Finnish Environment Institute SYKE, Finland

Draft Rulebooks on the Establishment of National Information System for Nature and on Exchange of Biodiversity Information: Framework, justifications and texts for the regulations

Twinning Project MK 13 IPA EN 02 17

Report D 4.2. - 3.

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The Ministry of Environment and Physical Planning, Department of Nature,
Republic of North Macedonia
Metsähallitus (Parks and Wildlife Finland), Finland
The State Service for Protected Areas (SSPA), Lithuania

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Table of Content

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The scope of the document:

- In 1st chapter to describe the framework for the necessary elements for a functioning National Information System for Nature (NISN), as well as its organisational setup;

- In the 2nd chapter to present detailed justifications for the establishment of an Information System for Nature (NISN);

- In 3rd chapter to present a draft text for a Rulebook for the establishment of a Information System for Nature (NISN);
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- In 4th chapter to present detailed justifications for exchange of biodiversity information;
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- In 5th chapter to present a draft text for a Rulebook on exchange of biodiversity information, with template for agreements and a document on Data Policy as annexes;

- In Annexes to provide the following:
    - a flowchart model of the contents of the NISN as well as its accessibility;
    - examples of field forms that can be used to collect habitat and species data to be included into NISN;
    - recommendations on practical steps forward in efficient and effective establishment of NISN;
    - demonstrative pictures of data provision, management and use in the context of NISN (in a separate PP file).

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1. Framework: Necessary elements for a functional National Information System for Nature

1.1. Background

A first attempt to establish a National Biodiversity Information System (NBIS) in the Republic of North Macedonia was made in the framework of an internationally funded project on protected areas, that took place 2010-2011.[1] However, after the project, there was no funding for the maintenance of the system, so currently the NBIS is not operational.

During the project in 2010-2011, the legal framework only generally imposed establishment of NBIS, but did not define its scope and content in detail. As the process of accession negotiations with the EU is expected to continue during the years 2019-2020, an updated legal framework within the field of nature conservation is being drafted. A new draft for the Law on Nature Protection[2] which is expected to be subjected to public notice during year 2019, shall form a basis to subordinate (secondary) legislation (decrees, rulebooks). Following the public notice and corrections as well as legislative editing of the new act, it should be adopted in the near future. Meanwhile, some part of subordinate legislation is already being prepared.

One Rulebook by the Ministry of Environment and Physical Planning (hereinafter referred to as MoEPP) shall regulate the establishment of a National Information System for Nature (NISN), and another Rulebook, deeply connected to the above-mentioned one, shall regulate exchange of biodiversity data both regarding data input into NISN and data extraction from the system. This explanatory memorandum is prepared along the Drafts of the two Rulebooks to present the rationale and justification behind them.

During the past projects on development of nature protection regulation, a draft of a "Decree for the establishment of a National Information System for Biodiversity" has been prepared. It has been used as a basis of the new Rulebook on the establishment of NISN together with the conclusions and recommendations made in the project "Biodiversity Information System Management and Reporting (BIMR)"[3], implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Gmbh during 2016-2017. Suggested structure and content of the new NISN as well as justifications for the new Rulebooks together with proposed content (articles) for them are described in detail in the following chapters.

[1] UNDP/GEF project Strengthening of ecological, institutional and financial sustainability of the system of protected areas in the Republic of Macedonia, see https://www.thegef.org/project/strengthening-ecological-institutional-and-financial-sustainability-macedonias-national.

[2] Prepared under project Strengthening the capacities for implementation of NATURA 2000 - EUROPEAID/136609/IH/SER/MK, see eg. http://natura2000.gov.mk/en/strengthening-capacities-implementation-natura-2000-financed-eu/.

[3] See https://balkangreenenergynews.com/wp-content/uploads/2017/08/Macedonia-Assessment_ENG.pdf.

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1.2. Rationale behind the suggestions concerning establishment of NISN

Suggestions presented in this explanatory memorandum concerning establishment of NISN have been developed under Twinning Project MK 13 IPA EN 02 17 "Strengthening the capacities for effective implementation of the acquis in the field of nature protection[4]" and build upon expertise developed by Parks & Wildlife Finland being one of the competent organisations responsible for establishing, implementing and managing of the Finnish network of state protected areas and the Finnish Natura 2000 network. The baseline of the suggestions lies in the future aim of establishing the Macedonian Natura 2000 network based on Habitat and Bird Directives[5], together with the national aims set for biodiversity protection and establishment of protected area network of according to the national legal framework derived from the obligations set in the Convention on Biological Diversity (CBD), ratified in the Republic of North Macedonia in 1997.

Issuance of the Rulebook for the Establishment of NISN is based on the Draft Law on Nature Protection, mainly on Article 176 Establishment of National Biodiversity Information System. Other articles regulating acquisition and records of data in the field of nature conservation are Article 171 Nature Protection Records, Article 172 Cadastre of protected areas, Article 173 Register of natural heritage, Article 174 Matriculation in the register and Article 175 Records on the trade and other activities related to protected species.

After adoption of the act (new Law on Nature Protection), this explanatory memorandum should be revised by making the necessary changes concerning the name and reference number of the statute, as well as the title and number of the abovementioned articles, should they be changed from the current version.

1.3. The need for tools for systematic collection, storage, monitoring and analysis of biodiversity data

The UN Convention on Biological Diversity requires that the parties to the convention develop national biodiversity strategies for integrative, cross-sectoral biodiversity protection planning. The parties shall also submit regular national reports containing information on the measures taken to implement the convention and on their effectiveness. In 2010, a Global Strategic Action Plan for Biological Diversity 2010-2020 was adopted, with a common vision, mission, five strategic goals and 20 targets (known as Aichi Biodiversity Targets). This strategic action plan, being the leading international framework for nature conservation actions, aims at halting the loss of biodiversity in order to ensure that ecosystems are resilient and able to continue provision of important ecosystem services, thereby contributing to human well-being. The Republic of North Macedonia ratified the convention in 1997 and is thereby committed to fulfill its requirements.

The World Database on Protected Areas (WDPA) is the most comprehensive database of marine and terrestrial protected areas. Data in it are used in reporting to the Convention on Biological Diversity on progress towards reaching the Aichi Biodiversity Targets and to the UN to track progress towards the 2030 Sustainable Development Goals, as well as in compiling other international assessments and reports, such as Protected Planet Report by UNEP-WCMC. Also data on the biodiversity in the Republic of North Macedonia is included in the database.

[4] See http://natura2000.gov.mk/en/zajaknuvanje-na-kapacitetite-za-efektivno-sproveduvanje-na-evropskoto-zakonodavstvo-vo-oblasta-na-zashtitata-na-prirodata/.

[5] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora and Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds, hereinafter referred to as Habitat Directive and Bird Directive, respectively. See https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=LEGISSUM:l28076&from=EN.

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The need for effective tools for systematic collection, storage, monitoring and analysis of biodiversity data exists not only internationally but also on a national level. Thus far in the Republic of North Macedonia, information on biological diversity has not been collected and stored on a systemic manner, resulting in difficulties in further analysis and utilization of information and leading in effect to biodiversity data not being effectively taken into account in decision-making, thereby risking further loss of biological diversity.

By establishing a systematic method for biodiversity data collection and storage, also analysis and utilization of the data can be made easier, the eventual aim being recognition and protection of biodiversity values through integration of environmental considerations and requirements in all relevant fields of decision-making. This cannot be effectively achieved if information on different aspects of biological diversity is collected and kept in several independent ways and places. Management of biological diversity, whether management of species, habitats or protected areas, should be based on reliable, accurate and reasonably comprehensive information collected in a scientifically sound manner and kept available for those institutions and individuals responsible for biodiversity management and protection actions, as well as those participating in decision-making processes where biodiversity data is needed.

The objectives for the establishment of the NISN are thereby stated as follows:

- *to improve the quality of management and protection of biodiversity, geodiversity and the protected areas*;
- *to strengthen national databases and the reliability and utilization of biodiversity information;*
- *to enable access to information on natural heritage*;
- *to enhance and improve systems for decision-making and support of legal processes by providing tools for access and analysis of biodiversity data*;
- *to assist in reporting of biodiversity issues under liabilities stemming from national and international conventions and commitments, like the CBD and the future EU legislation, such as the newly amended Environmental Impact Assessment (EIA) Directive*[6].

1.4. Suggested structure of NISN: Overview of the data content, user interfaces and software architecture

The structure of NISN can be presented as consisting of four pillars, that contain information on several aspects of natural heritage of the Republic of North Macedonia. The baseline for the pillar structure is formed by a platform through which to include information into the database by scientific and other organisations. The four pillars (numbered as follows) are constructed of the information gained from inventories and monitoring of 1) species, 2) habitats, 3) geodiversity, 4) national ecological network of the Republic of North Macedonia (national protected areas, Emerald network and Natura 2000 network). The roof resting on the pillar structure shall be the user interface through which an access to the data shall be provided.

The NISN contains also metadata on eg. 1) reference databases of species, habitats and geodiversity present in the Republic of North Macedonia, and 2) database of the organizational setup of the nature protection regime and nature conservation organizations. This kind of reference information can also be presented in the website of MoEPP and/or other competent organizations.

