



**SERBIA ACCELERATING INNOVATION AND GROWTH
ENTREPRENEURSHIP (SAIGE) PROJECT**

**Sub-component 1.1: Science Fund of the Republic of Serbia
Program PRISMA**

**ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)
ENVIRONMENTAL CATEGORY MODERATE**

**Genetic diversity maintenance and population dynamics in natural
populations of endangered plant species:
Flower color polymorphism in *Iris pumila* L.
(IRIS)**

FINAL DOCUMENT

Belgrade

19/12/2023



ABBREVIATIONS AND ACRONYMS

ESMF - Environmental and Social Management Framework

ESMP - Environmental and Social Management Plan

ESS – World Bank's Environmental and Social Standard

HPLC- High Performance Liquid Chromatography

IBISS – Institute for Biological Research “Siniša Stanković”, National Institute of Republic of Serbia, University of Belgrade

SAIGE -Serbia Accelerating Innovation and Growth Entrepreneurship

SF- Science Fund

SRO – Scientific and Research Organization

PI – Principal Investigator

PIU- Project Implementation Unit

TM –Team Member

UAV – Unmanned Aerial Vehicle

UNESCO – The United Nations Educational, Scientific and Cultural Organization,

WP – Working Package



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EXECUTIVE SUMMARY

This draft Environmental and Social Management Plan (ESMP) has been prepared for the PRISMA Program, funded by the Science Fund of the Republic of Serbia. The goal of the PRISMA Program is to support research projects based on excellent ideas that in the future may have a significant impact on the development of science and research, as well as society at large, and clearly stated motivation for research within the framework of modern trends in the development of science in the relevant scientific fields. The ESMP for the project entitled “Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L.” (IRIS) was prepared in accordance with the Environmental and Social Management Framework (ESMF) for the SERBIA ACCELERATING INNOVATION AND GROWTH ENTREPRENEURSHIP (SAIGE) PROJECT. The development objective of the SAIGE project is enhancing Serbia’s growth and competitiveness by improving (i) the relevance and quality of scientific research, and (ii) entrepreneurship innovation and growth finance accessibility. The objective of the Environmental Management Plan is to highlight the negative environmental impacts during the implementation of the subject project, as well as the necessary mitigation measures. The key components of the Environmental Management Plan are: Plan for the mitigation of adverse impacts on the environment and a Plan for monitoring the effects on the environment. The ESMP with mitigation and monitoring plans was prepared solely on the basis of the authors’ knowledge of project activities, their experience of field and laboratory work, taking into account national legislation and regulations of Institute for Biological Research “Siniša Stanković”, National Institute of Republic of Serbia, University of Belgrade – IBISS as participating Scientific and Research Organization (SRO).

LEGAL AND ADMINISTRATIVE FRAMEWORK

Relevant framework and standard

The activities under the IRIS project are classified as a moderate risk project in terms of potential negative environmental and social impacts, and a low ethical risk project according to the World Bank's Environmental and Social Standard (ES). The ESMF document was used as a risk assessment tool. This draft ESMP document was applied to provide guidance for the implementation of the IRIS project, primarily to define environmental and social risks (if any)

and to identify how their impacts can be mitigated in accordance with national laws and regulations, the provisions of the environmental and social standards relevant to the project ES.

All activities under Project IRIS are subject to environmental, social and ethical impact assessments in accordance with the procedures described in the ESMF document that provides guidelines for the risk assessment of projects by the administrative unit of the SAIGE project. The ESMF document is available on the official website of the Science Fund of the Republic of Serbia, https://fondzanauku.gov.rs/vp-content/uploads/2023/03/ SAIGE-ESMF_Updated-March-2023.pdf

In accordance with the content of the ESMP, a detailed analysis of risks to the environment and social setting during project implementation has been prepared. Potential risks are identified, depending on the nature of the risk, along with appropriate measures to mitigate, minimize or avoid them. For each segment of activities during project implementation fieldwork and laboratory activities and detailed explanation is provided in the risk mitigation and monitoring plans defined in the ESMP document.

In the ESMP, all relevant certificates, permits and regulations have been addressed in addition to a detailed description of the project activities within the basic components of the project, the environmental medium in which the project takes place, the field and laboratory working environment, the potential impacts on the quality of air, water, and soil, the all types of wastes, the potential impacts on the health and safety of the researchers and the social community and the potential socioeconomic impacts.

EXISTING SERBIAN LEGISLATION

Fieldwork in Special Nature Reserve

The Special Nature Reserve “Deliblato Sands” is the largest European continental sandy terrain is located in the south-east part of Serbia, in Banat, and one of the most important centers of biodiversity in Serbia and Europe. This Special Nature Reserve, represents a unique test-field for ecology and evolutionary research without or small anthropogenic activity. The moderate continental climate, absence of surface water courses and sandy soil resulted in unique ecosystems containing species of flora and fauna rare and significant according to international criteria. According to the World Heritage Convention of The United Nations Educational, Scientific and Cultural Organization (UNESCO), the Special Nature Reserve “Deliblato Sands” is on list tentative list (<https://whc.unesco.org/en/tentativelists/1695/>).

Therefore, work at this site requires all precautions and protection measures, first of all respecting the Law on environmental protection (“Official Gazette of the RS”, No. 135/2004, 36/2009, 36/2009 – other laws, 72/2009 – other laws, 43/2011 – US decision, 14/2016, 76/2018, 95 /2018 – other law and 95/2018 – other law), Rulebook on the internal order and security service of the “Deliblato Sands” Special Reserve 10/2016-109 (“Official Gazette of RS “, No. 10, 08. 02. 2016) and Rulebook on the proclamation and protection of strictly protected and protected wild species of plants, animals and mushrooms (“Official Gazette of RS”, no. 5/2010, 47/2011, 32/2016 and 98/2016), while obtaining all the relevant permits necessary for the implementation of the Project IRIS, PRISMA Program.

The IRIS project activities will be carried out within the Special Nature Reserve “Deliblato Sands” with all required permits and the consent of the public company “Vojvodinašume” Forest Farm “Banat” (application for consent submitted, IBISS authenticated document No. 01-2361, 16.10.2023, file Attachment ESMP 7003 IRIS.pdf pages 26-27). The permit for project implementation for 2024-2026 and used drone in the Special Nature Reserve “Deliblato Sands” was obtained (No. 01-3014/2, 20.10.2023, file Attachment ESMP 7003 IRIS page 28). The work will also be carried out on the ground in accordance with the Rulebook on Internal Regulation and Guarding of the Special Nature Reserve “Deliblato Sands” (“Official Gazette of RS”, No. 10/2016).

The area to be explored (Figure 1) covers an area of approximately 4.65 ha (44°57’59.66 “N and 21°2’20.98 “E; 44°57’57.07 “N and 21°2’15.67 “E; 44 °57’48.25 “N and 21°2’32.02 “E; 44°57’51.32 “N and 21°2’34.62 “E).



