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# REGIONAL ASSESSMENT OF BIODIVERSITY INFORMATION MANAGEMENT AND REPORTING BASELINE FOR SOUTH-EAST EUROPE



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Open Regional Fund for South-East Europe – Biodiversity (ORF-BD)

GIZ Country Office in Bosnia and Herzegovina

Zmaja od Bosne 7-7a, Importanne Centar 03/VI

71 000 Sarajevo, Bosnia and Herzegovina

T +387 33 957 500

F +387 33 957 501

info@giz.de

www.giz.de

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GIZ ORF-BD / Igor Zdravkovic

**Prepared by**

Exatto d.o.o. za informacijske tehnologije

**GIZ ORF-BD team in charge**

BIMR Project Manager / Coordinator for Montenegro

Jelena Perunicic (jelena.perunicic@giz.de)

BIMR Project Manager / Coordinator for Bosnia and Herzegovina

Azra Velagic-Hajrudinovic (azra.velagic-hajrudinovic@giz.de)

with support by ESAV Project Manager / Coordinator for Serbia

Kristina Kujundzic (kristina.kujundzic@giz.de)

**Text**

Marin Grgurev, PhD

Petra Strbenac

**Reviewed and endorsed by**

BIMR Regional Platform South-East Europe

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## **ABBREVIATIONS**

BD - Biodiversity

BiH - Bosnia and Herzegovina

BIMR - Biodiversity Information Management and Reporting

BISE - Biodiversity Information System for Europe

CBD - Convention on Biological Diversity

CHM - Clearing House Mechanism

CITES - Convention on International Trade in Endangered Species

EIA - Environmental Impact Assessment

EIONET - European Environment Information and Observation Network

EPA - Environmental Protection Agency

EU - European Union

GEF - Global Environmental Facility

GIS - Geographical Information System

GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit

IPA - Instrument for Pre-Accession Assistance

IUCN - International Union for Conservation of Nature

NGO - Non Governmental Organization

ORF-BD - Open Regional Fund for South-East Europe - Biodiversity

SDG - Sustainable Development Goals

SEE - South-East Europe

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## Preface

South-East Europe (SEE) is one of the richest parts of Europe in terms of biodiversity. In order to conserve and sustainably use these biodiversity assets and valuable natural resources under a concerted regional approach, a regional consensus on principles and key elements of a biodiversity information management and reporting (BIMR) mechanism in line with Convention on Biological Diversity (CBD) and European Union (EU) requirements is required. It will enable regional exchange of data and information for collaborative monitoring, reporting and management of (shared) biodiversity resources. Accession to the EU constitutes a common goal for economies of SEE, where an important pre-requisite is the transposition and full implementation of the environmental *acquis communautaire*, especially the Birds Directive (2009/147/EC) and Habitat Directive (92/43/EEC) and the EU Biodiversity Strategy 2020. Therefore, BIMR is a crucial component for all economies in the SEE region and improvements are needed.

In general, the SEE region has significant gaps at different levels in each economy regarding BIMR issues. For instance, key challenges in all economies relate to insufficient technical, organizational and financial capacities of the institutions involved (especially environmental ministries, environmental agencies and nature parks' institutions), as well as missing standards for data collection, verification and validation and indicators for monitoring of the implementation of national action plans and Aichi goals according to CBD recommendations.

One of the attempts to successfully contribute to the establishment or improvement of biodiversity information systems in the SEE region has commenced with this publication. It was scaled up from existing regional projects and initiatives, as well as European and global standards. This publication describes the current situation of BIMR elements at the national and regional level considering contributions from key stakeholders in the period from September 2016 to April 2017. The focus of the approach taken was on findings of high relevance adding value to related ongoing and future initiatives. Subsequent collaborative and coordinated efforts on implementing the recommendations are needed.

The German Federal Ministry for Economic Cooperation and Development (BMZ) supports this ongoing process including development of BIMR Regional Guidelines and piloting through the *Regional Network for Biodiversity Information Management and Reporting* project as part of the GIZ Open Regional Fund for South-East Europe-Biodiversity (ORF-BD) in close dialogue and coordination with relevant stakeholders and partners.



Gabriele Wagner  
GIZ Sector Fund Manager – ORF-BD

## **Acknowledgment**

This publication is the result of a joint effort of ministries, competent authorities, research institutions, NGOs and experts from Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro and Serbia to develop a comprehensive overview of biodiversity information management and reporting in the SEE region. This endeavour, which involved pooling of expertise from all six economies as well as from Croatia, was pursued with determination and in a spirit of high cooperation at all levels: political, technical and administrative. All parties and persons involved are greatly acknowledged for their contribution to this work.

## 1. INTRODUCTION AND BACKGROUND

Exceptionally high biodiversity exposes the South-East Europe (SEE) region as a true hotspot of European biodiversity. Diversity of species and habitats, environments, intraspecific and interspecific variations as well as extremely high level of endemism in comparison to the rest of the Europe make the SEE a prime area for conservation objectives. Even more as this area is usually an unknown white spot in all biodiversity relevant assessments. As such, it is essential for this region to be considered, assessed and included in any strategic document and process related to conservation of biodiversity on global and especially European level. This is becoming regionally and globally more relevant as demonstrated by increasing demands for consolidated and trans-boundary biodiversity related monitoring and reporting.

Taking into account the complex physical geography and recent history, the SEE region is unfortunately still insufficiently explored. Furthermore, despite many similarities among these economies there exist also significant differences that have to be considered, especially in regards to different level of knowledge and availability of data about species and habitats and the extent to which they have been researched and used.

In order to adequately assess the biodiversity status in the SEE region for robust decision-making and management related to biodiversity and ecosystem, digitized, structured and verified data on biodiversity is needed. Additionally, there is a need for the establishment of (regional) mechanisms for the exchange of data, standards and experiences. This can be achieved through the review and implementation of common technical and biodiversity standards for data exchange, species and habitats lists as well as through continuous dialogue, coordination and communication among all relevant stakeholders in the region.

When discussing term such as biodiversity information system, it is useful to begin by examining different elements of which this expression is comprised. According to the Convention on Biodiversity (CBD) biodiversity means “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”, while information system is any organized system for the collection, organization, storage and communication of information.

Therefore, it is important to note that biodiversity information system in context of **“Biodiversity Information Management and Reporting (BIMR)” does not only include some specific databases or applications but in fact it includes a wide range of dynamic and continuous operations and activities that various stakeholders conduct in order to collect, filter, process and analyse, create and distribute data on biodiversity.** In that sense biodiversity information system is a set of different databases, applications, processes, protocols and services that are intended for biodiversity data storage, maintenance and sharing. Its main purpose is to bring together facts on biodiversity in a structured format. The system needs then to be linked with related policies, research results as well as other information systems in order to support

expert work of all involved stakeholders and facilitate biodiversity related management decisions at various levels (government, communal, private sector).

The understanding of the role, content, design and use of a biodiversity information system is quite often distorted and as such **prevents stakeholders to perceive complexity of biodiversity information system as one integral set of smaller interconnected modules**. Not having a clear understanding and vision necessarily leads to inadequate financial planning and strategic decisions, and often leads to situations where economies and their projects related to setting up or enhancing biodiversity information systems fail to reach their objectives. This consequently results in significant financial losses, inadequate reporting to CBD and European Union (EU) as well as wasting experts' time and efforts. Furthermore, the clear understanding of information system is a prerequisite to valid planning of financial, human and technical capacities.

**Development of some specific database or module or collection of specific data does not make the information system completed and finalized. In fact, it is of outmost importance to keep in mind that each information system is an ever growing formation that requires sustainable long term financial, technical and staff support.**

This lack of understanding is present in all stakeholder organisation/institutions despite their background, level of activity, financing, governmental/non-governmental status etc. Without information system, the capacity to adequately store, process, analyse and share biodiversity data is severely disrupted thus contributing to the ongoing biodiversity loss and consequently losing the chance to achieve EU Biodiversity Strategy to 2020 targets as well as the 2030 Agenda of Sustainable Development Goals which integrates Aichi Biodiversity Targets.

As the Open Regional Fund for South-East Europe-Biodiversity (ORF-BD) supports regional projects which aim at implementing the EU Biodiversity Strategy to 2020 through increased regional cooperation, the idea of ORF-BD BIMR project was to help SEE region economies to assess the current status of biodiversity information system setup on both regional and national level and improve the partner institutions' capacities to conform with the reporting requirements to the CBD and with other EU requirements (e.g. Natura 2000 network).

Significance of improving BIMR on both regional and national levels was recognized by stakeholders in the target economies of SEE region in the project identification mission in 2014 and was therefore addressed as one of the three priority intervention areas of ORF-BD. The continued project consultations up to now, including those held at the ORF-BD Kick-off meeting in Belgrade, in February 2016 reconfirmed the need for intervention and resulted in the development of a BIMR project which commenced in July 2016.

The objective of ORF-BD BIMR project is that capacities of partner institutions needed to meet CBD and EU reporting requirements have been improved in the SEE region. Within this objective, there are three BIMR project building blocks identified:

1. **Regional Assessment of BIMR Baseline**, whose objective is to develop and publish detailed regional and national assessment documents analysing current stakeholder situation, policy, legal and institutional framework and information system set-up. It is

believed that this baseline assessment process and result will be a first step to assist stakeholders in improving processes related to BIMR in their own institutions/groups. Regional Assessment is based on findings collected and processed in scope of national assessments and as such provides insights to the state of BIMR on regional level.