[6] 2014/52/EU, see https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0052.

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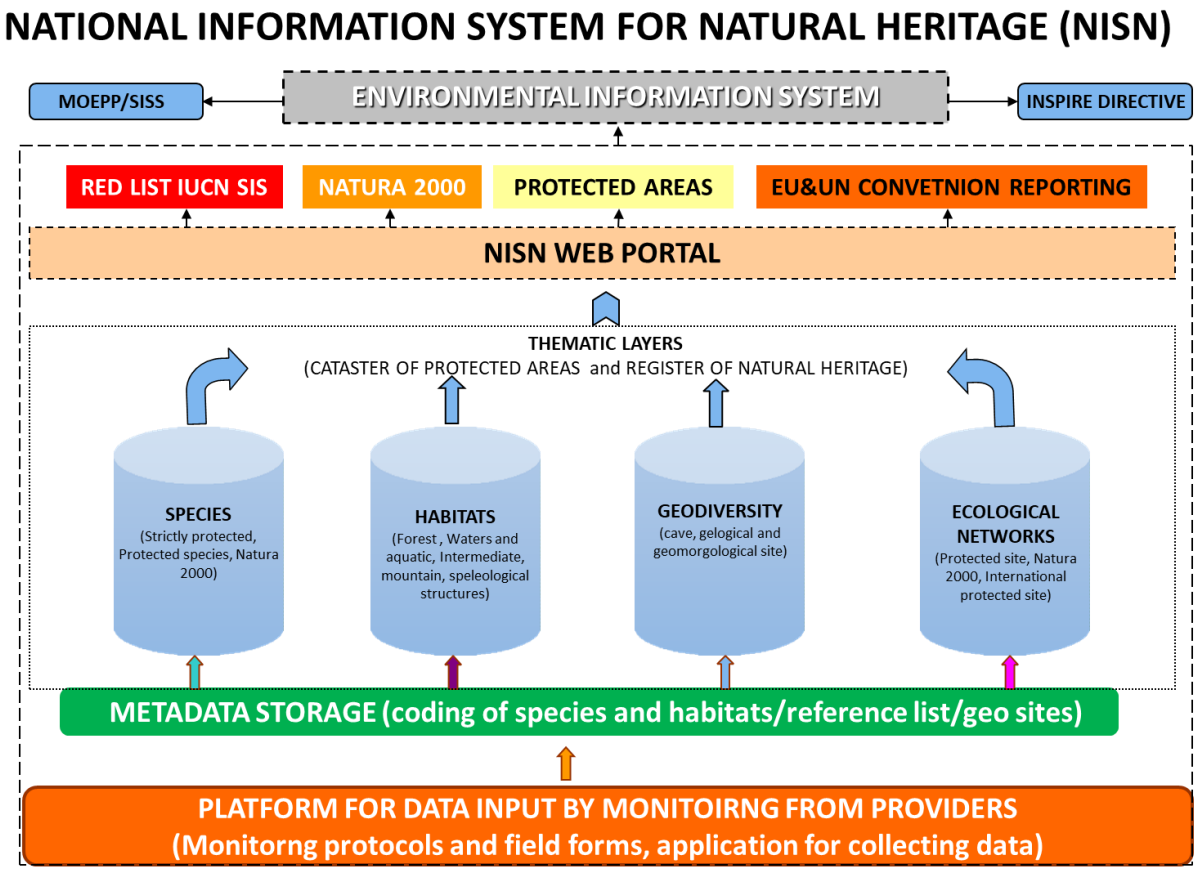

Picture 1. Suggested structure of NISN and its data content.

In the Rulebook, four groups of users of NISN are defined, with differing rights and privileges i.e. different user interfaces in the system. The first group is representatives of the Data Custodian in the, who will have rights to keep the records in the system, as well as rights to view and verify data entered to the system. The second group consists of Data Providers, who provide and share data in the system, and will have rights to record and view data on species, habitats, geodiversity and protected areas. The third group consists of Distinguished Data Users, who will have rights to view open data and specified restricted-use data needed in their operations. Access to data of the latter two groups will be based on an agreement conducted with the Data Custodian. The fourth group is formed by the Public, who will have access to open biodiversity data, but not to data defined as restricted-use data.

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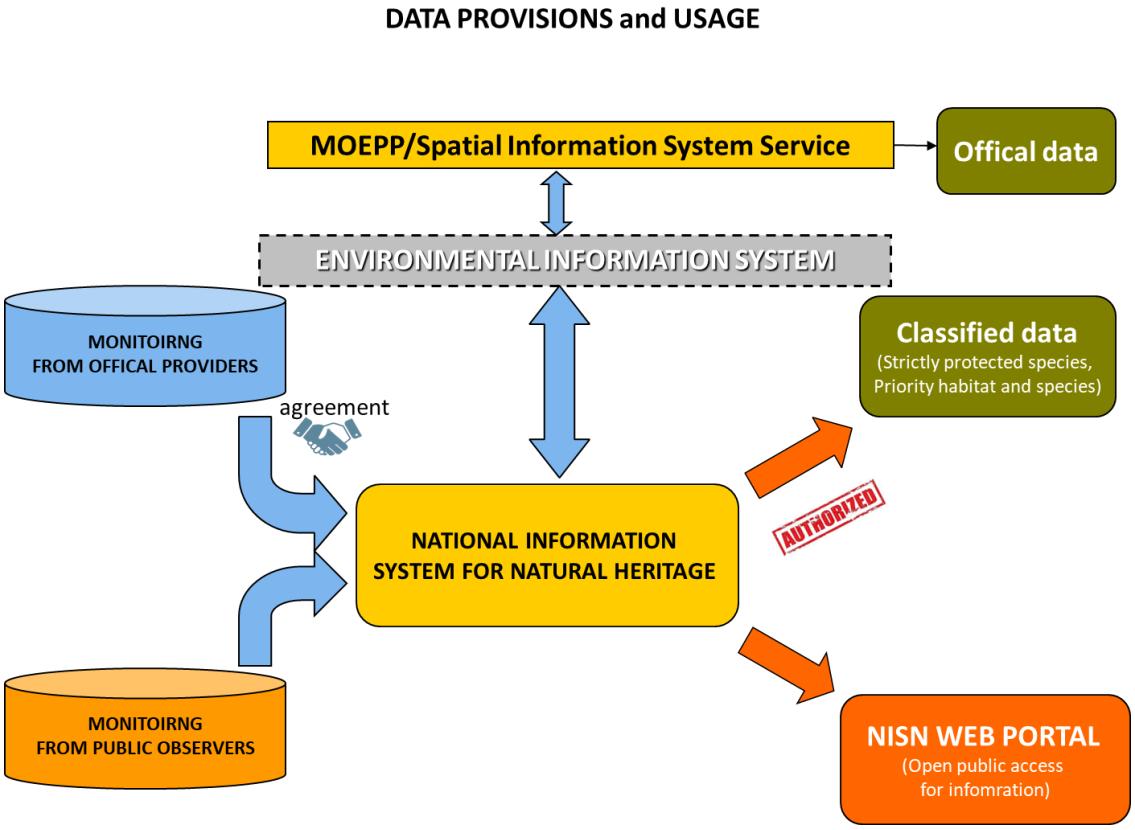

Picture 2. User groups of NISN.

The software architecture of NISN consists of a central database, desktop user interface and WEB user interface. The central database consists of information stored in the reference databases (metatada) and information gained from biodiversity inventories and monitoring, as well as establishment and management of protected areas and Natura 2000 sites, as described in the pillar model above.

Keynote. The structure of NISN shall consist of four pillars, those of 1) species, 2) habitats, 3) geodiversity and 4) national ecological network. The baseline for the pillar structure is formed by a platform through which the data input is done by scientific and other organisations. The roof resting on the pillar structure shall be the user interfaces through which data can be extracted from the system.

1.5. Definition of the data content of the NISN

For effective utilization of the NISN, it is of utmost importance to define the necessary data needed to fulfill the objectives set for the establishment of the system, regarding the national, international as well as the future EU legal framework. In the process of defining the data needed, both the methods of data collection and acquisition and the data content of the system i.e. data recording format need to be defined in parallel, so that the data forms used in the field work for data collection respond to the data needs identified for the system. This is a system-level change compared to the practice used in nature inventories and monitoring up to now,

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where the organizations and professionals performing the actions have used case-specific methodologies, resulting in a situation where the information collected is not directly comparable between sites and studies but presented only within written reports and evaluations.

A justified starting point for the definition of the data content is the habitat and species classification in the EU Habitat and Bird Directives, but also a national approach to data collection and content is needed. The latter is obvious concerning geodiversity that falls outside the scope of the above-mentioned EU directives but might be relevant also for the conservation of species and habitats, or other aspects of biodiversity, such as sites of national or regional value to be preserved or species and habitats typical and in need of protection in the Republic of North Macedonia.