Figure 1. *The location of the Project IRIS field activities.*

The endangered plant species

The dwarf bearded iris *Iris pumila* L. (Iridaceae) is the endangered small monocot (Figure 2) that occurs in the lowlands of central and eastern Europe and in the protected area to Deliblato Sands in Serbia. These studies are an important basis for future research that could focus on integrative studies, studies of genetic variability maintenance and long-term population studies, as well as on analyses of environmental stress and studies that can lead to practical applications of evolutionary findings for biomonitoring and establish conservation strategies based mostly on long-term population studies. Every year we receive an annual permit from the Ministry of Environmental Protection of the Republic of Serbia for our work on *I. pumila* in Deliblato Sands, and so it will be in 2024, 2025 and 2026, when our work is planned under this project proposal. We possess the valid permit No. 353-01-214/2023-04 for the year 2023 from 09.03.2023 (Attachment ESMP 7003 IRIS.pdf, pages 17-23), issued by the Ministry of Environmental Protection of the Republic of Serbia, in which *I. pumila* in Deliblato Sands is explicitly mentioned, as in all previous years (for all years from 2011-until now). It can be issued upon request, as all other permits issued in previous years. An application has been submitted to the Ministry of Environmental Protection of the Republic of Serbia for the issuance of a permit for scientific research work in the framework of IRIS project activates on the endangered species *I. pumila* in 2024 (IBISS authenticated document No. 01-2102, 12.10.2023). According to Rulebook on the proclamation and protection of strictly protected and protected wild species of plants, animals and mushrooms (“Official Gazette of RS”, no. 5/2010, 47/2011, 32/2016 and 98/2016), scientific research on endangered species is considered as the measure of its protection.



Figure 2. *Iris pumila* flowers in nature.

Unmanned Aerial Vehicle – Drone

An analysis of the rules and risk assessments for UAV (Unmanned Aerial Vehicle) use during activities in the Special Nature Reserve “Deliblato Sands” been presented. The activities of team members during research in the field have been defined and relevant permits for work in the nature reserve and work with protected species have been included in accordance with the Rulebook on Internal Regulation and Guarding of the Special Nature Reserve “Deliblato Sands” (“Official Gazette of RS”, No. 10/2016).

The use of drones is in accordance with the Regulations for Unmanned Aerial Vehicles („Official Gazette of the RS“, no. 1/2020) and the Law on Air Traffic („Official Gazette of the RS“, no. 73/2010, 57/2011, 93 /2012, 45/2015 and 66/2015). The drone is used and legally operated by team members holding a license issued by the Directorate of Civil Aviation of the Republic of Serbia, the agency that is the national regulatory and supervisory authority of the Republic of Serbia in aviation (Attachment ESMP 7003 IRIS.pdf, pages 3-6). The drone was used in accordance with Article 5 of the Unmanned Aircraft Regulations („Official Gazette of RS“, No. 1/2020).

The drone is registered in the Certificate of Records issued by the Directorate of Civil Aviation of the Republic of Serbia (No.license YU-D0602, 18.10.2023, file Attachment ESMP 7003 IRIS.pdf, page 1) and with the Third-party liability insurance policy (No. 160-00002134 6, 16.10.2023, file Attachment ESMP 7003 IRIS.pdf, page 2). A recording permit is not required because the flight area of the unmanned aircraft is the part of the airspace in which the unmanned aircraft flies over an undeveloped and uninhabited area in which there are no people other than the operator of the UAV (Area I) (Article 2, 6(1) of the Unmanned Aircraft Regulation „Official Gazette of RS“, No. 1/2020).

The recording will be carried out in the Special Nature Reserve „Deliblato Sands“ with the consents of the public company „Vojvodinašume“ Forest Farm „Banat“ (IBISS authenticated document No. 01-2361 16.10.2023, file Attachment ESMP 7003 IRIS.pdf page 25-26) and specifically for Project IRIS for in period of 2024-2026 (No. 01-3014/2, 20.10.2023, file Attachment ESMP 7003 IRIS page 28). The provisions of the Law on Confidentiality of Data („Official Gazette of RS“, No. 104/2009) will be implemented during the activities under the Project IRIS and the Law on the Protection of Personal Data ('Official Gazette of the RS“, No. 87/2018) will be observed, thus avoiding possible negative impacts on social/societal issues when using a drone for recording. The digital photographs taken by drone will be saved on the external disk drive and used in analyses in the framework on the IRIS project. The TM1

is responsible for storing and using digital records (IBISS authenticated document No. 01-2011, 06.10.2022). Taking photographs with UAV (drone) in fact reduces the impact on the environment because researchers spend less time and move much less in Protected Natural Reserves.

National Law and Regulations List

The implementation of the project IRIS will be in accordance with all relevant laws and regulations attached to this document (laws, regulations, permits, consents, certificates and agreements) (some of them are publicly available, but some internal IBISS documents are available on request, other relevant documents are part of the attached file – Attachment ESMP 7003 IRIS.pdf). In this way, the project implementation will comply with the basic principles that ensure the protection of the environment is in accordance with national and international standards. In addition to laws and regulations, the ESMP includes detailed explanations of legal requirements for environmental protection, pollution prevention and control, and protection of human health and safety. The laws and regulations that are binding on the Project are listed below.

- Air transport law (“Official Gazette of the RS”, nos. 73/2010, 57/2011, 93/2012, 45/2015 I 66/2015, 83/2018, 9/2020 and 62/2023).

- Regulation on unmanned aircraft (“Official Gazette of the RS”, no. 1/2020)

- Code of practice for fieldwork of IBISS

(https://www.ibiss.bg.ac.rs/images/IBISS/Resursi/Pravila_terenskog_rada/Code_of_practice_for_fieldwork_of_IBISS.pdf),

- General and safety code of conduct and practice applied to laboratories at IBISS

(https://www.ibiss.bg.ac.rs/images/IBISS/Resursi/Pravila_rada_u_lab/General_and_safety_code_of_conduct_and_practice_applied_to_laboratories_at_IBISS.pdf),

-Law on environmental protection (“Official Gazette of the RS”, No. 135/2004, 36/2009, 36/2009, - 72/2009 —43/2011, 14/2016, 76/2018, 95 /2018 – and 95/2018),

- Law on Science and Research of the Republic of Serbia (“Official Gazette of RS”, No. 49/2019),

-Law about national parks of the Republic of Serbia (“Official Gazette of RS”, No. 84/2015 and 95/2018),

- Law on Science (“Official Gazette of the RS “, br. 116/2007, 88/2009, 88/2009, 104/2009, 10/2015 and 36/2018),

- The law on data confidentiality (“Official Gazette of RS”, No. 104/2009),



- Law on Protection of Personal Data (“Official Gazette of RS “, No. 87/2018),
- Law of gender equality (“Official Gazette of RS”, No. 52/2021)
- Rulebook on the proclamation and protection of strictly protected and protected wild species of plants, animals and mushrooms (“Official Gazette of RS”, no. 5/2010, 47/2011, 32/2016 and 98/2016)
- Rulebook on the internal order and security service of the Deliblato Sands Special Reserve 10/2016-109 (“Official Gazette of RS “, No. 10, 08. 02. 2016),
- Regulation on the procedure for issuing permission for aerial photography of the territory of the FRY and for issuing cartographic and other publications: SRJ 54/1994-758, RS 72/2009-139 (other law)
- Decree on the Deliblato Sands special nature reserve („Official Gazette of RS”, No. 66/91, 83/92, 53/93, 67/93, 48/94, 44/95 and 53/95).