2. **Development of BIMR Regional Guidelines** aims to improve existing systems in managing data and reporting on species diversity, ecosystems and genetic diversity. They cover aspects such as standardized biodiversity methodology, mechanism for data validation and verification, tools for monitoring and reporting and both tailor-made and generic solutions for national biodiversity information systems. The final published BIMR Regional Guidelines aims to represent common regional framework for biodiversity reporting to CBD in line with EU requirements in the SEE region and contribute to enhanced capacity in SEE region and increased cooperation and exchange.
3. In **Piloting of BIMR Regional Guidelines**, the BIMR project approach is to assist at least 3 economies in using and introducing findings from Regional Assessment of BIMR Baseline and BIMR Regional Guidelines in existing systems and efforts (piloting). It follows consultations and agreements with relevant country stakeholders and supports regional exchange and improved cooperation with all economies. The full implementation of the regional guidelines in the entire SEE region is beyond the scope of the current BIMR project and will require additional financial resources and significant time. Complementarity with other projects and initiatives are therefore important. The third project Component also includes GIS training to relevant stakeholders in SEE region.

In order to better understand and assess complex relationships between relevant stakeholders, data sources and established data flows on both regional and national level, it is important to assess each country's true potential to manage biodiversity data on an adequate quality level and in line with EU standards and obligations. In addition to this Regional Assessment, six assessments for each SEE economy have also been prepared as an integral part of Regional Assessment with the aim to provide thorough insights regarding stakeholders, policy and information system setup on national level.

Although the thematic focus of the assessment was put on EU obligations related to biodiversity data, CBD reporting obligations as well as Natura 2000 commitment, the assessment as such delivered much broader results. The assessment was not only limited to data, information and capacities necessary for reporting towards CBD and relevant EU directives, but it also provided insights about broader scope and usage of biodiversity data.

In that sense, biodiversity data was not only assessed in regards to reporting obligations but was also in regards to biodiversity data as a basis for nature conservation tasks in general.

## 2. METHODOLOGY

The assessment methodology consisted of five main steps along with a set of sub-steps, as follows:

- 1) Stakeholder identification by the means of local expert knowledge
- 2) Stakeholder analysis by the means of ranking stakeholders according to their relevance to BIMR, political influence and capacity (financial, technical and human resources)
- 3) Policy analysis by means of desk-reviewing all relevant sources
- 4) Stakeholder meetings:
  - a) National briefings
  - b) Stakeholder interviews (in person and by telephone)
- 5) Collection of the data on information system set-up by conducting online questionnaire

Data collection process and methodology was designed in close consultations with project beneficiaries and was supported by valuable local expert knowledge.

In scope of BIMR project the BIMR Regional Platform (in further text: Platform) was established as a mechanism for data and experience exchange among stakeholders on regional level. Main objectives of the Platform include supporting implementation of the BIMR project at the regional scale, enabling cooperation and communication of BIMR project related activities with all stakeholders, enhancing Platform member participation in training events and conferences and mobilization of institutional, scientific and technical networks in support of BIMR project activities.

Platform consists of 2-3 permanent focal points and a variable number of non-permanent members from each of the SEE economies. Focal points are nominated upon written request of ORF-BD BIMR project by line ministries and competent authorities in charge of biodiversity monitoring and reporting. The Platform acts as an consultative regional technical group that is communicating and disseminating information on BIMR project actions in their respective institutions and sector of work and other initiatives.

### 1) Stakeholder identification

In order to get detailed insight into information about legal, organisational and technical background of biodiversity data management and data flow among different structures in each economy, all relevant stakeholders engaged in biodiversity data inventory, storage, processing and reporting were identified. For this purpose, as well as later stakeholder analysis, three local experts have been engaged which provided valuable knowledge and insights related to BIMR stakeholder identification in the respective economies. Upon experts insights combined with contribution of ORF-BD team and other theme-relevant initiatives the initial stakeholder list was prepared and all relevant stakeholders were identified. This list was extended after the feedback from the briefings and stakeholder meetings held in October and November 2016. This process also provided additional information about stakeholders and ranked them according to their political influence, relevance, capacity, roles and reporting obligation.

## 2) Stakeholder analysis

All stakeholders were first ranked in respect to their political influence, relevance, capacity, roles and reporting obligations by means of local expert knowledge and other available information. After the initial screening all stakeholders were divided in respective groups according to their roles in BIMR context. The first role and “the first link in the chain” are individuals that collect biodiversity data in the field (**biodiversity data collectors**) about species, habitats and/or landscape features that are important for biodiversity. The collected data can be used for individual purposes (publishing scientific papers for instance) or can be integrated with data that comes from other data collectors.

Stakeholders that integrate biodiversity data from different sources into a single database (**biodiversity data integrators**) must take care about standardisation of structure and harmonisation of collecting methodologies of different sources.

Stakeholders willing and ready to share their structured data with other individuals or organisations (by granting access to their biodiversity data or providing structured digital data) are **biodiversity data providers**.

Data providers that provide data, which is not directly related to biodiversity data, but is useful for better understanding of biological patterns and processes (like orthophoto or satellite images, land use maps etc.), are **supporting data providers**, and are also important for efficient biodiversity data processing and reporting.

Stakeholders that are not directly involved in activities on biodiversity data collecting and processing, but are ready to provide support (logistical, in-kind or financial) are **financial supporters**.

In addition to stakeholder ranking, detailed data flows between all the stakeholder groups have been mapped to show specific relationships between stakeholders and to give insights in all existing and planned information systems and databases.

## 3) Policy set-up analysis

By reviewing all relevant sources (legislative, studies, reports etc.) related to policy set-up of biodiversity information system, the list of all relevant legislative documents that mention the obligation of establishing biodiversity information system in any of the stakeholder institutions have been compiled.

## 4) Stakeholder meetings

To gain additional information about specific stakeholders two types of meetings have been organised.

First, on national level, briefings were organised with Ministries and Agencies in charge of environment and nature protection. Their objective was to follow up on BIMR project Kick-off meeting held in Sarajevo in September 2016 and particularly to secure the engagement of

national stakeholders involved in BIMR project. During this meeting, Croatian experience from "Development of the Croatian National Nature Protection Information System" has been presented as an example of lessons learned and good practice.

In parallel with meetings, individual stakeholder consultations have been conducted which involved in person (or in some situations telephone) meetings with relevant stakeholders (mostly academia and NGOs) related to biodiversity data collection, provision, integration and management.

In addition, in December 2016. First BIMR Regional Platform Meeting was held in Podgorica while Second BIMR Regional Platform Meeting was in Banja Luka (April, 2017).

## 5) BIMR questionnaire

For the purposes of acquiring specific information related to information system set-up and data management for each stakeholder organisation the online questionnaire has been implemented and hosted on online platform. BIMR questionnaire was published and sent to stakeholders on November 2016 and remained online until the end of December 2016.

Questionnaire was intended to be responded by each stakeholder organisation and each group received explanations before: biodiversity data collectors, biodiversity data integrators and biodiversity data providers as those three groups are most important and relevant for BIMR assessment.

The complete questionnaire with all the questions is available in Annex 1.

The focus of BIMR framework is on offering solutions for efficient data handling and reporting about biodiversity. Biodiversity data can be oriented towards a particular area or group of living organisms: it may store specimen-level information, species-level information, information on nomenclature, or any combination of the above. Biodiversity data collected in the field, according to the level of processing, can be divided into:

### Primary (raw) biodiversity data

*Occurrences* - an observation (in the field or vouchered (labelled) specimen in a collection) of a taxon at a particular place on a specified date (eventually enriched with other attributes of the collecting/sampling event like collector name, number of specimens, etc.).

*Checklists* - lists of scientific names of organisms grouped into taxonomic hierarchies that are common in a particular area.

*Registers of places and/or landscape features* - list of (if possible spatially referenced) elements of an environment.

### Processed biodiversity data

*Indicators* - statistical measures of biodiversity which help scientists, managers and politicians understand the state of biodiversity and the factors that affect it. Usually indicators are result of some kind of processing like grouping, categorising, pulling, or mathematical transformations of primary biodiversity data.

*Metadata* - structured descriptions of other datasets.

Understanding the nature of biodiversity data which should (or is expected to) be handled in the information system is essential because the design and functionality that will be implemented must be adapted to their specific features.

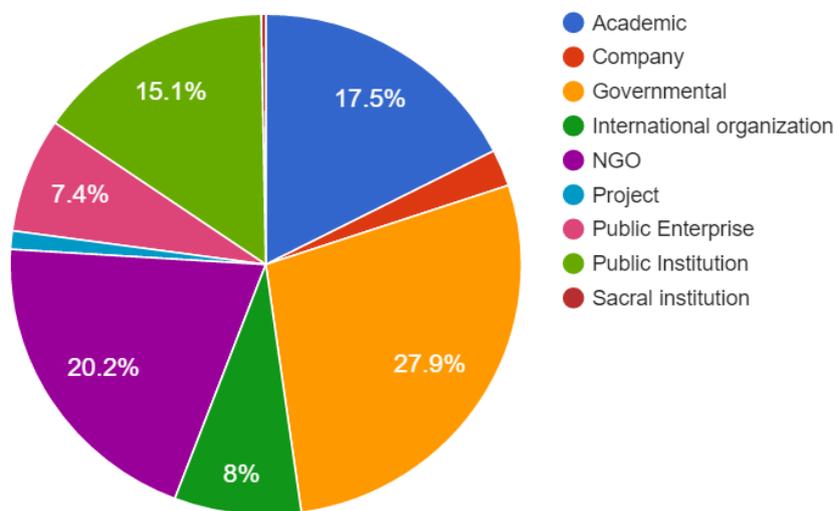
### 3. STAKEHOLDER ASSESSMENT

In 2016, in the SEE region, 342 stakeholders (not individuals, but institutions/organizations) related to BIMR were identified. When observing stakeholders based on an organisation type it is evident that governmental institutions dominate. This is expected since in all SEE economies there are many similarities in nature protection institutional frameworks and throughout the region governmental institutions are the main institutions responsible for nature protection and environment tasks, as well as reporting towards various international conventions and directives.