Prior to defining the data content of the Habitat pillar of NISN, a manual of European Habitat types and their inventories to meet the obligations stemming from the Habitat Directive is needed. This means first drafting national guidelines as "*Natura 2000 Habitats Interpretation Manual*", where the terminology used and information needed of the habitats in Standard Data Forms (SDF) of the Habitat Directive are described in detail, and where the characteristics of the habitats identified as present in the Republic of North Macedonia are described. The Manual should include for each habitat 1) general description, 2) guidance for identifying and defining the habitat and 3) characteristics of the habitat - e.g. Area, coverage, species typical to them, biological characteristics related to habitat type, threats and pressures, representativity i.e. how "typical" the habitat on site is respective of the habitat's characteristics, relative surface, degree of conservation and global assessment of the value of the site for conservation.

Data on Annex I habitats and species of Habitat Directive is needed 1) while filling Standard Data Forms for each Natura 2000 area, and 2) while reporting every six years to the Commission under the obligation set in the Habitats Directive (Article 17). In reporting under article 17 this data is needed both inside and outside of Natura 2000 network. The reporting includes conservation measures taken and their outcome in terms of the conservation status of species and habitats listed on the Directive's Annexes. Data on habitats and species needs to be collected and their status to be monitored with such accuracy, that it is possible to make observations on trends in conservation status of habitats and species. The Bird directive also requires SDFs and reporting information on several population characters to be collected.

Regarding Habitat and Bird Directives, the possible threats to species and habitats should also be estimated and future conservation measures should be enlisted. This information is of use while defining the activities that need to be regulated in order not to cause significant impacts on biodiversity values of future Natura 2000 sites. Assessment of threats on a general scale, such as it is in SDF, can be included into NISN as information to be considered in site management and in future appropriate assessment (AA) procedures.

As a first step, it is recommended to gather knowledge of national experts regarding current status and localities of European Habitats (Habitat Directive, Annex I), species (especially Annex II, but also Annexes IV and V of the Habitat Directive) and Bird Directive species. Reference lists of species and their known occurrences are needed while planning inventories at these sites and when developing future Natura 2000 and national protected area networks.

To enable data collection, a nationally standardized document form for the field work needs to be drafted. Suitable models are abundant (See examples included in Annexes II-III of this document) and can be modified to meet the national needs concerning characteristics of the natural heritage of the country. The SDF does not function in field data collection, being more like a tool for field data analysis and recording. The data recording format in NISN can include information from both the national field data collection forms and SDF for any site regardless of its status (e.g. Regional or national protected site or future Natura 2000 site).

Methods applicable for active management of species and habitats are important in meeting the requirements set in the Habitat Directive article 6.1 regarding the member states' duty to establish the necessary conservation measures and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types of Annex I and the species in Annex II. The impact of those measures to the conservation status of the natural habitat types of Annex I and the species in Annex

II are among the information that shall be reported to the Commission every six years from the date of expiry of the period set for adopting the necessary laws, regulations and administrative provisions to comply with the Habitat Directive.[7] Thereby the management methods applicable should be described in the "*Natura 2000 Habitats Interpretation Manual*" and their usage should be documented in NISN.

The NISN which is based on Article 176 of the draft Law on Nature Protection, shall upon establishment also include Nature protection records as mentioned in Article 171 of the draft law, and consisting of a cadaster of protected areas defined in Article 172 of the draft law and register of natural heritage defined in Article 174 of the draft law. Thereby the NISN shall in effect cover all the biodiversity and geodiversity records the draft law calls for. That way the establishment of several separate, incompatible and overlapping data systems is avoided and effective methods for data storage and utilization are provided.

Keynote. The exact definition of the data content of the NISN should follow the objectives set for biodiversity and geodiversity management both in the national as well as the future EU legislation. While fixing the data content, the methodology for future data collection and monitoring need also to be fixed to an extent that the quality of information in NISN will be satisfactory regarding the objectives set in the legislation for the system. The NISN shall in effect cover all the biodiversity and geodiversity records the draft Law on Nature Protection calls for, to provide effective methods for data storage and utilization and to avoid separate, incompatible and overlapping data systems.

1.6. Starting the system: First round of inventories and data recording

After reaching consensus on the layout of the field forms and training of adequate number of experts, a first round of habitat inventories can be started. Areas subject to inventories are divided into polygons by using GPS technology, and then each polygon is invented to collect data requested in the field forms. Such documentary of field data based on biological inventories needs to take place prior to the establishment of the actual Natura 2000 network, to allow for assessment of the biodiversity in the national scale, to find out which habitats under Annex I and species under Annex II of the Habitat directive occur in the country, as well as their coverage, representativeness, conservation status and other factors relevant for future filling out of the SDFs. Only after the first national round of inventories and data recording, the proposition for the network of Natura 2000 can be drafted and transmitted to the Commission for further preparation of Sites of Community Interest (SCI).

The information collected in the inventories can be utilized also in strengthening the national protected areas network, comprising at present of 86 areas proclaimed under different categorizations of protection regimes set in the current Law on Nature Protection. Among the challenges observed in the national protected areas network is the uneven positioning of protected areas between eastern and western part of the Republic of North Macedonia, as well as weak representativeness of the current national network of protected areas regarding the different natural values of the country (marshes, mountain areas, alpine, forest areas, lowland and even semi-natural ecosystems), the current network being oriented more to forest, alpine and lake ecosystems. Both the improvements for the national protected areas network as well as preparations for the future establishment of the Natura 2000 network support National Target 11 set in the National Biodiversity Strategy and Action Plan For the period of 2018-2023[8].

[7] See Habitat Directive, Article 17.1, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:01992L0043-20130701.

[8] Established in the Project "Support to the Republic of Macedonia for revision of National Biodiversity Strategy and Action Plan and development of the Fifth National Report to the Convention on Biodiversity". See https://www.cbd.int/doc/world/mk/mk-nbsap-v2-en.pdf.

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Keynote. Documentary of field data based on biological inventories needs to take place prior to the establishment of the actual Natura 2000 network, to allow for assessment of the biodiversity in the national scale. The results can be utilized in preparation of both the Natura 2000 network and complement the national network of protected areas.

1.7. Monitoring of natural heritage: Follow-up inventories

The data on habitats, species and geodiversity in NISN should be stored according to timing of its acquisition i.e. enabling "piling" of information concerning the same habitats, species' populations and objects of geodiversity into the system, without losing the prior data recordings by input of new data.

Monitoring is defined in the new Draft Law on Nature Protection as "continuous monitoring, measuring, observation, valuation and control of the state of nature i.e. biological and landscape diversity". Monitoring of natural heritage is carried out by follow-up inventories of habitats, species or of geodiversity objects by the same standardized methodology used in the original inventories, or by methodology commensurate to that used in prior inventories yielding comparable results.

There are several factors contributing to the needs to carry out future monitoring of biodiversity objects. Some of the biodiversity objects, eg. some types of habitats are such that they change rather quickly, especially if no active management actions are undertaken. That holds for e.g. habitats formed by traditional agricultural activities such as grazing. The need for new inventories (in effect, monitoring) of biodiversity objects may also stem from planned or implemented activities resulting in estimated or realized impacts in nature, such as construction of infrastructure, or environmental effects due to e.g. pollution resulting in changes in natural conditions that are of interest regarding biodiversity protection. As a baseline for the need to update information on habitats and species serves also the need for repeated reporting to the Commission regarding fulfillment of obligations of the Habitats and Birds Directives.

Keynote. The data content of NISN should allow for data from repeated inventories to be stored without losing the prior data recordings by input of new data.

1.8. Information on the ecological network in NISN

Ecological network data consists of data on protected areas, Emerald sites and future Natura 2000 sites in the country, as well as proposals for sites. Currently there are 86 protected areas representing various IUCN categories proclaimed, of which three are national parks. In the Emerald network, there are 23 sites identified. Preparations for the future Natura 2000 network have been started, and the current version consists of 9 sites, with 3 more proposals under preparation. All the Emerald and proposed Natura 2000 sites will be also national protected areas. In the previous chapters, the methods of preparation of the proposal for Natura 2000 network are presented in more detail.

In the new Draft Law on Nature Protection, Protected areas are described in Article 77. Article 78 includes Categorization of protected areas based on IUCN categories, and Articles 80-127 describe the individual categories, manner of their management, management planning, prohibited activities, zoning and processes of proclamation of protected areas. Based on Article 77, by proclamation of an area as protected, it shall

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acquire the status of natural heritage, which in turn is to be recorded in nature protection records under Article 171 and encompassed by the NISN.

Characteristics of the individual sites in NISN shall include name, location, surface area, date and documents of proclamation or re-proclamation, national codes from the cadastre, category of protection under IUCN, relevant legal documents and programs like studies for valorization of nature values, management plans and annual programs for nature protection and ecological information of the sites (references to species, habitats and geodiversity data). The ecological network data is partly GIS-data and partly data consisting of other formats attributed to GIS-objects describing the sites.

Keynote. Ecological network data consists of data on protected areas, Emerald sites and future Natura 2000 sites in the country, as well as proposals for sites. The ecological network data is partly GIS-data and partly data consisting of other formats attributed to GIS-objects describing the sites.

1.9. Other methods of data acquisition: Citizen science

In the future, also data acquired through citizen science could be included into NISN. Citizen science regarding collection of biodiversity data could be eg. inventories or monitoring carried out partly or wholly by private citizens, citizen groups or NGOs (non-governmental organizations). For citizen science to yield successful results, proper guidance, supervision and verification of results are needed. If conducted in an appropriate manner, citizen science may considerably increase the resources available for biodiversity monitoring and conservation.