Some of the regulations and decrees are kept in internal database regulations in IBISS. That includes the Gender equality plan (IBISS authenticated document No. 01-2139, 13.12.2021), the Risk management plan (IBISS authenticated document No. 01-2750, 30.12.2022). The medical waste removal agreement – IBISS authenticated document No. 01-331, 19.02.2018 and Waste collection agreement – IBISS authenticated document No. 01-871, 10.05.2022.

PROJECT DESCRIPTION

INSTITUTIONAL AND ADMINISTRATIVE PART	
Country	Serbia
Project	Serbia accelerating innovation and growth entrepreneurship (SAIGE) project
Sub-component	Science Fund of the Republic of Serbia
Program	Program PRISMA
Subprogram	Natural sciences, NS Biological sciences, Evolutionary Biology
Project title	Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in <i>Iris pumila</i> L.
Acronym	IRIS
Principal Investigator (PI)	Danijela Miljković
Contact email address	danijela.miljkovic@ibis.bg.ac.rs
Participating Scientific and Research Organization (SRO):	Institute for Biological Research “Siniša Stanković”, National Institute of Republic of Serbia, University of Belgrade – IBISS The responsible person: Mirjana Mihailović

Project IRIS addresses one of the central problems in evolutionary and conservation biology – maintenance of genetic polymorphism – by jointly applying the set of state-of-the-art approaches on flower color polymorphism in natural populations of *I. pumila* L., endangered species inhabiting the Natural reserve of Deliblato Sands, Serbia.

Genetic polymorphism is crucial for evolution by natural selection, but mechanisms of its maintenance are the subject of considerable debate. Huge flower color polymorphism found in *I. pumila* populations makes it superb object for this type of research. It was already successfully used, but with many important limitations that will be eliminated by proposed innovative approach.

In this approach we will efficiently analyze huge new and existing data sets from several flowering seasons by using drone digital photographs, overcoming previous limitations of much smaller samples restricted to flowering peak. Variability in flower color will now be precisely accessed by reflectance spectroscopy in the field, removing previous subjectivity in

visual identification that led to inconsistencies in defining color morphs. This will be followed by HPLC analysis of relevant pigments, providing insights into polymorphism biochemical basis. Microsatellite genetic analyses will immensely supplement previous utilization of flower color in identifying different genotypes in population, as the most cost-efficient method for this purpose.

Expected results will include precise multi-year identification and characterization of *I. pumila* genotypes and assessment of their spatial and temporal patterns in population. This will provide tools for cutting-edge insights into population dynamics and polymorphism maintenance.

Results will have impact on other evolutionary studies, on sustainable within-species biodiversity protection, and on monitoring environmental changes (including climate ones), giving textbook examples for much needed promotion of evolutionary biology.

Participating Scientific and Research organization (SRO) is Institute for Biological Research “Siniša Stanković”, National Institute of Republic of Serbia, University of Belgrade – IBISS. The team of IRIS project are PI and four researches, all employed in SRO.

Project methodology and equipment

Population study (Equipment: DJI Mavic Pro Drone)

During the proposed research data collection will be considerably enhanced by the utilization of unmanned aerial vehicle – DJI Mavic Pro drone with Haselblad L1D-20c, a state-of-the-art aerial camera 1/2.3-inch CMOS sensor and a total pixel count of 12.71 M, capturing photos at 4000 x 3000 pixels (Figure 3). This will speed up data collection and leave enough time for simultaneous data collection for reflectance UV enhanced spectroscopy, as well as HPLC and microsatellite analyses. This approach to data collection was already tested and used in the 2021, 2022 and 2023 flowering seasons. Experimental plots are sited in uninhibited location of Deliblato Sands and drone is taking pictures during the daytime (between 8 AM and 15 PM) from attitude of no more than 25 meters above the experimental. The horizontal distance from the operator never exceeds 500 m.



Figure 3. DJI Mavic Pro Drone flying over experimental plots.

Reflectance UV enhanced spectroscopy (Equipment: JAZ UV/VIS Portable spectrometer)

JAZ UV/VIS Portable spectrometer with UV enhanced detector (200 -850 nm) with optical resolution of 1.3 nm, Premium reflectance probe and Pulsed-Xenon light source will be used in proposed research (Figure 4). Overcoming subjectivity (quantitative spectrum instead of subjective visual detection), insect vision (UV enhanced instead of human vision spectrum) and variability in light conditions (Xenon light source instead of variable environmental light conditions). Reflectance spectroscopy can be applied efficiently on *I. pumila* flowers under field conditions. UV enhanced reflectance spectroscopy overcomes problems with subjectivity of human vision and variability of environmental lighting. Variability detected on various levels enable extensive population studies with proper statistical analysis.

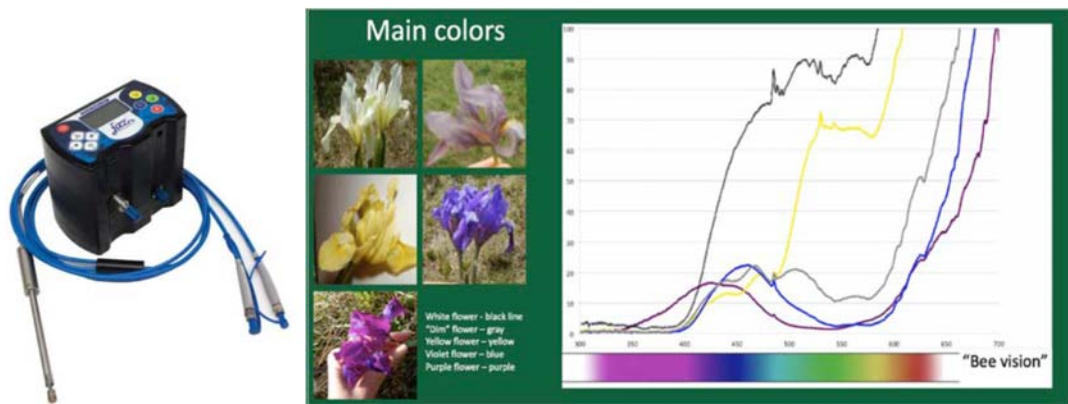


Figure 4. On the left: JAZ portable UV enhanced spectrometer with probe. On the right: Specters of main colors of *I. pumila* flowers.

High performance liquid chromatography (HPLC) of flower pigments (Equipment: HPLC Analysis System)

High performance liquid chromatography (HPLC) is a method suitable for detection of large biological molecules, and will be utilized for detection of various pigments in *I. pumila* (Figure 5). Three groups of pigments are responsible for coloration in plants: flavonoids, anthocyanins and carotenoids, flavonoids and anthocyanins being the major contributors to flower color.



Figure 5. HPLC system in IBISS

On the basis of pigments found in other species, we selected following standards for HPLC pigment analysis in *Iris pumila* flowers: Anthocyanins (Delphinidin-3-O-rutinoside chloride, Delphinidin-3-O-galactoside chloride, Pelargonidin-3-O-rutinoside chloride, Callistephin chloride, Keracyanin chloride), Isoflavones (Iridin, Tectoridin, Genistin, Anthocyanins, Sophoricoside, Formononetin, Iriflophenone-3-C- β -D-glucopyranoside, Iriflophenone-3-C-glucoside, Irogenin), Xanthenes (Neomangiferin, Mangiferin, Swertianolin) Flavones (Isoorientin, Orientin, Isovitexin, Vitexin) Carotenoids (Lycopene, Lutein, Neoxantin, Violaxantin).