Significant number of stakeholders also includes academic and public institutions as well as nongovernmental organizations. These institutions/organizations are the main data collectors that, in scope of their regular work, conduct field inventory or maintain biodiversity collections (specimens). They cooperate with governmental institutions through - although mostly not structured and formalized - provision of biodiversity related data, as well as share their expertise to support governmental institutions in carrying out expert tasks of nature protection.

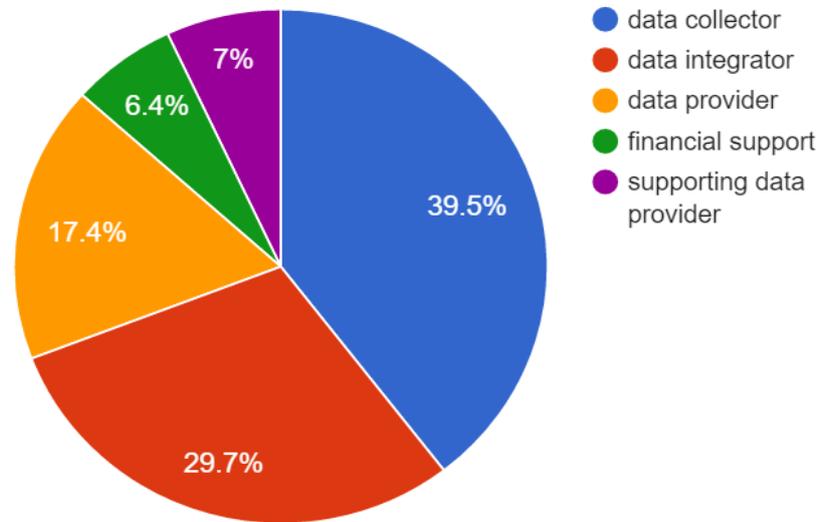
It is also important to note the significant portion and role of various international organizations and biodiversity related projects that often provide valuable data and financial and expert support as well.

**Overview of stakeholders by organization type (SEE region)**



On regional level, most stakeholders are identified as data collectors and data integrators. Less than 20% represent institutions/organizations serve biodiversity data to other stakeholders in structured form such as databases, web service etc. (i.e. to data providers). Other identified roles include institutions/organizations that provide financial support and supporting data providers.

**Stakeholders by role (SEE Region)**



Throughout the region, majority of stakeholders are concentrated in capital cities which indicates strong centralisation of stakeholders with the exceptions of Serbia and Bosnia and Herzegovina (BiH). In Serbia decentralisation is present due to political decision to decentralize nature protection sector in several different regional departments which consequently resulted in larger number of stakeholders in regional centres such as Novi Sad, Niš etc. In BiH decentralisation is present due to political decentralisation (existence of two entities, ten cantons in Federation of BiH and Brcko District) and the presence of multiple administrative centres.

On regional level, the most relevant institutions in regards to BIMR include projects related to biodiversity (often implemented by various international organizations), academic and governmental institutions.

Institutions/organisations with highest political influence include governmental institutions as well as international organisations. International organisations were also estimated as having the highest capacities for carrying out biodiversity related tasks.

For the most relevant BIMR stakeholders, political influence as well as capacity are moderate (although this depends on specific economy, we can generally conclude that this is a regional average). There is a clear need to further strengthen and build capacities (financial, technical and human resources) especially governmental including local level and NGO sector.

In all economies of SEE region only ministries and agencies that carry out environment and nature protection tasks are obliged to report towards CBD and Natura 2000 as well as various other conventions and networks such as EIONET, Bonn convention, Bern convention, Ramsar convention and CITES.

#### 4. POLICY SET-UP

There are no obligatory documents or legislation that would require any kind of reporting for SEE region yet, but since EU accession is a common goal for economies in the region, they are all faced with a mutual challenge to grasp and incorporate EU's environmental policies. In addition, all the economies except Kosovo are the signing parties of the CBD which together with EU Biodiversity Strategy to 2020 represents the most relevant reference policy framework - the EU Birds Directive and the Habitats Directive, as well as implementing and ensuring achievement of Aichi Biodiversity Targets of the CBD.

The main objective of the EU Biodiversity Strategy to 2020 is to stop the loss of biodiversity and improve the state of Europe's species, habitats, ecosystems and the services they provide. Regarding BIMR, the most important initiatives and frameworks refer to CBD CHM (Clearing House Mechanism) and BISE (Biodiversity Information System for Europe) as a central point for data on biodiversity supporting the implementation of the EU Strategy and the Aichi Biodiversity Targets in Europe as well as specific Strategy actions (such as Target 1, Action 4b<sup>1</sup> of Strategy) that help to improve and streamline monitoring and reporting of biodiversity data.

Policy set-up assessment's focus was to assess all national legislation that tackles legal obligations of biodiversity information system establishment or at least databases related to or important to biodiversity in different sectors (water, forestry, agriculture etc.). In addition to national legislation, the policy set-up assessment also considered ongoing projects and initiatives related to BIMR on regional level.

**It is interesting to notice that at the regional level there is a lack of initiatives that would tackle aspects of biodiversity information systems set-up - from technical standards and guidelines to biodiversity data standards as well as data harmonization and data exchange mechanisms.** As such, BIMR project is the first project of this kind in the region that is specifically focused on technical aspects and standards related to biodiversity data.

One of the projects that has been going into more details regarding BIMR is IUCN ECARO project funded by MAVA foundation "Towards Strengthened Conservation Planning in South-Eastern Europe" (2013 - 2016) where managing and using biodiversity information (monitoring and reporting) was recognized as a priority activity. All other projects are mostly focused on broader scope and they cover topics of biodiversity and nature conservation issues in general in SEE region. Technical report "Assessment of biodiversity framework in South-East Europe" (March 2016), commissioned by ORF-BD, provides an overview of all relevant biodiversity policies, strategies and legislation.

**In SEE region the obligation to establish and maintain biodiversity information system is stipulated in both nature protection and/or environment legislative.** Biodiversity

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<sup>1</sup> EU Biodiversity Strategy 2020 - Target 1: The full implementation of the EU nature legislation; Action 4b) *The Commission will create a dedicated ICT tool as part of the Biodiversity Information System for Europe to improve the availability and use of data by 2012.*

information systems are often established as sub-modules/integral parts of environment information systems which is not an optimal setup and often complicates management of data and systems. Unfortunately, economies mostly lack resources to operationally implement the legislative related to BIMR in reality, thus decreasing the potential to make better use of biodiversity data in conservation or natural resources planning.

Ministries and state agencies/institutes for environment and nature protection are structures that are formally/legally obliged to establish and maintain biodiversity information systems. Throughout economies of the SEE region it is notable that such obligation is only scarcely mentioned and explained in national legislation and it is not adequately covered by legislative documents. **This indicated that there was a need for more detailed ordinance or other legally binding document that would tackle all information system aspects such as exchange and provisions of the data, access and usage rights, technical and functional requirements/standards, compliance with relevant international standards and EU directives such as INSPIRE Directive<sup>2</sup> etc.**

Detailed overview of policy set-up insights on national level can be found in the assessment reports for each country in the SEE region, including overview of the BIMR related legislation from other sectors (forests, water etc.) that hold the relevant biodiversity data.

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<sup>2</sup> INSPIRE (Infrastructure for spatial information in Europe) <http://inspire.ec.europa.eu/>

## 5. INFORMATION SYSTEM SET-UP ASSESSMENT

In order to examine current situation and gain insights regarding biodiversity data storage and maintenance, including capacity of institutions to effectively use and maintain data for biodiversity management and reporting, an online questionnaire was prepared and distributed to the stakeholders.

The questionnaire was primarily intended for following groups of stakeholders:

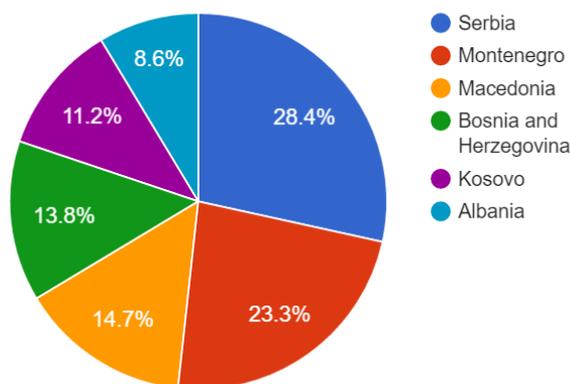
- Biodiversity data collectors (includes institutions/organizations/experts that collect biodiversity data through field inventory);
- Biodiversity data integrators (includes institutions/organizations that finance biodiversity data field research or institutions/organizations that collect biodiversity data from external experts/institutions on the basis of legal or formal obligation);
- Biodiversity data providers (includes institutions/organizations that serve biodiversity data to other stakeholders in structured form - database, web service etc.).