However, in the terminology of this memorandum as well as in the Rulebooks, citizen science is considered separate from Data Providers, who on the first level of introduction of the NISN shall be mainly institutions working in the field of biology and nature conservation. The main reason for this is that observations and information of citizens shall be collected without prior agreements on user rights to the NISN, ie. through a separate, WEB based open access user interface. For NISN, the component including results from citizen science can be introduced either as a first-hand priority or later when the system has become an everyday tool in nature conservation administration.

Keynote. In the future, also data acquired through citizen science could be included into NISN. Citizen science regarding collection of biodiversity data could be eg. inventories or monitoring carried out partly or wholly by private citizens, citizen groups or NGOs (non-governmental organizations). Observations and information of citizens shall be collected without prior agreements on user rights to the NISN, ie. through a separate, WEB based open access user interface. For NISN, the component including results from citizen science can be introduced gradually when developing the system.

1.10. Role of NISN in reporting: WDPA, CBD, Habitat Directive and other treaties and obligations

As mentioned before, The Republic of North Macedonia is committed to eg. the UN Convention on Biological Diversity, which together with number of other international commitments require regular reporting regarding the state of biodiversity and actions taken for its protection. An important function of NISN is to

facilitate the reporting under international commitments, as well as in reporting obligations derived from national and future EU legislation.

The NISN will at early stages not contain functionalities for reporting, but mainly is a tool for data storage, therefore facilitating the use of and analyses based on comprehensive, comparable, up-to-date biodiversity data. NISN can also serve as storage and sharing point for the reported information, for it to be widely available to interested parties and the public. This can be achieved through the WEB user interface of the system.

Keynote. An important function of NISN is to facilitate the reporting under international commitments, as well as in reporting obligations derived from national and future EU legislation. The NISN is a tool for data storage, therefore facilitating the use of and analyses based on comprehensive, comparable, up-to-date biodiversity data.

1.11. Organizational setup of nature protection regime

The Ministry of Environment and Physical Planning (MoEPP) is the responsible authority in charge of implementing and promoting nature protection in the country. In the draft Law on Nature Protection, it is referred to in Article 154 as body of the state administration responsible for the affairs of nature protection. The three national parks have their own administrative organs responsible for management of each park. Most of the field work related to habitats and species is carried out by scientific organizations and NGOs, which will have an important role in updating the biodiversity data in NISN through agreements with the MoEPP.

The MoEPP has expertise both in the administrative and biological field, but most probably has not enough staff and financial resources to meet the obligations of the future adoption of the Habitat and Bird Directives. Also, as the Ministry is the topmost authority supervising the adoption and implementation of the national and future EU legislation on nature conservation, it is not a suitable option for it to be also the operational organisation carrying out the actual duties related to conservation efforts. Thereby it is necessary to establish an Agency for Nature Protection that could take on the operational responsibilities of site establishment, management, monitoring and conservation actions. The Agency should perform its duties according to guidance and supervision of the MoEPP, with close contacts to other agencies, businesses and interest groups present in or working on protected areas. The Agency should also receive the necessary funding from the state budget to guarantee its independent status.

In Article 155 of the draft Law on Nature Protection, the responsibilities of the competent body for the execution of the expert works in area of nature protection are defined. According to definitions set in Article 8 of the draft Law, the competent body shall be established by law, but so far there is no detailed description of the process.

Keynote. The MoEPP has expertise both in the administrative and biological field, but most probably has not enough staff and financial resources to meet the obligations of the future adoption of the Habitat and Bird Directives. It is necessary to establish an independent Agency for Nature Protection that could take on the operational responsibilities of site establishment, management, monitoring and conservation actions.

1.12. Needs for capacity building: Expertise and software

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The Ministry of Environment and Physical Planning (MoEPP) has knowledge on the administrative, legal and biological aspects of biodiversity management, but the staff resources are limited. There are only few experts in the field of biodiversity (biologists, ecologists, geologists), and very limited expertise in the field of IT/software management. Besides, the Ministry should stick to being the directional and supervisory body in the field of nature conservation, with the future Agency in charge of the operational work. To acquire that, it is needed to both strengthen the expertise of the Ministry and to promote the establishment of an Agency for Nature Conservation with a strong expertise in biological sciences, and the necessary expertise in IT/software management including GIS techniques to promote the aims of the organization.

After the past project of 2010-2011, when the NBIS was first structured, there have been difficulties both with the hardware and software needed for the system to work. While the availability of hardware (machinery) has during the past 10 years developed and its maintenance and updating is recognized as standard practice, there is still a lot to do regarding the software used. To develop and maintain a functional IT-based information system requires collaboration of both biologists and IT experts, especially GIS expertise. The software to be developed and taken into operation should be relatively simple to be adopted as an everyday tool by also the personnel without prior GIS or other expertise in the field of biology. In addition, it should be accessible and updatable from different locations and organizations. Suitable models based on open source code are available that could be utilized, such as the Atlas of Living Australia, to get the system established and into utilization on a quick time interval. The software could later be modified to achieve more functionality regarding e.g. planning applications, but as the first step a reasonably comprehensive data storage system is recommended.

Keynote. It is needed to both strengthen the expertise of the Ministry of Environment and Physical Planning and to promote the establishment of an Agency for Nature Conservation with a strong expertise in biological sciences, and the necessary expertise in IT/software management to promote the aims of the organization. To develop and maintain a functional IT-based information system requires collaboration of both biologists and IT experts, especially GIS expertise. Suitable models based on open source code are available that could be utilized, such as the Atlas of Living Australia, to get the system established and into utilization on a quick time interval.

1.13. Summary graph of the National Information System for Nature

Justification presented earlier in this chapter can be summarized in a graph below. It contains information on different kind of data levels, data users, content of the data in different levels as well as inputs and outputs.

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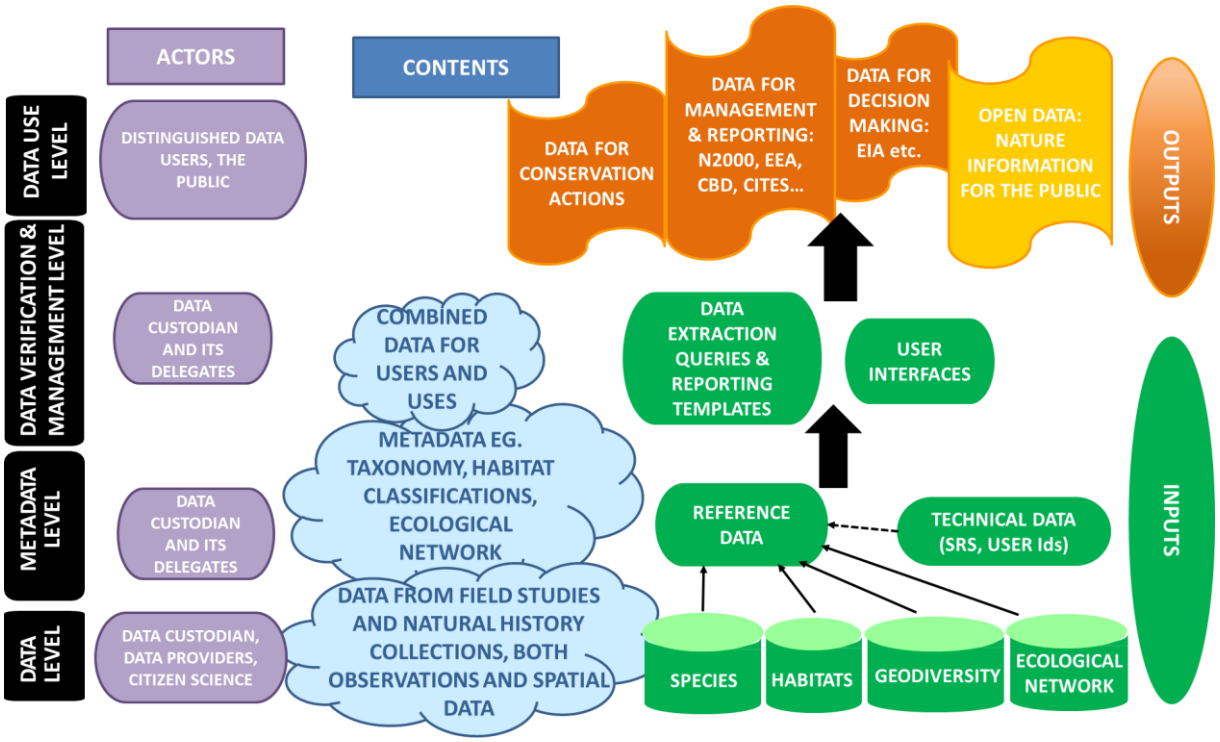

Figure 3: 1.13. Graph of the National Information System for Nature

2. Justification of the Draft Rulebook on the Establishment of NISN

2.1. Review of the Draft Degree written under a previous project

The Draft Decree for the establishment of NISN, written during a prior attempt to establish a national information system on biodiversity, forms a good basis to the current preparation of the draft rulebook. The format and content of the rulebook can be kept similar as in the draft degree, with only minor modifications and updates to the content of NISN, as well as applying the new name and abbreviation of the system, the National Information System of Nature (NISN).