Microsatellite analysis (Equipment: PCR, Sequenator)

Genetic identity of plants within populations will be assessed by microsatellite (SSR - simple sequence repeats) genotyping, as most cost-effective method for this purpose, allowing us to have largest possible suitable sample size under resource limitations. Since for this



method primers must be developed for the species in question, after preliminary testing from larger sets of primers chosen on the basis of existing information on EST and EST-SSR marker resources for *Iris* we already detected five suitable loci (IM 93 FAM, IM 123 VIC, IM 196 VIC, IM200 NED and IM 348 PET) with appropriate level of variation. DNA amplification will be done in Institute for Biological Research "Siniša Stanković" (SRO) by PCR method with strict adherence to best laboratory practices given in IBISS Rulebook, while sequencing will be outsourced.

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

The potential impacts and activities of the IRIS project on the environment and social community are the generated waste and its disposal flows, the impact on the health and safety of researchers and the community, and socio-economic impacts.

In the Project IRIS, which aims at evolutionary ecology research, there is no risk of negative impacts on the environment or society, such as loss of natural habitat, pollution, air, water, soil, involuntary resettlement and violation of human rights. Implementation of the project will not result in involuntary land acquisition, population resettlement or permanent land occupation, encroachment on private property, or impact on income. Activities will not negatively impact local, regional or national cultural heritage. In fact, there will be no negative impacts on the social community, as the research will be solely for the study of genetic diversity and population dynamics in natural populations of endangered plant species in the protected uninhabited nature reserve "Deliblato Sands". Activities are performed in the Natural Reserve with all necessary permits from the Ministry of Environmental Protection, the public company "Vojvodinašume" Forest farm "Banat" as a supervisor of the Special Nature Reserve "Deliblato Sands".

Waste and disposal

The transportation and disposal of hazardous and potentially hazardous chemical waste, electronic waste and medical waste is carried out by licensed companies. Procedures in the SRO for transport and disposal of waste, including potentially hazardous waste, are harmonized in accordance with Serbian legislation. Hazardous and potentially hazardous chemical waste, electronic waste and medical waste are transported and disposed/managed by licensed companies. As part of activities in the laboratory work environment, all chemical wastes that



would require special management are disposed of by disposal companies contracted by the SRO (The medical waste removal agreement - IBISS authenticated document No. 01-331, 19.02.2018 and Waste collection agreement - IBISS authenticated document No. 01-871, 10.05.2022). Other vegetative wastes are household wastes and do not require special handling and disposal. No waste will be generated during fieldwork activities during the implementation of the proposed project activities.

Health and safety of researchers

The members of the Project IRIS are familiar with the rules of work in the field and in the laboratory, which they confirmed by signing the statements (file Attachment ESMP 7003 IRIS pdf, pages 6-16). In the document Code of Practice for Fieldwork, from the Institute for Biological Research "Siniša Stanković" - National institute of the Republic of Serbia, University of Belgrade, detailed instructions are given in Annex 4, for actions to be taken in the event of hazards to the safety and health of team members. Detailed descriptions for each phase are provided in the Environmental Mitigation and Monitoring Plan for activities undertaken during project implementation.

Socio-economic impacts

The socio-economic benefits of the IRIS project are mainly focused on the scientific community. However, the positive impact on the scientific community as part of the social community will lead to results that will contribute primarily to the advancement of evolutionary biology and popularization of science. Also, during the project implementation all human rights will be respected according to the regulations (according to the internal documents of SRO IBIS as Gender equality plan created according to the Law on Gender Equality (created according to the list of laws and regulations in IBISS authenticated document No. 01-2139, 13.12.2021) and Risk management plan ("Official Gazette" of RS" no. 52/21., IBISS authenticated document No. 01-2750, 30.12.2022).



CAPACITY ENHANCEMENT AND TRAINING

Every scientific project leads to some level of capacity enhancement in various fields, and it can also lead to capacity enhancement in fields of estimating, mitigating and monitoring environmental and social impacts of research.

Previous projects on the IDEA Program led by the Institute for Biological Research “Siniša Stanković”, National Institute of Republic of Serbia, University of Belgrade (IBISS) already lead to improvement of significant parts of SRO regulations, including latest versions of the IBISS Code of Practice for Fieldwork and General and Safety Code of Conduct and Practice Applied to Laboratories.

We expect that work on this project (7003 IRIS) will significantly enhance the capacity of the Serbian research community in issues of estimating environmental and social impacts, mitigating measures and monitoring of using drones (and, to a lesser degree, of research in protected natural areas) on Fund of Science research projects and programs.

SUMMARY OF ENVIRONMENTAL AND SOCIAL IMPACT

During the preparation and implementation phase, of the scientific research project “Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *I. pumila* L.” (IRIS) there are certain/potential environmental impacts listed below, together with the intensity of their actions.

Table 1. Review of the impact on the environment that predicted for the duration of the Project IRIS.

INFLUENCE	SIGNIFICANCE	COMMENT
Impacts on land use and settlements	Does not exist	
Ground and surface water	Does not exist	
Air quality	Does not exist	
Flora and fauna (protected areas and species)	Low	Addressed in Management and Monitoring plans
Monuments	Does not exist	
Noise	Does not exist	
Soil management	Does not exist	
Management of Waste	Low	Addressed in Management and Monitoring plans
Management of hazardous materials and chemicals, including hazardous waste	Low	Addressed in Management and Monitoring plans
Medical waste management	Does not exist	
Working in the laboratory	Low	Addressed in Management and Monitoring plans
Safe management of biohazards	Does not exist	
Handling of gases under pressure (H&S at work and prevention of accidents)	Does not exist	
Health&Safety of the local populations (Field activities)	Does not exist	
Cumulative impacts	Low	Addressed in Management and Monitoring plans



Project identification

SAIGE PROJECT

Sub-component 1.1: Science Fund of the Republic of Serbia

Program PRISMA

7003 – IRIS

“Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L.”

ESMP Prepared by:

Belgrade, 19.10.2023.

Danijela Miljković, PhD,
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Aleksej Tarasjev, PhD,
Team Member 1



MITIGATION PLAN

MITIGATION PLAN				
Issue	Mitigating measure	Cost of mitigation	Responsibility	Supervision
Project preparation phase				
General				
Possible grounds for Environmental and Social concerns	Identification of possible concerns as well as concerns from Checklist in Part B of the project proposal Table 1.2	No cost	PI	PIU/Fund for Science RS/IBISS
Identified Environmental and Social concerns	Developing <i>Environmental and Social Management Plan (ESMP)</i>	No cost	PI, TM1	PIU/Fund for Science RS/IBISS
Field				
Work with protected species is in accordance with existing regulations	Applying for permit	No cost	PI	PIU/SF/Director of IBISS (SRO)
Work in Nature reserve is in accordance with existing regulations	Applying for permit	No cost	PI	PIU/SF/Director of IBISS (SRO)
All participants in field trips are aware of safety regulations	All participants get acquainted with IBISS <i>Code of Practice for Fieldwork</i> and sign statement	No cost	IBISS (SRO) Head of Department	PIU/SF/IBISS (SRO) Administrative and Legal Service
Drone				
Drone operated only by certified persons	Obtaining certificates from Directorate for Civil Aviation	IBISS (SRO)	TM 1 (leader of WP 1)	PIU/SF/IBISS
Drone registered as required under regulations	Registering Drone at Directorate for Civil Aviation	IBISS (SRO)	Appointed person in IBISS (SRO)	PIU/SF/Director of IBISS (SRO)



Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L. (7003- IRIS)

Issue	Mitigating measure	Cost of mitigation	Responsibility	Supervision
Protection of people/goods	Drone Insurance, Third-party liability insurance policy (No. 160-00002134 6, 16.10.2023, file Attachment ESMP 7003 IRIS page 2)	IBISS (SRO)	Appointed person in IBISS (SRO)	PIU/SF/IBISS (SRO) Financial Service
Drone maintained according to producer instructions	Appointing person responsible for drone	No cost	IBISS (SRO) Head of Department	PIU/SF/Director of IBISS (SRO)
Privacy protection	All persons that will be operating drone get familiar with regulations	No cost	PI	PIU/SF/Director of IBISS (SRO)
Laboratory				
Participants in lab familiar to good laboratory practice during work	All participants get acquainted with IBISSS <i>General and safety rules of conduct and work in the laboratories</i> and sign statement	No cost	IBISS Head of Department	PIU/SF/IBISS (SRO) Administrative and Legal Service
Participants in lab familiar proper chemicals storage	All participants get acquainted with IBISSS Rulebook and sign statement	No cost	IBISS Head of Department	PIU/SF/IBISS (SRO) Administrative and Legal Service
Participants in lab familiar proper waste deposition	All participants get acquainted with IBISSS Rulebook and sign statement	No cost	Head of IBISS Technical Service (SRO)	PIU/SF/IBISS (SRO) Administrative and Legal Service
Participants adhere to fire protection regulations	All participants complete fire exhaustion drill, complete test and receive certificate	IBISS (SRO)	Head of IBISS Technical Service (SRO)	PIU/SF/IBISS (SRO) Administrative and Legal Service
Project execution phase (Field/Laboratory)				
Field				
Work with protected species in accordance with existing regulations	Applying for yearly permit each year of the project and strictly adhere to conditions given in it	No cost	TM1 and PI	PIU/SF/Director of IBISS (SRO)



Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L. (7003- IRIS)

Issue	Mitigating measure	Cost of mitigation	Responsibility	Supervision
Work in Nature reserve in accordance with existing regulations	Applying for yearly permit each year of the project and strictly adhere to conditions given in it	No cost	TM1 and PI	PIU/SF/Director of IBISS (SRO)
Risks on the field trip- Dehydration	Prevention and first aid measures from IBISS <i>Code of Practice for Fieldwork</i> Appendix 4	No cost	Participants in field trip	PIU/SF/Leader of field trip
Risks on the field trip- Sunburn	Prevention and first aid measures from IBISS <i>Code of Practice for Fieldwork</i> Appendix 4	No cost	Participants in field trip	PIU/SF/Leader of field trip
Risks on the field trip- Heat exhaustion or stroke	Prevention and first aid measures from IBISS <i>Code of Practice for Fieldwork</i> Appendix 4	No cost	Participants in field trip	PIU/SF/Leader of field trip
Risks on the field trip- Extreme weather conditions	Prevention and first aid measures from IBISS <i>Code of Practice for Fieldwork</i> Appendix 4	No cost	Participants in field trip	PIU/SF/Leader of field trip
Risks on the field trip- Traffic accidents	Prevention and first aid measures from IBISS <i>Code of Practice for Fieldwork</i> Appendix 4	No cost	Participants in field trip	PIU/SF/Leader of field trip
Risks on the field trip- Attacks	Prevention and first aid measures from IBISS <i>Code of Practice for Fieldwork</i> Appendix 4	No cost	Participants in field trip	PIU/SF/Leader of field trip
Risks on the field trip- Hunting	There is no hunting in locality where project will be implemented, and field trips are all to be performed outside regular hunting season. In addition, before entering Special Natural Reserve Deliblato Sands, current situation in that respect will be checked in communication with forestry officer in charge for that section of Deliblato Sands	No cost	Participants in field trip	PIU/SF/Leader of field trip



Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L. (7003- IRIS)

Issue	Mitigating measure	Cost of mitigation	Responsibility	Supervision
Drone				
Documentation for drone is in order	Checking the documentation before field trip	No cost	Drone operator	PIU/SF/Leader of field trip
Drone in operating condition	Proper drone maintenance according to producer instructions in Operation Manual	No cost	Appointed person in IBISS (SRO)	PIU/SF/Head of IBISS Technical Service (SRO)
Drone operating airspace is not currently dedicated	Checking Airspace Usage Plan (AUP) on Serbia and Montenegro Air Trafficking Services (SMATSA) website on day of field trip (Tables of usage are released on internet one working day prior to the date of operations, by 4 p.m. local time, at the latest)	No cost	TM 1 (leader of WP1)	PIU/SF/IBISS
Drone in operating condition in field	Checking the drone before field trip	No cost	Appointed person in IBISS (SRO)	PIU/SF/Head of IBISS Technical Service (SRO)
Flight safety - operators	Drone operated only by certified persons	No cost	Leader of field trip	PIU/SF/Appointed person in IBISS (SRO)
Flight safety - operation	Drone operated following requirements in documents of Directorate for Civil Aviation	No cost	Drone operator	PIU/SF/Leader of field trip
Laboratory				
Proper laboratory management	The laboratory has a defined laboratory management that has overall responsibility for the work of the laboratory (job descriptions and responsibilities of researchers, responsible person for work in the laboratory, etc.);	No cost	IBISS Head of Department	PIU/SF/Director of IBISS (SRO)



Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L. (7003- IRIS)

Issue	Mitigating measure	Cost of mitigation	Responsibility	Supervision
Researcher safety	All researchers/participants in the Project are provided with means and equipment for personal protection at work (gloves, masks and respirators, protective glasses, etc., depending on the type of activity), all in accordance with the Rulebook on personal protective equipment	IBISS (SRO)	IBISS Head of Department	PIU/SF/Director of IBISS
Proper handling of chemicals	The handling of chemicals and other dangerous agents is carried out in accordance with the instructions from the safety data sheets;	No cost	responsible person for work in the laboratory	PIU/SF/IBISS Head of Department
Managing equipment failure	There is a documented procedure for what to do in the event of equipment failure, overloading or mishandling, and records are kept about it;	No cost	responsible person for work in the laboratory	PIU/SF/IBISS Head of Department
Safe work in laboratory	The laboratory has a list of documented information related to work in the laboratory, which all researchers/participants in the Project are familiar with (instructions for safe work, management of waste, chemicals, hazardous waste, etc.) according to <i>IBISS Safety Code of Conduct and Practice Applied to Laboratories</i>	No cost	responsible person for work in the laboratory	PIU/SF/IBISS Head of Department
Laboratory risk management	<i>IBISS Act on risk assessment for all workplaces in the working environment</i>	No cost	Director of IBISS (SRO)	PIU/SF
Waste management	In the Institute there is a Catalog of waste generated with defined waste streams;	IBISS (SRO)	IBISS Technical Service (SRO)	PIU/SF/Director of IBISS (SRO)
Fire protection	Fire-fighting equipment in place, and Instructions for evacuation routes provided according to <i>IBISS Safety Code of Conduct and Practice Applied to Laboratories</i>	IBISS (SRO)	Head of IBISS Technical Service (SRO)	PIU/SF/Director of IBISS (SRO)