There were total 46 questions in the questionnaire. Since questionnaire was intended for the data collectors, data integrators and data providers, the questions were grouped accordingly.

Questionnaire was published and distributed on 11 November 2016 and was opened for submission until 31 December 2016.

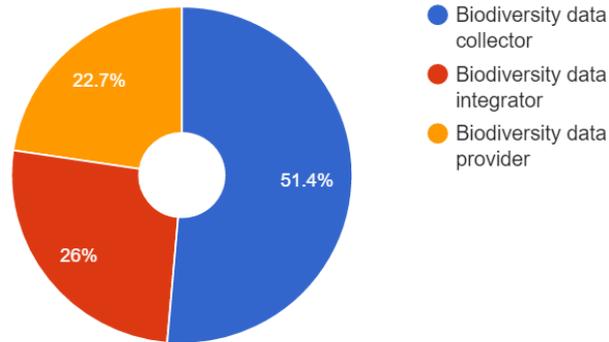
On 31 December 2016, there were 116 completed questionnaires submitted by the stakeholders from all six economies (SEE region).

Overview of completed questionnaires by each SEE economy



It has to be noted that **not all identified** stakeholders completed the questionnaire. However, significant amount of collected data still provides very good insights and gives us for first time preview on the BIMR status on regional level.

Overview of stakeholders that completed questionnaire by role



Information gathered through BIMR questionnaire was processed and analysed on regional and national levels, providing insights into specific situation in each of the SEE economies, as well as overall regional trends.

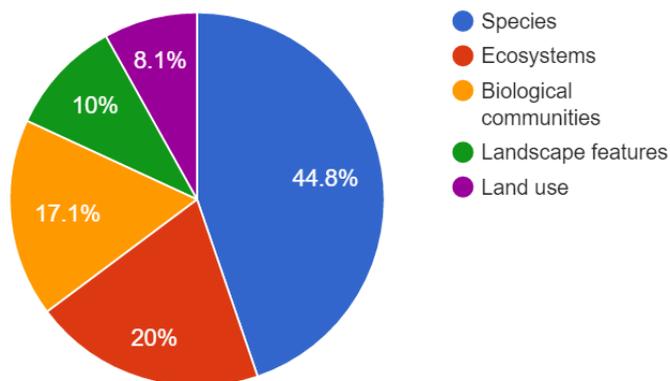
The following sections bring results of BIMR questionnaire analysis.

### 5.1. Insights from data collectors

Question group intended for data collectors was aimed at gathering information about type of biodiversity data collected, how data is collected, whether there exists any standardisation and protocols for data inventory and whether data collectors have sufficient capacities and skills for data collection, processing and analysis.

Analysis has shown that the most common category of collected biodiversity data includes data on species and ecosystems, which was expected. Besides that, the stakeholders also collect various other types of data such as data on specific ecosystem types such as caves, freshwater ecosystems, negative impacts or threats to nature, population genetics, species mortality data, etc.

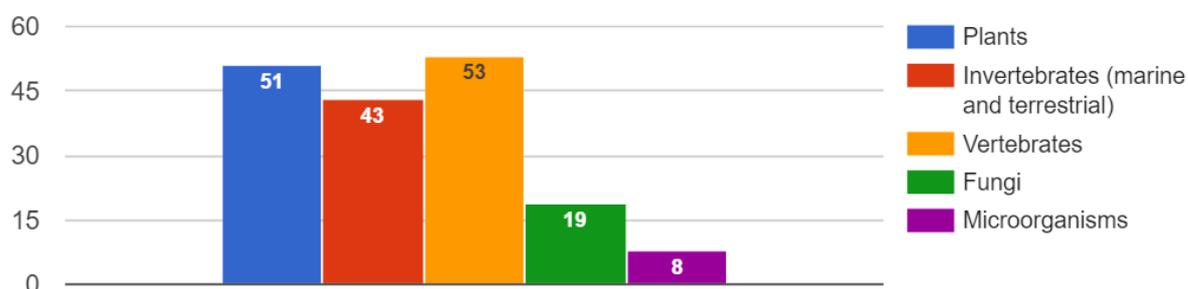
**A3. What is the category of biodiversity data you are collecting?**



**From the questionnaires it is evident that biodiversity data is very versatile and complex and the information system that supports it needs to capture all this complex data.**

As expected, most stakeholders collect data on plants, vertebrates and invertebrates.

**A1. What group(s) of organism do you collect data about?**

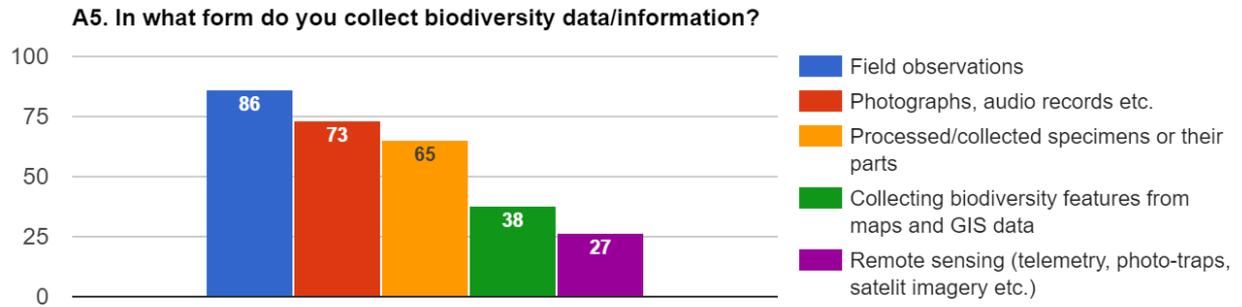


Collected data mostly included field observations, multimedia documents and processed specimens or their parts.

Almost 70% of stakeholders collect specimens (collections) which are important to know in advance when designing information system.

**Specimens collections are very valuable biodiversity data especially important for later genetic research, redetermination etc. but this type of data often requires further processing and digitalisation to be able to use it in various analysis.**

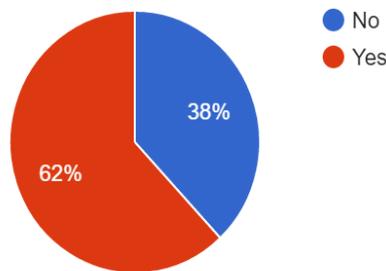
In that sense data and metadata related to specimens in collections are quite different than field data.



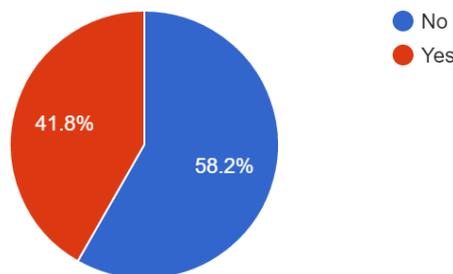
**Significant number of stakeholders does not use any type of predefined standardized forms/protocols for field inventory - unstructured data is very hard or impossible to analyse, it requires additional efforts and time to process data and align different datasets to make data comparable.**

Majority of stakeholders do not use any software solution for data collection that would help them collect and store data in standardized form (saving them time and efforts related to further processing of data). Those that use such software solutions work with applications such as BioRas, Naturalist, Observado, SMART, Memento, eBird etc. There are many solutions already available for purposes of data collection - both out-of-the-box solutions as well as platforms that can be tailored to fit specific purposes, both commercial and open-source solutions.

**A7. Do you use any predefined standardized forms for data collecting?**

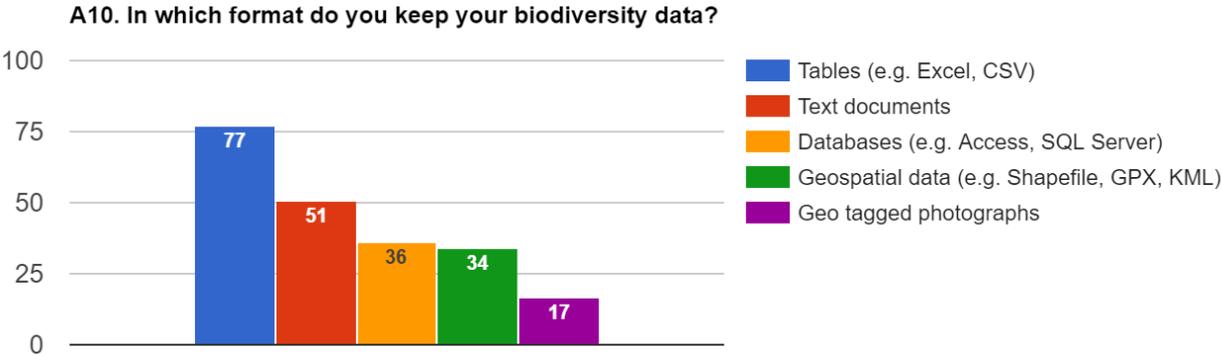


**A8. Do you use any software solutions for data collection (used on PDAs, mobile devices, laptops)?**



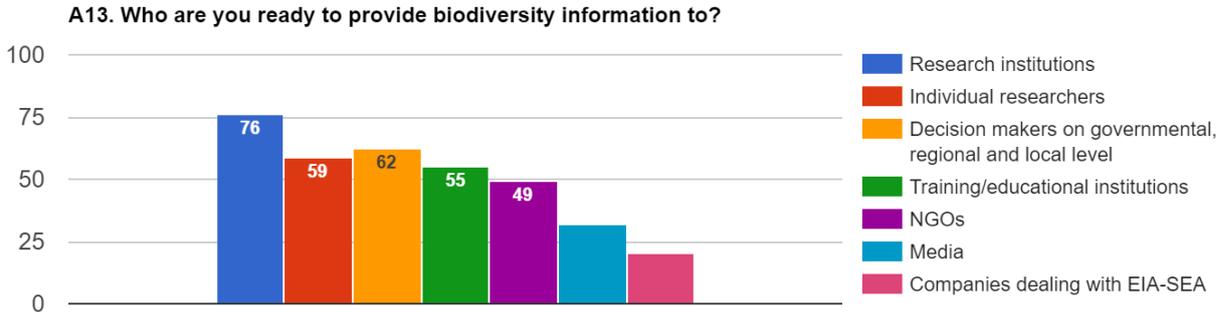
Majority of stakeholders use some kind of data storage solution - most data is stored in table format (MS Excel), but users also use various database solutions (MS SQL, MySQL, MS Access, GDB or specific solutions such as Specify).

