, or year) in a specific territory.
CR – Critically endangered (danger of immediate extinction)	Extremely high probability of taxon extinction in the near future
EN – Endangered (high risk of extinction in the wild)	High probability of taxon extinction in the wild in the near future
VU – Vulnerable	High probability of taxon endangerment in the wild in the near future
LR – Lower risk	Low probability of taxon endangerment (CD – Conservation dependent; NT – Near threatened; LC – Least concern)
DD – Data deficient	Insufficient data to assess the probability of taxon extinction
NE – Not evaluated	The taxon has not been evaluated against the criteria.

Based on the available data, any researcher can apply the following additional criteria:

- Criterion A: Population reduction over a specified period of time;
- Criterion B: Habitat area and the area of occupied space;
- Criterion C: Small size and reduction of population;
- Criterion D: Extremely small and limited population;
- Criterion E: Assessment of extinction probability over a specified period of time [4, 1].

Imposed Control of the Use and Trade of Specific Wild Flora and Fauna from National Parks

The control of collection, use, and trade of specific flora and fauna in national parks is imposed in order to ensure that the species are collected from their natural habitats for later use in the *amounts* and in the *manner* that will not endanger their future, structure, and stability of their communities.

The *Regulation on Imposing Control over the Use and Trade in Wild Flora and Fauna* defines 78 plant species, three lichen species, 15 fungi species, and nine wild fauna species whose collection, use, and trade has been placed under control [1, 23].

Protected species can be collected in amounts that are determined each year for national parks, with adherence to the following principles:

- Prohibited collection of protected species outside predetermined periods;
- Prohibited use of technical equipment for wild species collection;
- Protected species collectors have to be professionally trained for collection;
- Protected species collection has to adhere to specific rules and techniques;
- Prohibited damaging of subsurface plant organs, breaking of trunks, stems, and branches of trees and shrubs, etc. [1].

The following additional protection measures must also be adhered to:

- Prohibited hunting over a specified period (close season), which protects specific species of mammals and birds;
- Permanently or temporarily prohibited fishing;
- Prohibited collection of specific protected wild flora and fauna species in specified territories [1].

Technical and Technological Measures of Natural Resource Protection in National Parks

For the purpose of protecting and conserving a favourable state of national park natural assets, it is possible to use certain technical and technological solutions that will eliminate or mitigate the negative impact on natural assets.

Special technical and technological solutions are usually used in practice, as they allow the creation of *wildlife crossings*, which enable unobstructed and safe passage of wild animals between areas. Wildlife crossings include ecological bridges, underpasses, overpasses, tunnels, culverts, ditches, safety and directional objects, fish ladders, lifts, and other structures [32]. The type of crossing to be used depends on the analysis of ecological vulnerability of the area, the composition of natural vegetation, and movements of wild animals, especially during the mating season. Depending on their purpose, wildlife crossings can be divided into amphibian-reptile tunnels, crossings for small and large wild mammals, and landscape bridges [15].

Amphibian-reptile tunnels are tunnels with movement guidance with openings at both ends, either orthogonal or elliptical. *Crossings for small mammals* (e.g. foxes, otters, hedgehogs, badgers, rabbits, etc.) are underpasses, either round or orthogonal, whose size is usually adapted to the species for which it is intended. *Crossings for large mammals* (e.g. wild boars or does) include *overpasses* (with safety fencing) and *underpasses* [15].

Additional measures of protecting natural assets in national parks include:

- Safety fences that protect animals from falling on or reaching roads, eliminate or reduce the negative effects of noise and light beams from roads, etc.;
- Technical measures of pest control;
- Placement of fire lookout towers;
- Technical fire safety measures;
- Enclosure of specific sections for direct physical protection;
- Construction of waste management facilities;
- Restriction or change of transport regimes to prevent potential threats or damage to natural assets in national parks;

- Placement of feeders, waterers, and canopies;
- Prohibition of access to specified locations;
- Construction of entrance posts with proper facilities and equipment;
- Placement of traffic and technical signalization;
- Construction of educational and visitor centres, etc. [1].