The contents of the Rulebook should be kept on a reasonably general level to not tie hands of those establishing and developing the system, when it comes to e.g. technical characteristics and detailed data content of the system.

2.2. Justification to Article 1 The Scope

In Article 1 The Scope of the Rulebook is defined. It is the establishment of the National Information System for Nature (NISN), with the contents listed that shall be presented in detail in the following articles.

Issuance of the Rulebook for the Establishment of NISN is based on the Draft Law on Nature Protection, mainly on Article 176 Establishment of National Biodiversity Information System. In the current Draft Law

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on Nature Protection, there are also other articles regulating acquisition and records of data in the field of nature conservation. The NISN shall upon establishment also include Nature protection records as mentioned in Article 171 Nature Protection Records, Article 172 Cadastre of protected areas, Article 173 Register of natural heritage, Article 174 Matriculation in the register and Article 175 Records on the trade and other activities related to protected species.

Thereby the NISN shall in effect cover all the biodiversity and geodiversity records the draft law calls for. That way the establishment of several separate, incompatible and overlapping data systems is avoided and effective methods for data storage and utilization are provided.

Further regulation of NISN regarding the aspects presented in article 1 is carried out in this Rulebook. Another Rulebook shall regulate exchange of biodiversity information in the context of NISN.

Text box 1: Article 1 The Scope.

Article 1

The Scope

This Rulebook regulates the establishment of the National Information System for Nature (NISN), including:

- *Objectives which shall be achieved with the introduction of NISN;*
- *Responsible institution for its establishment, maintenance and development;*
- *Structure and organizational setup of the NISN;*
- *Data content of the NISN;*
- *Types of users/entities of the system,*
- *Rights and obligations of all participants in maintenance, development and use of the NISN;*
- *Ways to access NISN.*

The need for establishment of NISN is based on the criteria imposed by the Law on Nature Protection, especially Article 171 Nature protection records, Article 172 Cadastre of protected areas, Article 173 Register of natural heritage and Article 176 Establishment of National Biodiversity Information System.

2.3. Justification to Article 2 Terms used in this Rulebook

In Article 2 Terms used in this Rulebook are defined. First, certain technical characteristics of the system are defined. The NISN shall have central database with desktop and WEB user interfaces. The data is partly GIS data, meaning that the data is tied to a geographic location. Part of the data is metadata, which means data describing other data. Open biodiversity data is data not defined as restricted-use data, which in turn means data concerning particularly sensitive or confidential information.

Second, the roles of institutions and individuals using and maintaining the system are defined. By Data Providers, such institutions or individuals are meant who work on research and/or conservation of nature, and who provide data into and share data via NISN. Distinguished Data Users are authenticated users of NISN, who have gained access to biodiversity information and can utilize it for defined purposes. Authentications means an event where NISN users' identity is confirmed. This is done when making an

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agreement on exchange of biodiversity data. Data custodian means the body responsible for NISN administration. Data Custodians are responsible for the safe custody, transport and storage of the data and implementation of agreed terms with data owners. Data Custodians are also responsible for the technical environment and database structure of NISN.

Finally, MoEPP as the abbreviation to the Ministry of Environment and Physical Planning is used in the Rulebook. So far MoEPP is also the body acting both as data custodian and contracting authority regarding NISN and agreements on exchange of biodiversity information. However, should the proposed establishment of a new nature protection agency proceed, the rulebook can be modified by directing to the new agency the responsibilities of the data custodian and the contracting authority.

Text box 2: Article 2 Terms used in this Rulebook.

Article 2

Terms used in this Rulebook

- *NISN - National Information System for Nature. The NISN is built to manage information concerning biodiversity, geodiversity, protected areas and related information, e.g. habitats and threatened species of the Republic of North Macedonia. The NISN is governed and managed by Data Custodian, currently being the Ministry of Environment and Physical Planning. The data in NISN may include openly available data as well as restricted-use data;*
- *Central Database - An organizational structure which with the help of an appropriate hardware and software, enables the recording, storing and processing of data on biodiversity and other related data;*
- *Desktop user interface - An application solution designed for Data Providers and Distinguished Data Users working on recording and viewing of different biodiversity data. For the use of this application it is necessary to sign an Agreement on Providing and/or Using the Biodiversity Data of NISN between the Data Custodian and the contracting party;*
- *WEB User Interface - Application solution, intended for the public to view open biodiversity data;*
- *GIS - Geographic information system;*
- *Data - Entities consisting of individual records stored in digital form. The number of records can vary from a handful to millions; they can include text, numbers, photographs, audio or comparable content, as well as related metadata;*
- *Metadata - Data describing other data;*
- *Open biodiversity data - Data not defined as restricted-use data;*
- *Dataset - A set of data or metadata;*
- *Restricted-use data - Data that contain particularly sensitive or confidential information. Species data is typically classified as restricted-use, if there are evident reasons to believe that opening this information to public causes threat to the protection of the species. Another reason for restricted-use classification is typically research embargo based on the data policy of the research institute. Finally, the data owner may want to restrict the use for any other rational and justified reason;*
- *Data Providers - Individuals and institutions working on research and/or conservation of biodiversity and protected areas, providing and sharing data for other individuals and institutions;*
- *Distinguished Data Users - Individuals and institutions who through authentication have gained access to the data in NISN;*

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- *Authentication - Event, where NISN users' identity is confirmed;*
- *Citizen science - Public participation in scientific research, monitoring and data collecting in the field of biodiversity protection;*
- *Data Custodian - The body administering NISN;*
- *MoEPP - Ministry of Environment and Physical Planning.*

2.4. Justification to Article 3 The need for NISN and objectives to be achieved with its introduction

The need for effective tools for systematic collection, storage, monitoring and analysis of biodiversity data exists on national as well as international level. By establishing a systematic method for biodiversity data collection and storage, also analysis and utilization of the data can be made easier, the eventual aim being recognition and protection of biodiversity values through integration of environmental considerations and requirements in all relevant fields of decision-making. This cannot be effectively achieved if information on different aspects of biological diversity is collected and kept in several independent ways and places but calls for more comprehensive approach for data management.

Management of biological diversity, whether management of species, habitats or protected areas, should be based on reliable, accurate and reasonably comprehensive information collected in a scientifically sound manner and kept available for those institutions and individuals responsible for biodiversity management and protection actions, as well as those participating in decision-making processes where biodiversity data is needed.

Text box 3: Article 3 Objectives to be achieved with the introduction of NISN.

Article 3

The need for NISN and objectives to be achieved with its introduction

To gain reliable information of the situation in biodiversity conservation, of biological values identified and of threats facing them, of management activities proposed and taken as well as of needs for further actions, a comprehensive data management system is to be established.

Through institutional and systematic capacities development, the NISN will

- *improve the quality of management and protection of biodiversity and the protected areas;*
- *strengthen the national databases and information, and by using the support of appropriate technologies will enable different ways of access to this information;*
- *enhance the systems for decision-making and support of the legal processes by providing tools for access and analysis of this data and information;*
- *assist in reporting of biodiversity issues under liabilities stemming from national and international conventions and commitments, like the CBD and the future EU legislation, such as the newly amended Environmental Impact Assessment (EIA) Directive;*
- *support other processes in the state, including but not limited to:*

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- *spatial planning (spatial, general, detailed and other plans);*
- *issuing of permits (exploitation of mineral and other resources, concessions, etc.);*
- *planning and performing construction and other activities;*
- *other activities that may affect the protection of biodiversity, protected areas or Natura 2000 sites.*

2.5. Justification to Article 4 Responsible institution

Currently, the Ministry of Environment and Physical Planning is the only national administrative organization working in the field of nature conservation. Therefore, it is placed as the organization responsible of the establishment and management of the NISN, termed as Data Custodian. These responsibilities can be delegated to other competent body, should eg. the establishment of the proposed nature conservation agency proceed.

The responsibilities of the data custodian include both technical and data management activities, together with further development of the system and instructions and training of the users of the system. To fulfill these responsibilities, adequate personnel with necessary IT and biological skills are needed.

Text box 4: Article 4 Responsible institution.

Article 4
Responsible institution

The institution responsible for establishing and maintaining the NISN is termed as Data Custodian.

The Data Custodian is responsible for all aspects of NISN, including:

- *provision of the technical facilities necessary for the installation and maintenance of NISN:*
  - *servers, software applications and data;*
  - *user interfaces, desktop and WEB, for recording and viewing data in NISN;*
  - *proper system protection and maintenance, including data backup, firewall, antivirus protection, etc.;*
- *standardized procedure on data access;*
- *maintenance of qualitative and quantitative control of the data content;*
- *keeping of records and verification of individuals and institutions responsible for certain aspects of biodiversity;*
- *preservation of the integrity of the national database;*
- *additional development and adjustment of NISN, in accordance with the identified needs and/or requirements of users;*
- *instructions and training on using NISN by different categories of users;*
- *personnel to support the system.*

In the current organizational regime in the field of nature conservation, the Data Custodian is the Ministry of Environment and Physical Planning (MoEPP). MoEPP can delegate duties belonging to it according to paragraphs 1 and 2 of this Article to a competent body for the execution of the expert works in the area of nature protection referred to in Article 155 of the Law on Nature Protection.