**Most of stakeholders however do not store collected data in geospatial format. They need to put additional efforts to prepare data in geospatial format to be able to use it in spatial analysis or spatial search.**

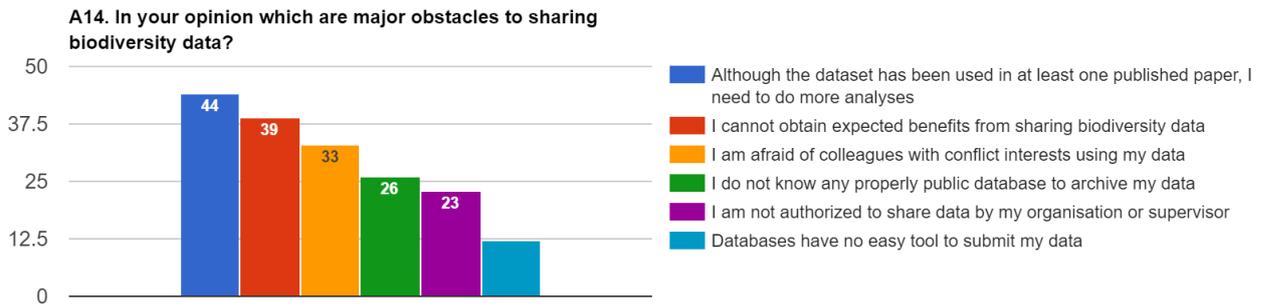


Significant amount of data is still stored in form of text documents. As such, this data is easy to be lost and not used and of questionable usability and there is only very limited or no possibility to include such data in any kind of analysis.

Regarding provision and sharing of biodiversity data, it is notable that **data collectors are least ready to share the data with companies dealing with EIA-SEIA (environmental impact assessment)**. Those companies actually need to prepare important documents and studies which need recent and high quality biodiversity data important for decision makers. As such, those companies need data as much as decision makers and nature protection related agencies in order to correctly make conclusions about various potential impacts in nature.



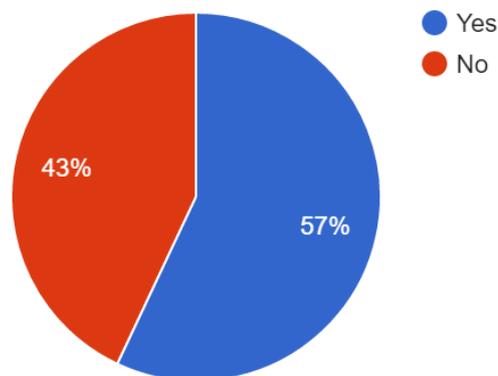
Major obstacles for sharing biodiversity data include: need for more analyses (stakeholders are not confident about their data), data collectors cannot obtain expected benefits from sharing data or are afraid that colleagues with conflict interest will use their data.



There is a quite significant number of stakeholders that think that **there are insufficient capacities and skills for data collecting, processing and analysis. Main reasons include lack of trained experts for field research, lack of proper data collection protocols and standardized forms, lack of GIS and statistical data processing skills.**

**Additional resources, both financial and human are needed for targeted education and training in analysis and processing of biodiversity data.**

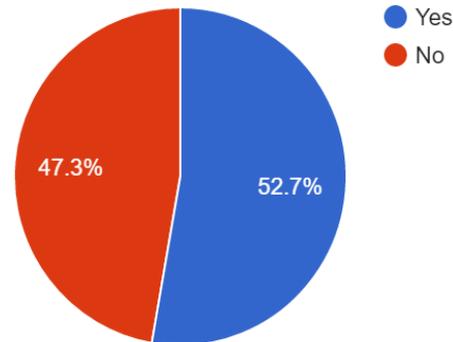
**A16. Are there sufficient capacities and skills for adequate data collecting?**



Most important capacities and skills that respondents find important for data collecting are following:

- need for standardized forms for data collecting etc.
- need for proper data collection protocols and accurate geo-referencing;
- lack of trained personnel and financial support for fieldwork (biodiversity inventory);
- training in Natura 2000 methodologies;
- need for more trained volunteers for some research fields, necessary specific fauna group obtaining workshops, trainings;

**A17. Are there sufficient capacities and skills for adequate data processing and analysis?**

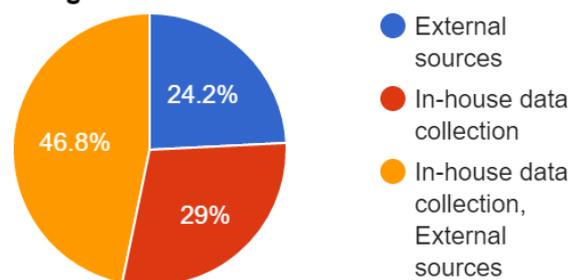


There is mostly lack of capacities and skills in regards to spatial analyses of collected data, statistical data processing, geo-referencing, modelling of biological systems, GIS, usage of adequate software for data storage and creating database systems and data processing.

## 5.2. Insights from data integrators

Question group intended for data integrators was aimed at gathering information about various sources of biodiversity data that stakeholders integrate, formal cooperation agreements or contracts with external sources of biodiversity data, data ownership and data usage aspects, what type of data are integrators ready to share, known obstacles for data sharing, skills and capacities for data processing and analysis and the like.

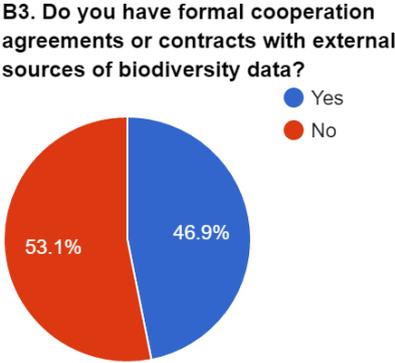
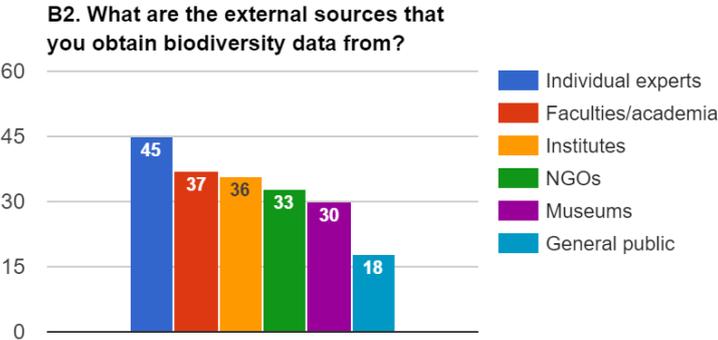
**B1. What is the source of biodiversity data that you integrate?**



When answering the question what the source of the biodiversity data that institutions integrate is, a lot of stakeholders (75%) collect biodiversity data in addition to obtaining data from external sources.

The problem lies in the fact that **50% of the stakeholders do not have any formal agreement or contract with academia/companies/NGOs/experts that collect biodiversity data at all.** If

there are formal cooperation agreements, almost 45% of existing contracts with researchers/external sources do not cover data ownership and data usage aspects. In that way data ownership and data usage aspects are not covered at all. This could lead to problems regarding the misuse of data.

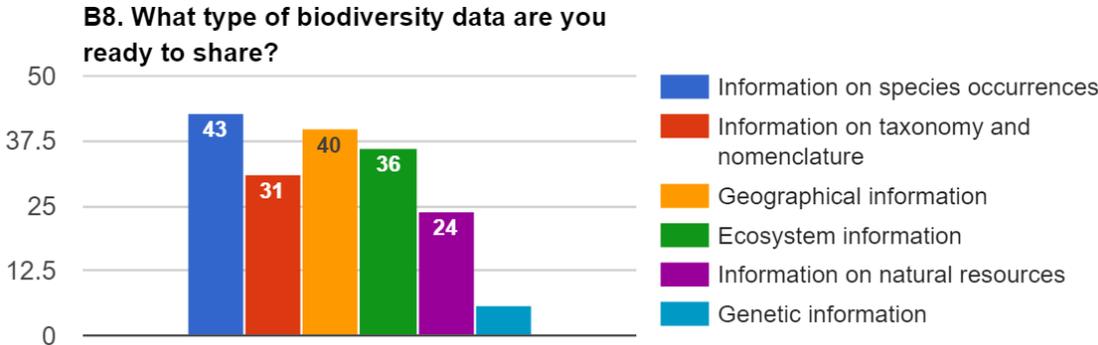


External sources include providers such as individual experts, faculties, NGOs, museums etc. However, there is a big potential to include general public in data collection (mountaineering and speleological associations, nature enthusiasts, students etc.).