Monitoring of Natural Resources in National Parks

Monitoring of natural resources is the basis for the management and successful monitoring of the implementation of protection regimes and natural asset conservation in national parks. Environmental monitoring is regulated by primary and secondary legislation. According to the *Law on Environmental Protection*, environmental monitoring in national parks involves:

- Monitoring;
- The information system;
- A report on the state of the environment [1, 33].

Monitoring in national parks is performed by systematic monitoring of indicator values, state of water, air, and soil quality, flora and fauna, and monitoring of negative impacts on the environment and the state of the environment. It also involves measures and activities that help reduce the negative impacts and improve environmental quality [1, 33].

The information system of the state of the environment in national parks involves the formation, classification, maintenance, presentation, and distribution of numerical, descriptive, and spatial databases regarding the quality of the mediums, environmental monitoring and protection, legislative, administrative, organizational, and strategic prevention measures, etc., as well as the keeping of the *registry of environmental pollution sources* in national parks [1, 22].

The report on the state of the environment in national parks is created based on collected data and information obtained through the monitoring of specific indicators [1, 33].

The *Law on Strategic Assessment of Environmental Impact* regulates the content of environmental monitoring in national parks, and the content comprises

- description of plan and program goals;
- environemntal monitoring indicators;
- rights and obligations of authorized bodies;
- response in the event of unforeseen negative impacts;
- other elements depending on plan and program type and scope [1, 29].

The key monitoring areas in national parks are natural assets (biodiversity, geoheritage, landscapes, and forests), air, water, soil, noise, and emissions [1, 9].

The national park monitoring system is based on

- the data on the environment that are present in the creation and development of various projects and programs in national parks (water supply, sanitation, transport and energy infrastructure, soil recultivation after exploitation, project of protection, recovery, and improvement of biodiversity, geoheritage, landscapes, forests, etc.;
- the data derived from the regulations and various established programs of regular environmental monitoring on a national and local level [1].

Monitoring of the state of most environmental factors in national parks is performed by local self-government bodies, i.e. municipalities in whose territories the national parks are located.

Monitoring system for water quality control. The main document for water quality monitoring in national parks is the *Program for Systematic Water Quality Testing* for the current year. The Program, implemented by the Republic Hydrometeorological Service of Serbia, includes

- monthly, weekly, or daily measurements and observations of water courses, accumulations, and springs of special importance;
- annual tests of sediment quality;
- annual groundwater testing [1, 30, 11].

Monitoring of water bodies used to supply people with drinking water is performed by the authorized healthcare institutions, while the type and scope of monitoring is adapted according to the dynamics of the realization of planned solutions for meeting the water supply demand, primarily with regard to tourism-related construction [1].

Monitoring system for air quality control. Standards and methods of air monitoring in national parks are regulated by the *Regulation on Air Quality Requirements and Monitoring Conditions* and the *Rules on limit values, immission measurement methods, criteria for establishing the measurement points and data recording* [1, 24, 11].

Systematic measurement of air quality in national parks measures the following substances:

- Specific inorganic substances (sulphur dioxide, soot, suspended particulate matter, nitrogen dioxide, ground-level ozone, carbon monoxide, hydrogen chloride, hydrogen fluoride, ammonia, and hydrogen sulphide);
- Particulate matter from the air;
- Heavy metals in suspended particulate matter (cadmium, manganese, lead, mercury, and copper);
- Organic substances (carbon disulphide, acrolein, etc.);
- Carcinogenic emissions (arsenic, copper, nickel, vinyl chloride) [1, 24, 11].

The measurements are performed by the Republic Hydrometeorological Service of Serbia based on the Serbian Government's or the municipalities' programs of environmental monitoring.