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2.6. Justification to Article 5 Data content and software architecture of the NISN

For effective utilization of the NISN, it is of utmost importance to define the necessary data needed to fulfill the objectives set for the establishment of the system, regarding the national, international as well as the future EU legal framework. A justified starting point for the definition of the data content is the habitat and species classification in the EU Habitat and Bird Directives, but also a national approach to data collection and content is needed. The latter is obvious concerning geodiversity that falls outside the scope of the above-mentioned EU directives but might be relevant also for the conservation of species and habitats, or other aspects of biodiversity, such as sites of national or regional value to be preserved or species and habitats typical and in need of protection in the Republic of North Macedonia.

To be able to fully utilize the system, the data content of NISN is defined in a broad manner, allowing anticipation to new or unexpected conditions as well as future development of the system. The Rulebook regulates only the types of datasets that can be included in NISN. The actual decision-making on what kind of information shall be collected and stored in the system and the associated prioritization shall be based on the objectives set for NISN and carried out by the responsible organization.

The basic structure of NISN can be presented as consisting of four pillars, that contain information on several aspects of natural heritage of the Republic of North Macedonia. The baseline for the pillar structure is formed by a platform through which to include information into the database by scientific and other organisations. The four pillars (numbered as follows) are constructed of the information gained from inventories and monitoring of 1) species, 2) habitats, 3) geodiversity, 4) national ecological network of the Republic of North Macedonia (national protected areas, Emerald network and Natura 2000 network). The roof resting on the pillar structure shall be the user interface through which an access to the data shall be provided.

The software architecture of NISN consists of central database, desktop user interfaces and open WEB user interfaces. Desktop user interfaces are based on ownership of the system and the data or on agreements with the Data Custodian. WEB user interfaces for input and viewing of biodiversity information do not require any agreements, and can be introduced step-by-step when the system is reasonably developed and appropriate support can be provided.

Text box 5: Article 5 Data content and software architecture of NISN.

Article 5
Data content and software architecture of the NISN

The data content of NISN consists of information on species, habitats, geodiversity and national ecological network of the Republic of North Macedonia.

The following types of datasets may be included:

- *Monitoring and mapping data: data compiled, combined and processed in order to produce maps or statistics, or to implement monitoring;*
- *Observation data without collection specimens;*

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- *Spatial and location data related to dataset types such as collection and observation locations or regions, location within collections, etc.;*
- *Material documenting collection specimens or observations, such as photographs, audio recordings, drawings, etc.;*
- *Nomenclatures and taxonomic hierarchies;*
- *Results of scientific measurement and classification;*
- *Data on collection specimens; collection specimens include complete organisms, macro- or microscopic parts of organisms, tissue samples or DNA, and fossils;*
- *Data on collections that contain strains of living plants, fungi or microbes; strains may consist of one or more individual specimen or growth, or several specimens or growths produced by a single seed or spore lot, or a vegetative reproduction or propagation event. These may be in various states of their lifecycle (for example, spore, seed, seedling, full-grown);*
- *Various analysis results: sample dating results, isotope ratio and element composition assays, DNA sequences and genotype assays, etc., and related process knowledge;*
- *Personal data related to dataset types listed above, such as name and organisation of the data producer, contact details, etc.*

NISN is implemented as a software system composed of modules divided in terms of functionality, administration and use:

- *Central database, as the only national database on biodiversity and protected areas in the Republic of North Macedonia;*
- *Desktop user interfaces, intended for Data Custodian administering the system, and for Distinguished Data Users providing and sharing biodiversity data or utilizing biodiversity data in their operations;*
- *WEB user interfaces, intended for the Public, for public access to input and view biodiversity information.*

2.7. Justification to Article 6 Ways to access NISN and types of user interfaces in the system

Access to the information stored in NISN is gained through ownership of the software system and the data content, through an agreement with the Data Custodian or freely through the WEB interface. The procedure regarding agreements between the Data Custodian and other contracting parties is regulated through Rulebook on exchange of biodiversity data.

User interfaces of NISN are based upon access rights to distinct data. The widest rights to the system lie within representatives of the Data Custodian, who are entitled to keeping records of and authenticating users of the NISN, as well as defining their access rights. The Data Custodian has also the rights to record and view data, GIS data and metadata in the system and to approve the data recorded by the Data Providers. That way the Data Custodian carries out its responsibilities set in Article 4.

Data Providers have right to record and view data, GIS data and metadata in the system. Distinguished Data Users have right to view open data and specified restricted-use data needed in their operations. The extent of

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the rights of Data Providers and Distinguished Data Users are based on a contract between them and the Data Custodian.

The public has access to all open data and metadata in the system. Data defined as restricted-use data is not open to the public in order not to risk damage to biodiversity values or to other aspects related to the data, eg. proper performance of research.

Text box 6: Article 6 Ways to access NISN and types of user interfaces in the system.

Article 6
Ways to access NISN and types of user interfaces in the system

Access to the NISN can be obtained in three ways:

- *Through ownership of the software system and data content by the Data Custodian;*
- *Through an agreement with the Data Custodian by the Data Providers and the Distinguished Data Users;*
- *Through the WEB interface by the Public.*

There are four types of user interfaces in NISN. Each group has different rights and privileges in the system, which are determined through differing user interfaces provided by the Data Custodian. Each of the groups can have subgroups, if more levels of functions within the group are required.

The following groups of user interfaces in the NISN are envisaged:

- *Representatives of Data Custodian, who have appropriate system access rights to*
  - *keep records of and authenticate users of the system and define their access rights;*
  - *record and view data in the system;*
  - *record and view metadata in the system;*
  - *approve (verify) the data entered by Data Providers;*
- *Data Providers, who have appropriate system access rights to*
  - *record and view data in the system;*
  - *record and view metadata in the system;*
- *Distinguished Data Users, who have appropriate system access rights to*
  - *view open data in the system;*
  - *view metadata in the system;*
  - *view specified restricted-use data needed in their operations;*
- *The public, who have appropriate system access rights to:*
  - *view open data in the system;*
  - *view metadata in the system.*

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3. Draft text for Rulebook for the establishment of National Information System for Nature (NISN)

Article 1

The Scope

This Rulebook regulates the establishment of the National Information System for Nature (NISN), including:

- *Objectives which shall be achieved with the introduction of NISN;*
- *Responsible institution for its establishment, maintenance and development;*
- *Structure and organizational setup of the NISN;*
- *Data content of the NISN;*
- *Types of users/entities of the system,*
- *Rights and obligations of all participants in maintenance, development and use of the NISN;*
- *Ways to access NISN.*

The need for establishment of NISN is based on the criteria imposed by the Law on Nature Protection, especially Article 171 Nature protection records, Article 172 Cadastre of protected areas, Article 173 Register of natural heritage and Article 176 Establishment of National Biodiversity Information System.

Article 2

Terms used in this Rulebook

- *NISN - National Information System for Nature. The NISN is built to manage information concerning biodiversity, geodiversity, protected areas and related information, e.g. habitats and threatened species of the Republic of North Macedonia. The NISN is governed and managed by Data Custodian, currently being the Ministry of Environment and Physical Planning. The data in NISN may include openly available data as well as restricted-use data;*
- *Central Database - An organizational structure which with the help of an appropriate hardware and software, enables the recording, storing and processing of data on biodiversity and other related data;*
- *Desktop user interface - An application solution designed for Data Providers and Distinguished Data Users working on recording and viewing of different biodiversity data. For the use of this application it is necessary to sign an Agreement on Using the Biodiversity Data of NISN between the Data Custodian and the contracting party;*
- *WEB User Interface - Application solution, intended for the public to view open biodiversity data;*
- *GIS - Geographic information system;*
- *Data - Entities consisting of individual records stored in digital form. The number of records can vary from a handful to millions; they can include text, numbers, photographs, audio or comparable content, as well as related metadata;*

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- *Metadata - Data describing other data;*
- *Open biodiversity data - Data not defined as restricted-use data;*
- *Dataset - A set of data or metadata;*
- *Restricted-use data - Data that contain particularly sensitive or confidential information. Species data is typically classified as restricted-use, if there are evident reasons to believe that opening this information to public causes threat to the protection of the species. Another reason for restricted-use classification is typically research embargo based on the data policy of the research institute. Finally, the data owner may want to restrict the use for any other rational and justified reason;*
- *Data Providers - Individuals and institutions working on research and/or conservation of biodiversity and protected areas, providing and sharing data for other individuals and institutions;*
- *Distinguished Data Users - Individuals and institutions who through authentication have gained access to the data in NISN;*
- *Authentication - Event, where NISN users' identity is confirmed;*
- *Data Custodian - The body administering NISN;*
- *MoEPP - Ministry of Environment and Physical Planning.*

Article 3

The need for NISN and objectives to be achieved with its introduction

To gain reliable information of the situation in biodiversity conservation, of biological values identified and of threats facing them, of management activities proposed and taken as well as of needs for further actions, a comprehensive data management system is to be established.