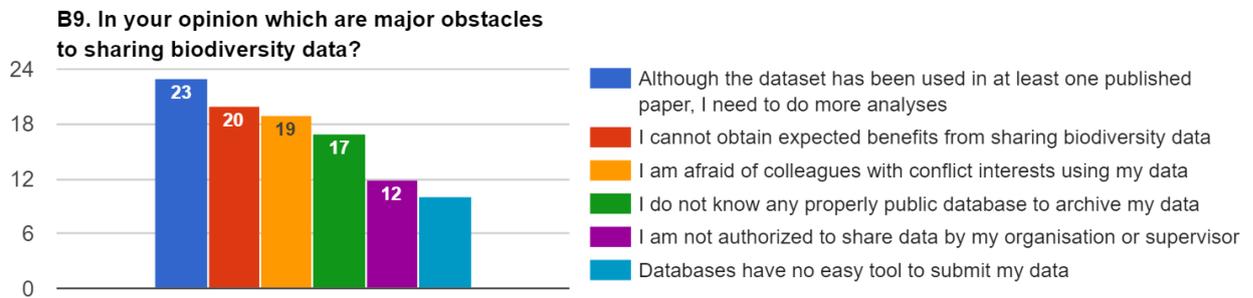
Nearly half of data integrators maintain their own bibliography databases with up to several thousand publications, books and scientific papers.

Almost 45% of data integrators, which main role is to collect and integrate biodiversity data, do not use any software solutions for data storage. This indicates that **data is stored in various formats and scattered in various places making the data hard or impossible to analyse and use for nature protection related tasks.**

Data integrators are mostly ready to share data on species occurrences, taxonomy and nomenclature, geographical and ecosystem information.



Biggest obstacles for data sharing include need for further analysis, concern that benefits of data sharing cannot be obtained as well as concern that colleagues with conflict interest might use their data.



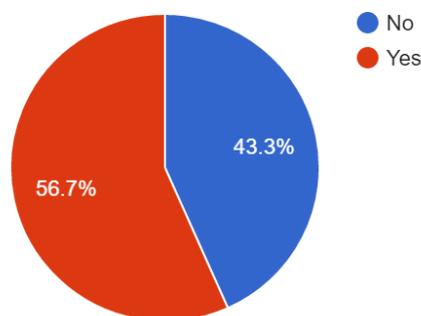
When assessing data validation, almost 50% of all data integrators are not conducting quality control or any form of data validation.

**In order for data to be used in various type of data analysis (modelling, spatial analysis, checklists etc.) data quality control and validation needs to be performed in both technical (logical validation of entered data such as timestamps, coordinates, projections etc.) and expert sense (i.e. taxonomic validation).**

If data validation and quality control is applied, it is performed in various ways such as:

- identification of field occurrences is verified by moderators/supervisors/individual experts;
- data is published in scientific journals;
- use of standardized methodologies;
- data is gathered via specific protocols.

**B12. Do you have practice of regular data backup?**



**Surprising number of stakeholders do not practice regular data backup leaving their data vulnerable and easily lost for good.** There are already some examples of very valuable data lost permanently due to lack of data backup practices. **Backups are a way to protect the investment**

**in data - in the absence of backup, all the efforts, funds and time invested in data collection and processing are irreversibly lost.**

More than a half of data integrators are aware of EU INSPIRE Directive<sup>3</sup>, but they have only heard about the Directive and are not fully familiar with the scope and objective of the Directive. **Almost 30% of data integrators are not aware of EU INSPIRE Directive at all.** This indicated that additional efforts should be made to inform and present INSPIRE Directive scope, regulations, obligations and technical guidelines to data integrators in scope of various workshops, expert meetings and similar.

In each EU member country many institutions that belong to the group of data integrators (governmental and public institutions) will be officially declared as members of national spatial data infrastructure and will be obliged to maintain, report and share biodiversity and nature protection data such as protected areas (including Natura 2000 ecological network), data on species occurrences and habitat types.

**B15. Are you aware of EU INSPIRE Directive?**



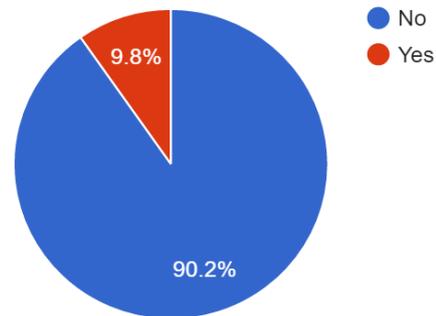
### 5.3. Insights from data providers

Question group intended for data providers was aimed at gathering information about whether data is provided free of charge or whether there are fees and payments necessary for gaining data access and if there are any exceptions.

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<sup>3</sup> The INSPIRE Directive aims to create a EU spatial data infrastructure for the purposes of environmental policies and policies or activities which may have an impact on the environment. Regarding BIMR main focus is on Directive themes: Annex 1 - Protected Areas and Annex 3 - Habitats and biotopes, Species distribution.

**C3. Do you charge for data (i.e. do users need to pay for data)?**



Majority of data providers do not charge for data. However, if they do this depends on specific situations, users and type of data (sensitive data etc.).

When charging for data, exceptions are mostly made for non-profit purposes, scientific research or for the cases of national interest. Exceptions are also made for data exchange between various governmental institutions such as ministries, agencies and institutes.

In some cases, generalized data is available free of charge, but precise data is charged for.

Data is mostly provided in various structured table formats (exports from databases, Excel tables etc.) and to a smaller extent as a web service (WMS, WFS).

## 6. CONCLUSIONS AND RECOMMENDATIONS

Even though the economies in the SEE region have established legal framework for the biodiversity conservation, aspects relevant to BIMR are not sufficiently embedded into national legislation or economies lack resources to operationally implement the legislative related to BIMR.

All the economies in SEE region, except Kosovo, are the signing parties of the CBD so for the major part of the region there is an obligation to report on the biodiversity status. Additionally, for the EU candidate economies as well as economies that started the process of accession to EU, the establishment of Natura 2000 Ecological Network is another major challenge lying ahead. All the Natura 2000 and CBD related obligations require adequate and verified data available in structured digital formats that can be applied and used for the purposes of reporting biodiversity and nature conservation issues.

When assessing SEE at national level, various gaps are notable regarding availability and quality of data as well as technical and human capacities and skills for biodiversity data management. Economies that have established biodiversity databases often tackle different set of issues and challenges such as limited data provision and sharing, and lack of cooperation among relevant stakeholders in the nature conservation sector, as well as across different sectors.

There are also notable differences and gaps among economies in the region regarding financial resources necessary for the establishment of adequate biodiversity information systems. Fortunately, generally economies in the SEE region have access to EU pre-accession funds such as IPA as well as other funds including GEF which can significantly help and support economies' requirements and needs related to BIMR.

**This Regional Assessment focuses on conclusions related to all aspects of managing and reporting biodiversity data and gives a BIMR baseline for the SEE region taking into account the similar geographical area with many common features but also different starting points when discussing BIMR. As such, a number of relevant conclusions can be drawn from this Regional Assessment and the following section brings the most relevant and interesting results.**

### **Design and complexity of biodiversity information systems**

Designing and developing of biodiversity information systems are often very challenging tasks for many IT and biodiversity experts. This is primarily due to the fact that biodiversity data is very versatile and complex and truly challenging to efficiently organize within the information system.

Different components of biodiversity such as habitat types or groups of species (mammals, birds, reptiles etc.) all require specific approaches in designing IT solutions intended for their storage and maintenance. Even among data on species there are significant differences on how data on specific groups of species is collected, what methodologies are used during inventory or what specific type of data is collected. Due to the structural complexity it is quite challenging to build a single large database that would efficiently store all this diverse data.

When designing biodiversity information system, the special emphasis has to be put on the common components of the system such as catalogue of species, catalogue of habitat types and perhaps even some specific components such as cadastre of speleological objects. It has to be taken into account that these common components have to be able to serve the need of various biodiversity information system modules. They require compliance and adjustments with relevant international and EU taxonomic databases and catalogues. Aside from technical aspects it is of utmost importance to organize and engage experts (i.e. taxonomic experts) and establish protocols for data maintenance and taxonomic administration.

Biodiversity information systems also have to consider various reporting obligations such as CBD and Natura 2000 as well as conformance with relevant EU standards and directives such as EU INSPIRE directive.

**Recommendation is to develop smaller interconnected modules of the biodiversity information system and take more fragmented approach.** This is also due to the fact that different biodiversity components require different experts, different approaches and focused vision from the nature protection experts.

### Standardized data forms for data collecting

From the results of the questionnaire, it is evident that significant number of stakeholders do not use any type of predefined standardized forms for field inventory which makes unstructured data very hard to analyse. Consequently, big amount of such data is not even considered to be used in various biodiversity analysis, gap analysis or EIA/SEIA studies which unfortunately lead to questionable decisions and conclusions.