MONITORING PLAN

MONITORING PLAN					
What	Where	How	When	Who	Supervision
Preparatory phase					
Field					
Needed permits obtained	IBISS (SRO)	Check obtained permits	At start of project field trip season	IBISS (SRO) Head of Department	PIU/SF/Director of IBISS (SRO)
Drone					
Drone is registered	IBISS (SRO)	Check registration document	At start of project field trip season	PI	PIU/SF/IBISS (SRO) Administrative and Legal Service
Drone is insured	IBISS (SRO)	Check insurance policy	At start of project field trip season	PI	PIU/SF/IBISS (SRO) Financial Service
Potential drone operators obtained their certificates	IBISS (SRO)	Check certificates	At start of project field trip season	PI	PIU/SF/Appointed person in IBISS (SRO)
Laboratory					
Statements signed in accordance with IBISS rulebooks	IBISS (SRO)	Check signed statements	At project start	PI	PIU/SF/IBISS (SRO) Administrative and Legal Service
All participants have fire exhaustion certificates	IBISS (SRO)	Check certificates	At project start	PI	PIU/SF/IBISS (SRO) Administrative and Legal Service



Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L. (7003- IRIS)

What	Where	How	When	Who	Supervision
Project execution phase (Field/Laboratory)					
Field					
Vehicle in working condition	Service	Service	Before every field trip	Service contacted by IBISS (SRO)	PIU/SF/Representative of Technical Service of IBISS (SRO)
Vehicle documentation is in order	IBISS (SRO)	Checking documentation	Before every field trip	Driver	PIU/SF/Leader of field trip
All permits needed for field trip are in order	IBISS (SRO)	Checking documentation	Before every field trip	Leader of field trip	PIU/SF/IBISS (PI)
All safety materials are packed	IBISS (SRO)	Checking baggage	Before every field trip	Leader of field trip	PIU/SF/IBISS (PI)
Field work is done according with the permits	IBISS (SRO)	Informing officer in charge for environmental protection about plan of work in Natural reserve	Before every field trip	TM1	PIU/SF/IBISS (PI)
Adherence to permit conditions	Special Natural Reserve Deliblato Sands	Informing forestry officer in charge of given sector of Special Natural Reserve Deliblato Sands about location, type and exact time of start and end of work	On each entering to Deliblato Sands Natural Reserve	Leader of field trip	PIU/SF/Forestry officer in charge of given sector of Special Natural Reserve Deliblato Sands
Drone					
Appropriate drone condition	IBISS (SRO)	Checking drone condition	Before every field trip	Person in charge of the drone in IBISS (SRO)	PIU/SF/Representative of Technical Service of IBISS (SRO)
Drone operator is certified	IBISS (SRO)	Checking documentation	Before every field trip	Leader of field trip	PIU/SF/Person in charge of the drone in IBISS (SRO)



Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L. (7003- IRIS)

What	Where	How	When	Who	Supervision
Adherence to drone permit conditions	Special Natural Reserve Deliblato Sands	Informing forestry officer in charge of given sector of Special Natural Reserve Deliblato Sands about location, type and exact time of start and end of flight	On each entering to Special Natural Reserve Deliblato Sands	Leader of field trip	PIU/SF/Forestry officer in charge of given sector of Special Natural Reserve Deliblato Sands
Environmental conditions are appropriate for flight	Special Natural Reserve Deliblato Sands	Checking weather forecasts and observing conditions on the spot	On every field trip	Drone operator	PIU/SF/IBISS (Leader of field trip)
Laboratory					
Work conducted according to good laboratory practice described in IBISS Rulebook	IBISS (SRO)	Inspection during work	Periodically	PI	PIU/SF/IBISS (SRO) Head of Department
Participants adhere to fire protection regulations	IBISS (SRO)	Inspection during work	Periodically	IBISS (SRO) Head of Department	PIU/SF/Representative of Technical Service of IBISS (SRO)
Waste is deposited in accordance with IBISS Rulebook	IBISS (SRO)	Inspection during work	Periodically	IBISS (SRO) Head of Department	PIU/SF/Representative of Technical Service of IBISS (SRO)

III. PUBLIC CONSULTATION DETAILS AND MINUTES OF MEETING FOR THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

PROJECT

Genetic diversity maintenance and population dynamics in natural populations of endangered plant species: Flower color polymorphism in *Iris pumila* L.

IRIS

Introduction

The document is an annex to the Environmental and Social Management Plan (ESMP) providing details on the Public Consultation. The public viewing of the ESMP aims to provide the public, agencies and organizations interested in the IRIS project with the opportunity to contribute to their discussion on the quality of this documentation and the acceptability of the plan for the implementation of the IRIS project.

The key technical and content related aspects of the Public Consultation are presented below:

1. Manner in which notification consultation was announced

The public consultation was announced via the official website of the of Institute for Biological Research "Siniša Stanković", National Institute of the Republic of Serbia, University of Belgrade (IBISS). The announcement was published 7 days before the public consultation.

(<https://www.ibiss.bg.ac.rs/index.php/en/events/item/3019-public-hearing>,
<https://www.ibiss.bg.ac.rs/images/IBISS/Resursi/Public-hearing.pdf>)

2. Dates of consultations

The consultation was held on December 15, 2023, starting at 11.00

3. Location consultation was held

The consultation was held using Zoom video conferencing platform, the details of the meeting is

<https://us06web.zoom.us/j/82515855758?pwd=2MlyOY3aU4fn2myGDSMCI9kUIav70S.1>

Received comments in writing are presented in this report, while public hearing was recorded and is available to Serbian Fund for Science on request.