Through institutional and systematic capacities development, the NISN will

- *improve the quality of management and protection of biodiversity and the protected areas;*
- *strengthen the national databases and information, and by using the support of appropriate technologies will enable different ways of access to this information;*
- *enhance the systems for decision-making and support of the legal processes by providing tools for access and analysis of this data and information;*
- *assist in reporting of biodiversity issues under liabilities stemming from national and international conventions and commitments, like the CBD and the future EU legislation, such as the newly amended Environmental Impact Assessment (EIA) Directive;*
- *support other processes in the state, including but not limited to:*
    - *spatial planning (spatial, general, detailed and other plans);*
    - *issuing of permits (exploitation of mineral and other resources, concessions, etc.);*
    - *planning and performing construction and other activities;*
    - *other activities that may affect the protection of biodiversity, protected areas or Natura 2000 sites.*

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Article 4
Responsible institution

The institution responsible for establishing and maintaining the NISN is termed as Data Custodian.

The Data Custodian is responsible for all aspects of NISN, including:

- *provision of the technical facilities necessary for the installation and maintenance of NISN:*
  - *servers, software applications and data;*
  - *user interfaces, desktop and WEB, for recording and viewing data in NISN;*
  - *proper system protection and maintenance, including data backup, firewall, antivirus protection, etc.;*
- *standardized procedure on data access;*
- *maintenance of qualitative and quantitative control of the data content;*
- *keeping of records and verification of individuals and institutions responsible for certain aspects of biodiversity;*
- *preservation of the integrity of the national database;*
- *additional development and adjustment of NISN, in accordance with the identified needs and/or requirements of users;*
- *instructions and training on using NISN by different categories of users;*
- *personnel to support the system.*

In the current organizational regime in the field of nature conservation, the Data Custodian is the Ministry of Environment and Physical Planning (MoEPP). MoEPP can delegate duties belonging to it according to paragraphs 1 and 2 of this Article to a competent body for the execution of the expert works in the area of nature protection referred to in Article 155 of the Law on Nature Protection.

Article 5
Data content and software architecture of the NISN

The data content of NISN consists of information on species, habitats, geodiversity and national ecological network of the Republic of North Macedonia.

The following types of datasets may be included:

- *Monitoring and mapping data: data compiled, combined and processed in order to produce maps or statistics, or to implement monitoring;*
- *Observation data without collection specimens;*
- *Spatial and location data related to dataset types such as collection and observation locations or regions, location within collections, etc.;*
- *Material documenting collection specimens or observations, such as photographs, audio recordings, drawings, etc.;*
- *Nomenclatures and taxonomic hierarchies;*
- *Results of scientific measurement and classification;*
- *Data on collection specimens; collection specimens include complete organisms, macro- or microscopic parts of organisms, tissue samples or DNA, and fossils;*

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– *Data on collections that contain strains of living plants, fungi or microbes; strains may consist of one or more individual specimen or growth, or several specimens or growths produced by a single seed or spore lot, or a vegetative reproduction or propagation event. These may be in various states of their lifecycle (for example, spore, seed, seedling, full-grown);*

– *Various analysis results: sample dating results, isotope ratio and element composition assays, DNA sequences and genotype assays, etc., and related process knowledge;*

– *Personal data related to dataset types listed above, such as name and organisation of the data producer, contact details, etc.*

NISN is implemented as a software system composed of modules divided in terms of functionality, administration and use:

– *Central database, as the only national database on biodiversity and protected areas in the Republic of North Macedonia;*
– *Desktop user interfaces, intended for Data Custodian administering the system, and for Distinguished Data Users providing and sharing biodiversity data or utilizing biodiversity data in their operations;*
– *WEB user interfaces, intended for the Public, for public access to input and view biodiversity information.*

Article 6
Ways to access NISN and types of user interfaces in the system

Access to the NISN can be obtained in three ways:

- *Through ownership of the software system and data content by the Data Custodian;*
- *Through an agreement with the Data Custodian by the Data Providers and the Distinguished Data Users;*
- *Through the WEB interface by the Public.*

There are four types of user interfaces in NISN. Each group has different rights and privileges in the system, which are determined through differing user interfaces provided by the Data Custodian. Each of the groups can have subgroups, if more levels of functions within the group are required.

The following groups of user interfaces in the NISN are envisaged:

- *Representatives of Data Custodian, who have appropriate system access rights to*
    - *keep records of and authenticate users of the system and define their access rights;*
    - *record and view data in the system;*
    - *record and view metadata in the system;*
    - *approve (verify) the data entered by Data Providers;*
- *Data Providers, who have appropriate system access rights to*
    - *record and view data in the system;*
    - *record and view metadata in the system;*
- *Distinguished Data Users, who have appropriate system access rights to*
    - *view open data in the system;*

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- *view metadata in the system;*
- *view specified restricted-use data needed in their operations;*

- *The public, who have appropriate system access rights to:*
  - *view open data in the system;*
  - *view metadata in the system.*

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4. Justifications to the Rulebook on exchange of biodiversity data

4.1. Justification to Article 1 The Scope

In Article 1 The Scope of the Rulebook is defined. This Rulebooks complements the Establishment of the National Information System for Nature carried out based on another Rulebook, by defining the methodology for data exchange and the data policy respected in the establishment and maintenance of NISN.

NB. This rulebook deals with exchange of biodiversity data, but a rulebook with similar content can be formulated for exchange of geodiversity data also, if desired.

Article 1

The Scope

This Rulebook regulates exchange of biodiversity information and agreements related to the biodiversity data of National Information System for Nature (NISN); including

- *Aim of standardized agreement procedure;*
- *Types of agreements;*
- *Content of agreements;*
- *Data policy for NISN.*

4.2. Justification to Article 2 Terms used in this Rulebook

In Article 2 Terms used in this Rulebook are defined. NISN and Data Custodian are defined according to the definitions set in the Rulebook on establishment of the system. Contracting authority and Partner refer to parties of agreements on exchange of biodiversity information.

Article 2
Terms used in this Rulebook

- *NISN - National Information System for Nature. The NISN is built to manage information concerning biodiversity, geodiversity, protected areas and related information, e.g. habitats and threatened species of the Republic of North Macedonia. The NISN is governed and managed by Data Custodian, currently being the Ministry of Environment and Physical Planning. The data in NISN may include openly available data as well as restricted-use data;*
- *Data Custodian – Organization responsible for the safe custody, transport, storage of the data and implementation of agreed terms with data owners. Data Custodians are also responsible for the technical environment and database structure of NISN;*
- *Data policy - The data policy describes the principles concerning the sharing of data stored in NISN.*

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- *Contracting authority - The Ministry of Environment and Physical Planning (MoEPP) or other competent organization working as the Data Custodian for NISN;*
- *Partner - The person or organization making an agreement with the Contracting Authority.*

4.3. Justification to Article 3 Aim of standardised agreement procedure

To secure relevance and reliability of data included in NISN, as well as appropriate utilization of biodiversity information, a procedure of standard agreements between the Data Custodian and the Partners is introduced. The standard agreement procedure will also provide for authentication of the system users and assist in defining intellectual property rights related to the data. Models for the standardized agreement with Data Providers and Distinguished Data Users is provided in the Rulebook as an annex. No other kind of agreement shall yield the capacities for data input or output to or from NISN.

Article 3

Objectives and content of standardized agreement procedure

The agreement procedure regarding exchange of biodiversity information between the Contracting Authority and the Partners shall end up to a standardized agreement being drafted between the two. The aim of the standardized agreement procedure is to guarantee the quality of the data content of NISN, to provide that data will be utilized solely for acknowledged purposes, to secure confidentiality of the information, to allow for authentication of the system users and to define the intellectual property rights related to the data.

By defining the content of the agreements, it is secured that no inappropriate measures will be applied in providing or utilizing the data in NISN, which is of vital importance to the reliability of the NISN.

The Partners will, by signing an agreement with the Contracting Authority, gain access to store, copy, download and use biodiversity data, which is stored and managed at the National Information System for Nature of the Republic of North Macedonia (NISN).

Only the standard model of agreement (provided in Annex I and II of this Rulebook) may be used for conducting a legitimate agreement. No other kind of agreement shall yield to any kind of obligation or privilege concerning exchange of biodiversity data within the scope of NISN.

4.4. Justification for Article 4 Data Policy for NISN

The principles concerning data sharing from NISN are declared in Data Policy annexed to the Rulebook. Thereby the Data Policy can be subjected to regular evaluation and update without needing to update the Rulebook itself. The Data Policy is openly available to the public and can be accessed also via the WEB user interface to NISN.

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Article 4
Data Policy for NISN

The data policy describes the principles concerning the sharing of data stored in NISN. The policy will be openly available for anyone interested. The policy forms the bases for the Contracting Authority on e.g. how the restricted-use data can be utilized by a Partner who have been authorised through an agreement with the Contracting Authority. The Data Policy is declared in Annex III of this Rulebook.