**It is of crucial importance to define standardized forms for collecting biodiversity data** (field inventory) by means of defining basic set of attributes which are needed to produce relevant platform for storing data. Additionally, **it is necessary to define logical and technical data validation procedures** to incorporate in the data collecting process. **It is also important to consider relevant biodiversity information standards such as Darwin core TDWG<sup>4</sup> or catalogues such as EU Nomen PESI (Pan-European Species directories Infrastructure)<sup>5</sup>** which are mandatory for many EU reporting obligations.

### Formats and data availability

Biodiversity data is often stored in herbariums or specimen collections so it is not even available for processing in digital format. Significant part of digitally stored data exists only in form of text documents (Word, PDF) and is, as such, of limited potential for analysis. Furthermore, biodiversity data for one country is sometimes stored and available in other country. Because data is not immediately at hand, it is neglected and not included as input in policies and management decisions. This also supports initiatives for establishment of data exchange and sharing mechanisms on regional level.

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<sup>4</sup> Darwin Core TDWG <http://www.tdwg.org/>

<sup>5</sup> EU Nomen PESI (Pan-European Species directories Infrastructure) <http://www.eu-nomen.eu/portal/>

Furthermore, most stakeholders do not store collected data in geospatial format. They need to put additional efforts to prepare data in geospatial format to be able to use it in spatial analysis or spatial search.

**In general, recommendation is to invest efforts in order to bring valuable data from static formats/media to digital structured formats.** In order to achieve this two main aspects should be tackled. One is to ensure that all collected biodiversity data through biodiversity inventories are **collected and stored in some kind of digital format**. The other is to **ensure continuous georeferencing and digitalisation** of literature data.

### **Stakeholder cooperation, data usage and authorship rights**

Question of formal cooperation agreements between stakeholders is another important aspect to consider as such agreements are aimed to ensure clear and timely data exchange and provision and should also define data usage and authorship rights.

When assessing regional results of BIMR questionnaire, 50% of the stakeholders at the national levels do not have any formal agreement or contract with academia/companies/NGOs/experts that collect biodiversity data. In that way data ownership and data usage aspects are not covered at all which could lead to problems regarding misuse of data. Without formal agreements, data exchange and provision is often difficult or obstructed and accessible with many delays.

**Recommendation is to ensure formal cooperation agreements between stakeholders** which will result and guarantee clear terms of data usage, authorship rights and mutual obligations in regards to data provision.

### **Capacities and skills for BIMR related tasks**

In scope of the BIMR questionnaire results, significant number of stakeholders in the region reported insufficient capacities and skills for data collecting, processing and analysis. Specifically, stakeholders lack various IT related skills such as data analytics, processing, spatial data handling or GIS which makes it difficult or impossible to conduct any complex analysis and gain significant insights and arguments. This indicates that additional resources are needed for targeted education and training in analysis and processing biodiversity data.

**Recommendation is to plan and organise education activities based on detailed assessment specific to each stakeholder organisation.** Info about education activities within economies could be easily shared over the Platform or similar board which could then be shared among stakeholders in order to better communicate education results.

### **National legislative related to BIMR**

Throughout the SEE region economies, it is notable that the obligation to establish and maintain biodiversity information system is only scarcely mentioned in national legislation and that it is not adequately covered in legislative documents.

**This indicates that there is a great need for more detailed ordinance or other legally binding document that would tackle all information system aspects** such as exchange and provisions of the data, access and usage rights, technical and functional requirements/standards, compliance with relevant international standards and EU directives such as INSPIRE Directive etc.

### **Data backup and insurance**

Surprising number of stakeholders do not practice regular data backup leaving their data vulnerable and easily lost for good. Backups are a way to protect the investment in data - in the absence of backup, all the efforts, funds and time invested in data collection and processing are irreversibly lost. In the region there were already some examples of very valuable data lost permanently due to lack of data backup practices. Data backup is not something that stakeholders should not underestimate and it is their fundamental responsibility to be able to manage data by means of ensuring regular backup procedures in order to protect data and prevent data loss.

**Recommendation is to ensure adequate IT support in all biodiversity information system projects** (even small scale projects) especially in early stages of project planning and technical specifications where necessary aspects of data back, support and insurance should be covered.

### **Data sharing**

Data sharing on regional and national level is still facing many obstacles and data is often not easily obtainable. Usually this is due to the lack of resources and technical capacities and skills to build and maintain IT infrastructure that would support adequate data sharing. In addition to this, stakeholders often show reluctance to open data sharing as they believe that they cannot obtain expected benefits from sharing data or are afraid that colleagues with conflict of interest will use their data.

Fortunately, with the awareness and anticipated obligations and principles brought by EU INSPIRE Directive, **stakeholders are more and more aware of importance and benefits of data sharing especially with public authorities in order to support them to deliver their public environmental tasks.**

## **NEXT STEPS**

The Regional Assessment of BIMR baseline was necessary to identify any gaps, insufficiencies and challenges that economies in the region face in regards to biodiversity data handling and their preparedness for adequate reporting on species diversity and ecosystems.

Results and major insights gathered through this assessment will be used and tackled in the BIMR Regional Guidelines document that will be prepared in scope of BIMR project Component 2. This document will bring most important practical guidelines and resources regarding biodiversity data management and reporting that are applicable and useable by economies in the region.

BIMR Regional Guidelines will be prepared with the intent to help and support stakeholders in the SEE region in regards to organisation and planning of activities related to biodiversity information systems. The main focus of these guidelines is on developing standardised methodology for collecting biodiversity data, improvement of mechanisms for information management and reporting as well as to provide clear guidance for establishing specific thematic components of biodiversity information systems.

With the BIMR Regional Guidelines project will contribute to enhanced data sharing and compatibility especially relevant for species monitoring and transboundary efforts and will complement and add value to existing initiatives by economies in the SEE region.

All the important information, insights and documents will continue to be exchanged through the Platform as a mechanism established through BIMR project with the purpose to support regional coordination and information exchange related to biodiversity monitoring and reporting among SEE economies in the focal area of BIMR.

## 7. REFERENCES

- Appleton, R. Michael: "Towards Strengthened Conservation Planning in South-Eastern Europe - Capacity Development Needs and Priorities for Nature Conservation in South-Eastern Europe". IUCN. 2016.
- Kryštufek, Boris, and Jane M. Reed. "Pattern and process in Balkan biodiversity—an overview." *Balkan biodiversity*. Springer Netherlands. 2004. 1-8.
- Seitz, Josef: "Assessment of biodiversity framework in South-East Europe". Technical consultant report.

**8. ANNEXES**

## Annex 1. BIMR questionnaire

# Regional Network for Biodiversity Information Management and Reporting (BIMR) Assessment

This questionnaire is prepared in scope of Open Regional Fund (ORF) for South East Europe - Biodiversity Sub-project: Regional Network for Biodiversity Information Management and Reporting (BIMR).

The Open Regional Fund for South-East Europe Biodiversity (ORF BD) project promotes regional cooperation of biodiversity-related organisations – in particular the ministries in charge of environment and environmental protection agencies, institutes for nature conservation as well as the ministries that deal with or impact on biodiversity and environment, including forestry, agriculture, tourism, water and energy, the municipal administrations, academic institutions and research institutes as well as non-governmental environmental organisations. Activities of the ORF are bundled and channelled through so-called sub-projects (SP).

Importance of improving regional biodiversity information management and reporting was raised by stakeholders in the target economies of South-East Europe (SEE) region in the project identification mission in 2014 and therefore addressed as one of the three priority intervention areas of ORF BD. The continued project consultations up to now, including those held at the ORF BD kick-off meeting in Belgrade, in February 2016 reconfirmed the need for intervention and resulted in the development of a SP Biodiversity Information Management and Reporting (BIMR).

The objective of SP BIMR is that capacities of partner institutions needed to meet Convention on Biological Diversity (CBD) and EU reporting requirements have been improved in SEE.

This questionnaire is intended for collecting data regarding biodiversity information system set-up assessment in each country and are intended for: Biodiversity data collectors (data collector is an institution/organization/expert that collects biodiversity data through field inventory); Biodiversity data integrators (data integrator is an institution/organization that finances biodiversity data field research or an institution/organization that collects biodiversity data from external experts/institutions on the basis of legal obligation); Biodiversity data providers (data provider is an institution/organization that serves biodiversity data to other stakeholders in structured form - database, web service etc.).

BIMR questionnaire in PDF format is available at the following link:

<https://drive.google.com/file/d/0B35G6cPOz8QjUTBNUTZlb0dkTXM/view>

\* Required

*Skip to question 1.*

## Stakeholder general information

### Institution/organisation contact information

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Please enter the info regarding your institution/organisation

1. Name \*

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2. Address \*

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3. Postal code \*

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4. City \*

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## Stakeholder person contact information

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Please enter the info regarding the person filling the questionnaire

5. Name and surname of the person filling the questionnaire \*

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6. Position of the person filling the questionnaire \*

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7. E-mail of the person filling the questionnaire \*

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8. How would you describe your role in regards to the biodiversity data? \*

*Check all that apply.*

Biodiversity data collector (data collector is an institution/organization/expert that collects biodiversity data through field inventory)

Biodiversity data integrator (data integrator is an institution/organization that finances biodiversity data field research or an institution/organization that collects biodiversity data from external experts/institutions on the basis of legal obligation)

Biodiversity data provider (data provider is an institution/organization that serves biodiversity data to other stakeholders in structured form - database, web service etc.)

## Important notice

Questions in this questionnaire are divided in sections and are organized in three groups - Group 1. Biodiversity data collectors, Group 2. Biodiversity data integrators and Group 3. Biodiversity data providers.