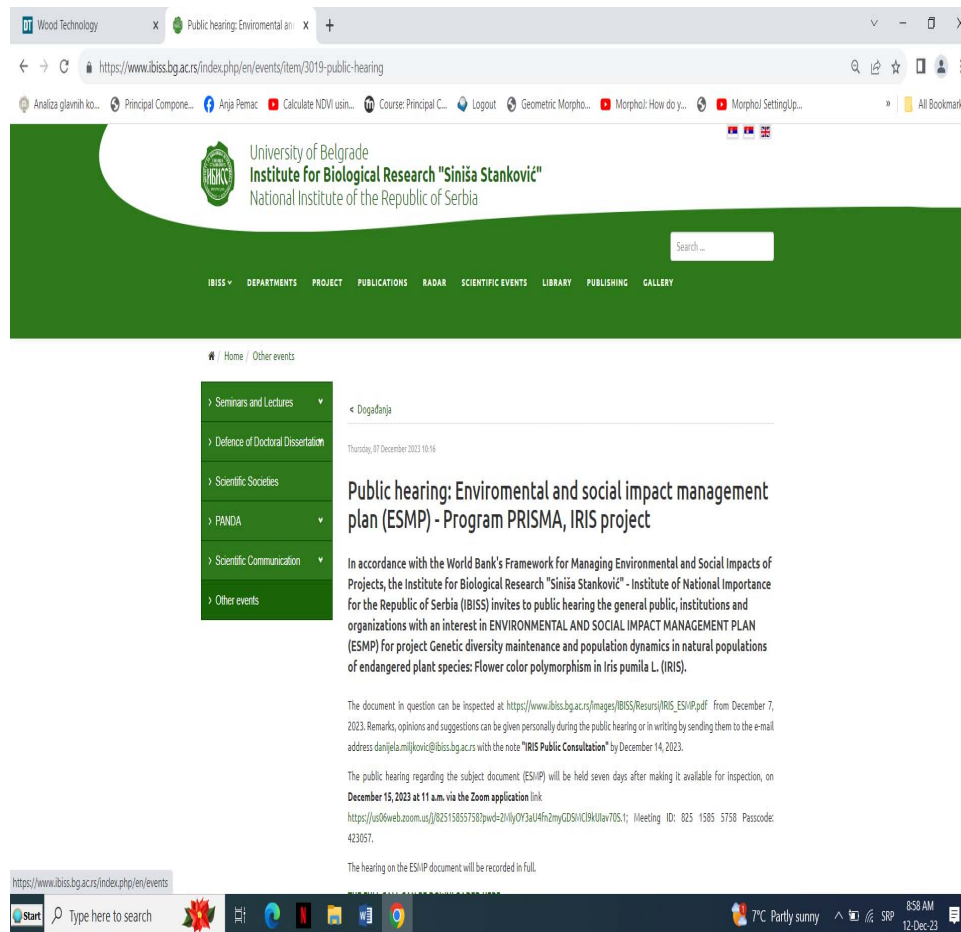


Photo 1. Announcement for public consultations for ESMP documents for the IRIS project posted on the official website of Institute for Biological Research "Siniša Stanković"

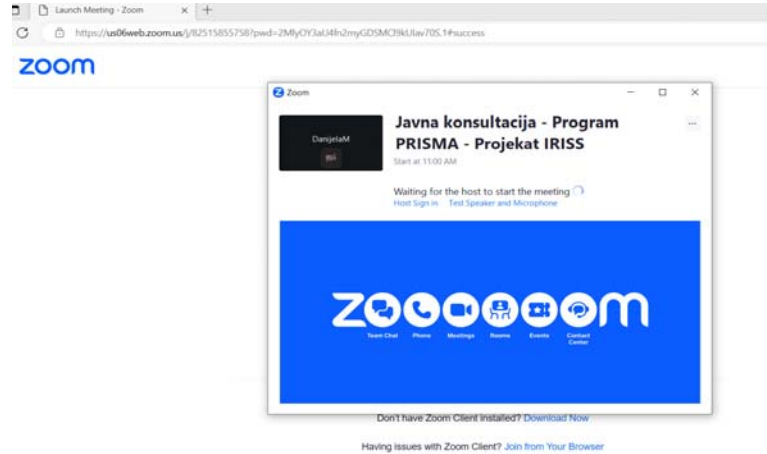


Photo 2. Invitation to zoom meeting

4. Who was specifically invited

The list of invitees that were specifically invited was created to respond to the main goal of the consultation – to gain additional insights for the ESMP from the specialists and experts in the field of ecology evolution microbial and food safety and soil protection and quality. Therefore, it includes the experts from the Association for unmanned aircraft systems in economy, JP Vojvodinašume, ŠG Banat, Ministry of environmental protection, Institute for Biological Research "Siniša Stanković", National Institute of the Republic of Serbia (IBISS), Faculty of Sciences and Mathematics, Department of Biology and ecology, University Niš, Faculty of Security Studies - Human security University of Belgrade and Military Geographical Institute.

The entire list of the invitees is as follows:

1. [REDACTED] Association for unmanned aircraft systems in economy, email: [REDACTED]
2. JP Vojvodinašume, ŠG Banat, The forest holding «Banat» manages forests and protected area on the territory of Banat. email: [REDACTED]
3. [REDACTED] Ministry of environmental protection, Head of Department for Biodiversity, [REDACTED]
4. [REDACTED] University of Belgrade, Institute for Biological Research "Siniša Stanković", National Institute of the Republic of Serbia (IBISS), Department of Evolutionary Biology, email: [REDACTED]

5. [REDACTED] Institute of Forestry Belgrade, email: [REDACTED]
6. [REDACTED] University of Niš, Faculty of Sciences and Mathematics, Department of Biology and ecology, [REDACTED]
7. [REDACTED] University of Belgrade, Faculty of Security Studies - Human security, [REDACTED]
8. [REDACTED] Institute of Lowland Forestry and Environment (ILFE), email: [REDACTED]
9. [REDACTED] University of Belgrade, Institute for Biological Research "Siniša Stanković", National Institute of the Republic of Serbia (IBISS) Department of Ecology, email: [REDACTED]
10. [REDACTED] Military Geographical Institute, email: [REDACTED]

5. List of Attendees

The list of attendees is presented in the table below:

1. [REDACTED] Association for unmanned aircraft systems in economy, email: [REDACTED]
2. [REDACTED] University of Niš, Faculty of Sciences and Mathematics, Department of Biology and ecology, [REDACTED]
3. [REDACTED] Institute for Multidisciplinary Research, University of Belgrade, [REDACTED]

6. Meeting Agenda

The agenda of the meeting included elements of the ESMP IRIS project that provided participants with detailed information on the identified risks and the planned mitigation and monitoring measures. The content of the meeting agenda is as follows:

Agenda

The subject: Environmental and Social Management Plan, Project IRIS public analysis and discussion



Time: Friday, 15th December 2023 in 11AM

Location: Zoom meeting

Activites of Zoom meeting:

- Presentation of ESMP
- Questions and answers
- Discussion
- Formulation and approval of the conclusions

Attachments: Environmental and Social Impact Management Plan (ESMP)
(IRIS_ESMP_Rev VP_23 10 23 revised OK_IN_FINAL_12 11 23_clean (1).pdf).

Link za Zoom meeting:

IRIS ESMP Public Defense

<https://us06web.zoom.us/j/82515855758?pwd=2MlyOY3aU4fn2myGDSMC19kUlav70S.1>

Meeting ID: 825 1585 5758 Passcode: 423057.

In line with the proposed Agenda, the meeting included:

- The IRIS project presentation, aiming to provide detailed info on the planned activities and expected outcomes, with the key environmental impact points identified stressed and elaborated;
- The ESMP, aiming to present the level of identified concerns and methods and activities for mitigation and monitoring;
- The discussion and Q&A segment;
- Identification and formulation of the conclusions.

The public consultation was started with a power point presentation of the ESMP by the PI of the IRIS project. The participants were informed about all possible risks and positive effects during the project implementation. All risks and effects were adequately presented and assessed, e.g. that the methods used are largely non-invasive and that scientific research on endangered species is a measure for their protection under Serbian law and regulations.