The state of air quality in national parks depends on the emission of gases from industry, transport, households, and uncontrolled burning (fires and burning of different materials). The air pollution level, i.e. the presence of pollutants in the air (CO_2, NO_2, and smoke), is primarily the result of obsolete manufacturing technology, old vehicles, fire-afflicted areas, etc. To monitor air quality, the Republic Hydrometeorological Service places measurement stations inside national parks [1].

Air quality evaluation is performed according to annual pollutant concentrations, which are obtained through measurement at automatic meteorological stations for air quality measurement (AMSKV).

Monitoring system for soil quality control. Monitoring of the soil intended for agricultural production in national parks is regulated by the *Law on Agricultural Land* and it pertains to the examination of the amounts of hazardous and harmful materials in the soil and irrigation water, according to the Program enacted by the minister of agriculture. Fertility control of arable agricultural soil and of introduced mineral fertilizers and pesticides is conducted when necessary, but no less than once every five years. The report on the basic examination is always accompanied by a recommendation on the type of fertilizer to be used and the best ways to improve chemical and biological

properties of the soil. The examinations are conducted by professionally and technically trained and authorized legal persons (companies, enterprises, and the like) [1, 27].

Monitoring of emissions. The *Law on Integral Prevention and Control of Environmental Pollution* mandates the monitoring of emissions/effects at the source as the necessary part of obtaining an integrated license for facilities and activities that could affect the national park environment and human health [1, 25].

Monitoring of noise. The *Law on Environmental Noise Protection* mandates that noise monitoring should be performed through systematic measurement, evaluation, or calculation of specific noise indicators. Noise level assessment, monitoring, and control are conducted on the national level, local level, or by national park managers. Noise monitoring data are always included in the unified environmental information system [1, 31].

Monitoring of natural assets. The primary goal of natural asset monitoring is the establishment of a monitoring system for the *state of biodiversity, wild flora and fauna populations* (predominantly the vulnerable habitats and rare endangered species), and the *state and change of geodiversity areas and objects* [1, 8, 31]. The said monitoring is under direct jurisdiction of the Institute for Nature Conservation of Serbia, and according to the medium-term and annual programs of natural asset conservation. Forest monitoring is performed by authorized forestry and forest management scientific institutions according to specific programs and projects, especially those related to negative impacts and changes (forest desiccation, fires, forest calamities and diseases, windthrow, and snow-induced damage), which are enacted for a five-year period (specific rules) and a ten-year period (general rules). These documents contain exact evaluations of the results of forest management and the changes that occurred during a given period [1].

The minimum requirement for general monitoring is once a year, while individual monitoring activities are organized if needed in the event of unforeseen changes that can cause significant negative effects. Monitoring of flora and fauna numbers and health status falls under the jurisdiction of national park management [1, 32].

Conclusion

The information presented in the paper leads to a conclusion that there is a set of legal, economic, and biological measures as well as technical solutions prescribed by primary and secondary legislation and other acts for the purpose of natural resource conservation in Serbian national parks.

The goal of all listed measures for natural resource protection and conservation is the same – to prevent destruction and uncontrolled use of natural resources over the entire protected territory of national parks and in protection zones.

However, all public companies that manage national parks in Serbia are prevalently "supported" from the exploitation of natural assets, primarily forests and forest resources. Therefore, it is necessary to change the current funding system for public national park management companies.

Finally, the conclusion is that it is necessary to permanently monitor all key indicators and introduce monitoring across entire protected areas of national parks in order to precisely define natural resource protection and conservation measures for each national park. Research has shown that certain secondary legislation acts are not harmonized with the new primary legislation acts in Serbian national parks. Thus, it is necessary to enact new and harmonized regulations as soon as possible because only

Djerdap National Park possesses the most important secondary legislation act – the *Rules on Internal Order*.

Natural resource protection and conservation measures have to be defined for each national park because the national parks are morphologically completely different. Only the combination of different prescribed measures and their continuous implementation can yield an efficient system of natural resource protection and conservation in national parks. Therefore, such measures need to be integrated and implemented in all key strategic documents, which are essential for successful and proper management of Serbian national parks.

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