Please answer ONLY question group(s) based on your selected role (data collector, data integrator or data provider).

Please SKIP question group(s) that are not intended for your role by choosing Next option (button) on the bottom of each question group page.

Stakoholder that belongs in two or more categories has to complete each corresponding parts of the questionnaire

## A. Data collectors specific questions

This question group is intended specifically for Biodiversity data collectors.

Leave answers empty if you (or your organization) does not fit into the stakeholder category.

### 9. A1. What group(s) of organism do you collect data about?

*Check all that apply.*

- Plants
- Invertebrates (marine and terrestrial)
- Vertebrates
- Fungi
- Microorganisms

### 10. A2. What specific area of your country do you cover with biodiversity data?

*Check all that apply.*

- Entire county territory
- Specific region(s)

### 11. A2.1. If you collect data for specific region(s), please indicate which region(s) you cover with biodiversity data:

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### 12. A3. What is the category of biodiversity data you are collecting?

*Check all that apply.*

- Species
- Ecosystems
- Biological communities
- Landscape features
- Land use
- Other: \_\_\_\_\_

13. **A4. What specific biodiversity data do you collect/store? (i.e. specific groups of species, animals, populations etc.)**

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14. **A5. In what form do you collect biodiversity data/information?**

*Check all that apply.*

- Photographs, audio records etc.
- Processed/collected specimens or their parts
- Field observations
- Remote sensing (telemetry, photo-traps, satellite imagery etc.)
- Collecting biodiversity features from maps and GIS data Other:
- \_\_\_\_\_

15. **A6. Do you keep biodiversity specimens (collections)?**

*Mark only one oval.*

- Yes
- No

16. **A6.1. If you selected "Yes" in the previous question, please describe the type of specimens you keep in your collection:**

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17. **A6.2. If you selected "Yes" in the previous question, please indicate approximate number of specimens you keep in your collection:**

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18. **A7. Do you use any predefined standardized forms for data collecting?**

*Mark only one oval.*

- Yes  
 No

19. **A8. Do you use any software solutions for data collection (used on PDAs, mobile devices, laptops)?**

*Mark only one oval.*

- Yes  
 No

20. **A8.1. If you selected "Yes" in the previous question, please describe which software solutions you use for biodiversity data collecting.**

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21. **A9. Do you use any software solutions for data storage (database systems, digital table formats or any other solution for storage of structured data)?**

*Mark only one oval.*

- Yes  
 No

22. **A9.1. If you selected "Yes" in the previous question, please describe which software solutions you use for data storage.**

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23. **A10. In which format do you keep your biodiversity data?**

*Check all that apply.*

- Text documents  
 Tables (e.g. Excel, CSV)  
 Databases (e.g. Access, SQL Server) Geo tagged  
 photographs  
 Geospatial data (e.g. Shapefile, GPX, KML)  
 Other: \_\_\_\_\_

**24. A11. Please specify where your biodiversity data is stored.**

*Check all that apply.*

- Personal computer
- Local network
- Remote server
- Cloud service

**25. A12. What type of biodiversity data are you ready to share?**

*Check all that apply.*

- Information on taxonomy and nomenclature
- Information on species occurrences
- Ecosystem information
- Genetic information
- Geographical information
- Information on natural resources
- Other: \_\_\_\_\_

**26. A13. Who are you ready to provide biodiversity information to?**

*Check all that apply.*

- Individual researchers
- Training/educational institutions
- Research institutions
- Decision makers on governmental, regional and local level
- NGOs
- Media
- Companies dealing with EIA-SEA
- Other: \_\_\_\_\_

**27. A14. In your opinion which are major obstacles to sharing biodiversity data?**

*Check all that apply.*

- Although the dataset has been used in at least one published paper, I need to do more analyses
- I am afraid of colleagues with conflict interests using my data
- I cannot obtain expected benefits from sharing biodiversity data
- I do not know any properly public database to archive my data
- I am not authorized to share data by my organisation or supervisor
- Databases have no easy tool to submit my data
- Other: \_\_\_\_\_

**28. A15. What benefits do you wish to obtain from sharing data?**

*Check all that apply.*

- Material benefits
- Reputation
- Higher citation rates
- Involvement in future assessments and field research
- Other: \_\_\_\_\_

**29. A16. Are there sufficient capacities and skills for adequate data collecting?**

*Mark only one oval.*

- Yes
- No

**30. A16.1. If answer to previous question is “No”, please specify what capacities and skills are you missing?**

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**31. A17. Are there sufficient capacities and skills for adequate data processing and analysis?**

*Mark only one oval.*

- Yes
- No

**32. A17.1. If answer to previous question is “No”, please specify what capacities and skills are you missing?**

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**B. Data integrators specific questions**

This question group is intended specifically for Biodiversity data integrators.

Leave answers empty if you (or your organization) does not fit into the stakeholder category.

33. **B1. What is the source of biodiversity data that you integrate - is data collection conducted in-house (with your own experts) or/and obtained from external expert institutions or individuals (faculties, museums, institutes, NGOs, individual experts)?**

*Check all that apply.*

- In-house data collection
- External sources

34. **B2. What are the external sources that you obtain biodiversity data from?**

*Check all that apply.*

- Faculties/academia
- Museums
- Institutes
- NGOs
- Individual experts
- General public

35. **B3. Do you have formal cooperation agreements or contracts with external sources of biodiversity data?**

*Mark only one oval.*

- Yes
- No

36. **B4. Do cooperation agreements or contracts with researchers/external sources cover data ownership and data usage aspects?**

*Mark only one oval.*

- Yes
- No

37. **B5. Are there any specific biodiversity data that you integrate/maintain? (i.e. only marine data, forest ecosystems, fresh water ecosystems etc.)**

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38. **B6. Do you use any software solutions for data storage (database systems, digital table formats or any other solution for storage of structured data)?**

*Mark only one oval.*

- Yes
- No

39. **B6.1. If you selected "Yes" in the previous question, please describe which software solutions you use for data storage.**

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40. **B7. Do you maintain biodiversity bibliography database?**

*Mark only one oval.*

Yes

No

41. **B7.1. If you selected "Yes" in the previous question, please indicate approximate number of bibliography data you have in your database.**

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42. **B8. What type of biodiversity data are you ready to share?**

*Check all that apply.*

Information on taxonomy and nomenclature

Information on species occurrences

Ecosystem information

Genetic information

Geographical information

Information on natural resources

Other: \_\_\_\_\_

43. **B9. In your opinion which are major obstacles to sharing biodiversity data?**

*Check all that apply.*

Although the dataset has been used in at least one published paper, I need to do more analyses

I am afraid of colleagues with conflict interests using my data

I cannot obtain expected benefits from sharing biodiversity data

I do not know any properly public database to archive my data

I am not authorized to share data by my organisation or supervisor

Databases have no easy tool to submit my data

Other: \_\_\_\_\_

44. **B10. Are there sufficient capacities and skills for adequate data processing and analysis?**

*Mark only one oval.*

Yes

No

45. **B10.1. If answer to previous question is “no” can you please specify what capacities and skills are you missing?**

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46. **B11. Is there any data quality control or data validation performed?**

*Mark only one oval.*

Yes

No

47. **B11.1. If answer to previous question is “Yes” please describe in more details how you perform data quality control or data validation on your data?**

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48. **B12. Do you have practice of regular data backup?**

*Mark only one oval.*

Yes

No

49. **B13. Do you use any of the national or international species/habitats catalogues for resolving taxonomic status of your biodiversity data (such as national checklists, EU Nomen PESI, Catalogue of Life, Fish Base or similar)?**

*Mark only one oval.*

Yes

No

50. **B14. Are you responsible for maintaining and updating of check-lists for any group of flora and fauna?**

*Mark only one oval.*

- Yes  
 No

51. **B14.1. If answer to previous question is “Yes” please could you explain in more details how you are performing activities related to maintaining and updating the relevant checklists.**

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52. **B15. Are you aware of EU INSPIRE Directive?**

*Mark only one oval.*

- Yes, but I have only heard about this Directive and I am not fully familiar with the scope and objective of the Directive  
 Yes, I am familiar with INSPIRE Directive scope, regulations and technical guidelines  
 No

## C. Data providers specific questions

This question group is intended specifically for Biodiversity data providers.

Leave answers empty if you (or your organization) does not fit into the stakeholder category.

53. **C1. Do you provide your data to external users?***Mark*

*only one oval.*

- Yes  
 No

54. **C2. Is the provided data available in structured format (database, web service)?***Mark*

*only one oval.*

- Yes  
 No

55. **C2.1. If the answer to previous question is “Yes”, please specify in which structured format is data available.**

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56. **C3. Do you charge for data (i.e. do users need to pay for data)?**

*Mark only one oval.*

- Yes
- No
- Other: \_\_\_\_\_

57. **C4. If you charge for data access do you make exceptions - are there specific institutions/ organizations that you provide your data for free (such as ministries, agencies or public institutions)?**

*Mark only one oval.*

- Yes
- No

58. **C4.1. If the answer to previous question is “Yes”, please specify to which institutions/organizations do you provide or you are ready to provide your data for free.**

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59. **C5. Are you aware of EU INSPIRE Directive?**

*Mark only one oval.*

- Yes, but I have only heard about this Directive and I am not fully familiar with the scope and objective of the Directive
- Yes, I am familiar with INSPIRE Directive scope, regulations and technical guidelines
- No