7. Summary Meeting Minutes (Comments, Questions and Response by Presenters)

Following the presentation of the plan, it was noted that the ESMP includes all potential risks to the environment and society and accordingly defines the mitigation measures for all

activities during the implementation of the project. After presentation of Plan there was a discussion. All participants as well as authors of written comments, expressed satisfaction with presented Plan and especially with the mitigation and monitoring plans. The public hearing was recorded and is available to Serbian Fund for Science on request. Positive comments prevailed in the discussion

- **The comment was:** the ZOOM consultations, full professor of evolutionary biology in the University of Niš, expressed satisfaction with presentation of ESMP on the project IRIS, and underlined the importance of non/invasive methods of data collection in proposed investigations. She also expressed hope that other research groups will follow example set by the project IRIS. She also stated that she was overwhelmed by extensive coverage on relevant legislation in Plan and asked how it was possible to survey it in such short time. Also the professor suggested that authors should document procedures that they were using in preparation of this Plan so it can serve as a template for others.
- **The response by presenters:** PI and TM1 explained their work on Plan and documents they were using in its preparation. They accentuated the importance of consultations with experts that were provided by Serbian Fund for Science for efficient preparation of ESMP.
- **The comment was:** the consultations Association for unmanned aircraft systems in economy emphasized the importance of this pioneering work on addressing drones in ESMP and thanked authors on their final result that be extremely useful for others that will prepare similar plans in the future according the new regulative and law for unmanned aerial vehicle.
- **The response by presenters:** PI thanked participation in this hearing and also on lecture that his Association gave in IBISS earlier this year that helped this project to be prepared for adressing the drones in this context. She also stated that Fund for Science will use our documentation as a possible template for assesing the drones in context of environmental and social management plans.
- During the ESMP's notice of public consultation we received written comments, which are presented in this report:
- **The comment was:** the officer for Protected Areas and Environmental Protection of Vojvodina Forests - the state organization that manages protected areas in the province of Vojvodina, Serbia - explained that all planned activities under the IRIS project are based on the national laws on protected areas. He referred to the decades of experience

of the team members involved in research in protected areas and on protected species. He also outlined his knowledge of the researcher's work to date and explained that it has always been carried out in accordance with the permits and regulations issued.

- **The comment was:** the scientific director of the Belgrade Forestry Institute stated in his written contribution that the ESMP contains appropriate environmental protection measures based on Serbian legislation in this area and wished the project participants successful work in implementing the project.

8. List of decisions reached, and any actions agreed upon with schedules and deadlines and responsibilities

All received comments were positive and supported the Plan conclusions that realisation of this project is safe both for environment and the society, providing benefits for both. Comments also give prominence to the importance of this Plan as relevant work in this field in Serbia especially in relation to utilization of drones in scientific projects. Main suggestion from this consultation process was that authors of the Plan should document all the steps in Plan preparation so it can serve as a template for future similar ESMP.

Based on the assessment of the participants in the public discussion, it was concluded that the ESMP adequately identifies potential risks and positive effects as well as methods and activities to mitigate, monitor and manage them. Therefore, it was decided that the project team members can implement the planned activities based on the detailed presentation of the mitigation plan and the monitoring of the activity plan under the project. During the implementation of the project, the dynamics of the implementation of the mitigation plan and the monitoring of potential risks to the environment and society will be monitored. In the event that new laws and regulations have an impact on project activities, additional activities will be defined to improve the plans submitted.

The public discussion ended at 11.45 (local time).

Screenshots of the public consultation:

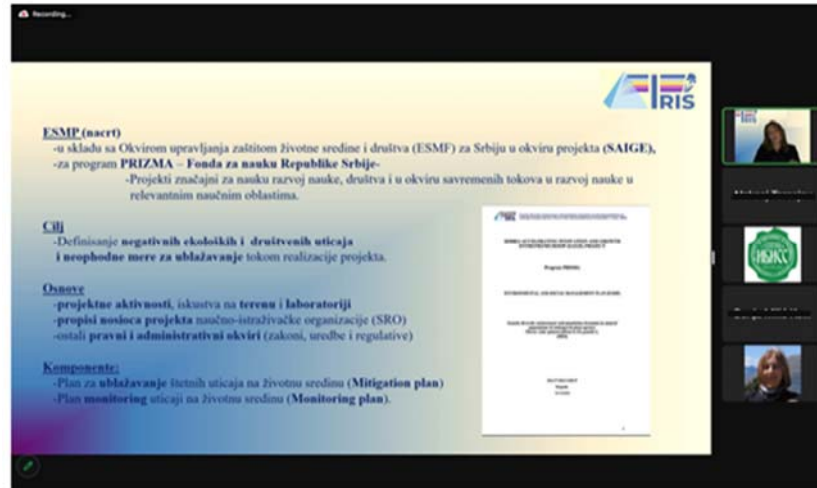


Photo 3. Public discussion of draft ESMP document IRIS project at the IBISS.



Photo 4. Public discussion of draft ESMP document IRIS project at the IBISS.

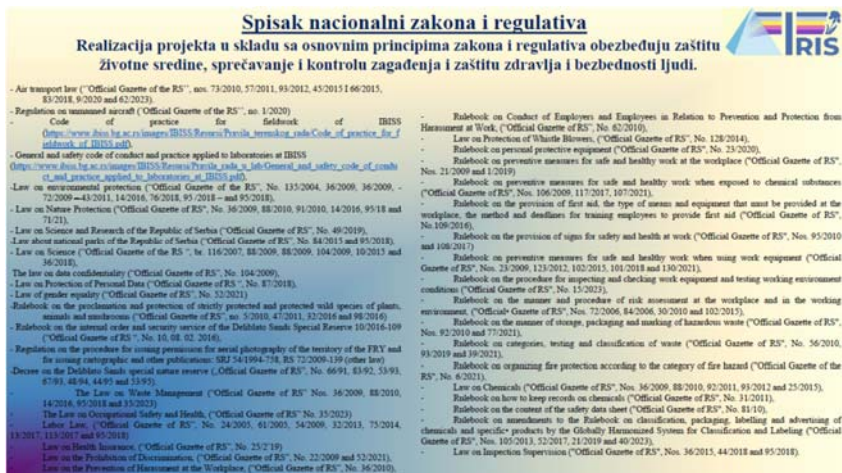


Photo 5. Public discussion of draft ESMP document IRIS project at the IBISS.



Photo 6. Public discussion of draft ESMP document IRIS project at the IBISS.

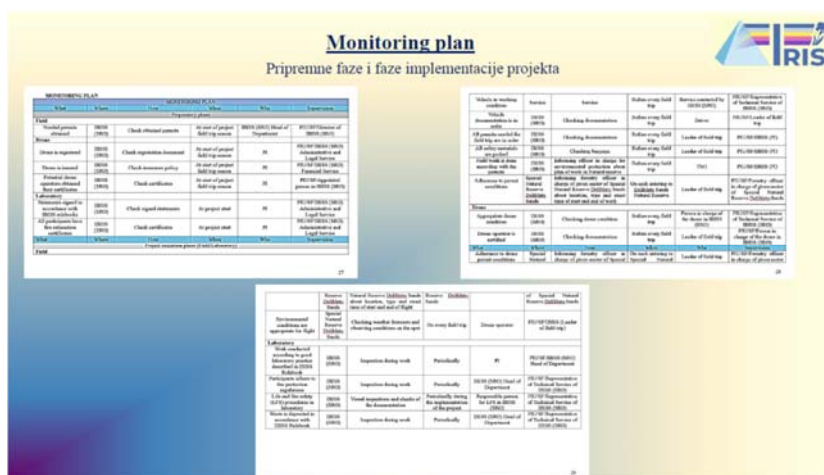


Photo 7. Public discussion of draft ESMP document IRIS project at the IBISS.

Public consultation report reviewed by Environmental and Social Expert:

Date: 19.12.2023.

Name: Vukica Popadic Njunjic

Title: ESE/PIU SAIGE

Signature: *V. Popadic*