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5. Draft text for Rulebook on exchange of biodiversity data, with template for Agreement annexed

Article 1

The Scope

This Rulebook regulates exchange of biodiversity information and agreements related to the biodiversity data of National Information System for Nature (NISN); including

- *Aim of standardized agreement procedure;*
- *Types of agreements;*
- *Content of agreements;*
- *Data policy for NISN.*

Article 2
Terms used in this Rulebook

- *NISN - National Information System for Nature. The NISN is built to manage information concerning biodiversity, geodiversity, protected areas and related information, e.g. habitats and threatened species of the Republic of North Macedonia. The NISN is governed and managed by Data Custodian, currently being the Ministry of Environment and Physical Planning. The data in NISN may include openly available data as well as restricted-use data;*
- *Data Custodian – Organization responsible for the safe custody, transport, storage of the data and implementation of agreed terms with data owners. Data Custodians are also responsible for the technical environment and database structure of NISN;*
- *Data policy - The data policy describes the principles concerning the sharing of data stored in NISN.*
- *Contracting authority - The Ministry of Environment and Physical Planning (MoEPP) or other competent organization working as the Data Custodian for NISN;*
- *Partner - The person or organization making an agreement with the Contracting Authority.*

Article 3
Objectives and content of standardized agreement procedure

- *The agreement procedure regarding exchange of biodiversity information between the Contracting Authority and the Partners shall end up to a standardized agreement being drafted between the two. The aim of the standardized agreement procedure is to guarantee the quality of the data content of NISN, to provide that data will be utilized solely for acknowledged purposes, to secure confidentiality of the information, to allow for authentication of the system users and to define the intellectual property rights related to the data.*
- *By defining the content of the agreements, it is secured that no inappropriate measures will be applied in providing or utilizing the data in NISN, which is of vital importance to the reliability of the NISN.*

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- *The Partners will, by signing an agreement with the Contracting Authority, gain access to copy, download and use biodiversity data, which is stored and managed at the National Information System for Nature of the Republic of North Macedonia (NISN).*
- *Only the standard model of agreement (provided in Annex I of this Rulebook) may be used for conducting a legitimate agreement. No other kind of agreement shall yield to any kind of obligation or privilege concerning exchange of biodiversity data within the scope of NISN.*

Article 4
Data Policy for NISN

The data policy describes the principles concerning the sharing of data stored in NISN. The policy will be openly available for anyone interested. The policy forms the bases for the Contracting Authority on e.g. how the restricted-use data can be utilized by a Partner who have been authorised through an agreement with the Contracting Authority. The Data Policy is declared in Annex II of this Rulebook.

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ANNEX I to the Rulebook on exchange of biodiversity data: agreement On Provision of Biodiversity Data to NISN

AGREEMENT

The Parties to this agreement:

The Ministry of Environment and Physical Planning, Square "Presveta Bogorodica" No.3 Skopje, Republic of North Macedonia,

represented by_____(hereinafter referred to as the "**Contracting Authority**").

and

„_____ ", address_____,

represented by_____, (hereinafter referred to as the "**Data Provider**")

Subject of the Agreement

Article 1

The subject of this *Agreement* is to adopt the principles on providing biodiversity data to be stored and managed at the National Information System for Nature of the Republic of North Macedonia (NISN).

The *Agreement* shall facilitate the mobilisation and the accumulation of essential biodiversity data to be stored and managed at the NISN, including data classified as restricted-use data by the owner (**Data Provider**).

The right to use, by a third party, of the restricted-use data, which is not classified as open data, in NISN is subject to another agreement with the **Contracting Authority**. The conditions of user rights agreement for NISN are based on this *Agreement* and the *Data Policy of National Information System of Nature* (DPNISN) by the **Contracting Authority**.

Terms used in this Agreement

Article 2

Restricted-use data – Data that contain particularly sensitive or confidential information. Species data is typically classified as restricted-use, if there are evident reasons to believe that opening this information to public causes threat to the protection of the species. Another reason for restricted-use classification is typically research embargo

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based on the data policy of the research institute. Finally, the data owner may want to restrict the use for any other rational and justified reason.

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Data Policy of National Information System of Nature (DPNISN) – The policy describes the principles concerning the sharing of data stored in NISN. It will be openly available for anyone interested. The policy forms the bases for the Contracting Authority on e.g. how the restricted-use data can be utilized by a third party who have been authorised through an agreement with the **Contracting Authority**.

National Information System for Nature, NISN – The NISN system is built to manage information concerning biodiversity, geodiversity, protected areas and related information e.g. habitats and threatened species of the Republic of North Macedonia. The NISN is governed and managed by the Ministry of Environment and Physical Planning. The data in NISN may include openly available data as well as restricted- use data.

Custodian of data – Data Custodians are responsible for the safe custody, transport, storage of the data and implementation of agreed terms with data owners. Data Custodians are also responsible for the technical environment and database structure of NISN

Authentication – Event, where users identity is confirmed.

General conditions of the Agreement

Article 3

The Agreement includes general conditions that are relevant concerning both the **Contracting Authority** and the **Data Provider**:

1. The sharing and storing of the data to the NISN is free of charge for the **Data Provider**.
2. The ownership of the data will not become automatically transferred to the **Contracting Authority** by the process of sharing the data. All changes in relation to the ownership are subject to separate agreements.
3. Each collection of data (dataset) in NISN has an owner, who needs to be specified and communicated in the metadata description of the data and, if appropriate, has a stable HTTP URI (Uniform Resource Identifier) unique identifier.
4. The annotations, updating the data, need to be done in the primary source of the information. If the NISN is the only data warehouse for the shared data, the annotations should be done in the NISN. If the data is already stored in another database, which is in active use as a primary data management system, the annotations need to be done in this system.
5. The data classified as open data, will be made, subject to adequate resources, openly available for the use of the general public via developed NISN web service.

6. Authorised users of the data in NISN

Article 4

The use of the restricted-use data stored and managed in the NISN requires authorisation. The potential use of the restricted-use data are e.g. land use planning, research, sustainable use of natural resources and decision making. The authorisation is arranged by following actions:

1. The **Contracting Authority** will create a *Data Policy of National Information System of Nature* (*DPNISN*) for management, storage and distribution use of the data, including restricted-use data.

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2. The bilateral agreements to share the restricted-use data will be based on the *DPNISN* and signed by the **Contracting Authority** anda partner.
3. The **Contracting Authority** will be automatically granted the right to use the restricted-use data for its assigned official purposes.
4. The *DPNISN* will be made openly available by the **Contracting Authority**.
5. *DPNISN* shall be presented as an *Annex* to this *Agreement.* (Annex 1)

Obligations of the Data Provider

Article 5

Data Provider's obligations in this *Agreement* are:

1. The **Data Provider** agrees to provide the biodiversity data, it has the ownership of, to be managed in the NISN according tothis *Agreement*;
2. The **Data Provider** shall make a list of all collections of data (datasets), which they will share with the **Contracting Party** by signing of this *Agreement***.** This list should be *Annex*ed (Annex 2) to the agreement. However, if the **Data Provider** does not have the data in the format that it can be listed, it needs to be described in the Annex 2. The list may be updated by mutual agreement (see Article 15, Changes tothis Agreement).
3. The list in the Annex 2, should also contain information on, which data is classified as restricted-use and which is open data. In the former case, an explanation must be provided, why the owner classify some data asrestricted-use.
4. The **Data Provider** commits to harmonise the data model it uses to become compatible with the data model NISN uses for straightforward exchange of data. This is especially critical in relation to master data e.g. the taxonomy, names, time and spatial data;
5. The **Data Provider** gives the **Contracting Authority** the right to manage and further share, re-disseminate, the data it provides to NISN. This must be done according to the *Data Policy of National Information System of Nature* (*DPNISN*) and is based on agreement (see *Article 4*, point 2).

Obligations of the Contracting Authority

Article 6

The **Contracting Authority** is obliged to:

1. Provide tools and templates for simple sharing of the data including tabular format (Excel and similar) data upload and specific forms, including e-forms, to record and manage data;
2. Provide on-line access to share data with the NISN database, if appropriate;
3. Provide step-by-step guidance on how to use the tools for sharing and recording the data, if appropriate;
4. Provide tailor made training on providing data to NISN, ifappropriate;

5. Provide user identity management system for user authentication for authorised use of NISN.

Quality of data

Article 7

The understanding of the quality of the data is essential for all users and therefore it is agreed that:

1. The **Data Provider** is fully responsible for the accuracy and the quality of the entered data;
2. The quality of the data needs to be communicated in the metadata description by the **Data Provider**;
3. For each shared data, the **Data Provider** is obliged to enter information on the source of the data;
4. The **Contracting Authority** keeps the right to make a quality assessment of the data provided by the **Data Provider** and to classify the data accordingly to provide adequate information also for further users of the data.

Confidentiality

Article 8

The **Contracting Authority** shall not disseminate any information provided by the **Data Provider**, which is considered confidential by legal regulation or by e.g. owner's data policy on research data.

If data includes such confidential information, it should be specified and described in an *Annex* (Annex 3) to this contract.

Intellectual Property Rights

Article 9

The intellectual property rights of the data shall not be changed by storing the data in the NISB, i.e., the data remain under the ownership of the organisations and/or the individuals who possess them originally.

The **Contracting Authority** becomes a **Data Custodian** of all the data stored in NISN. The accumulation of data in NISN is based on shared information by **Data Providers**.

However, the data that is considered open data by the owner shall be shared publically by the **Contracting Authority** under the standard license Creative Commons 4.0 BY (https://creativecommons.org/licenses/by/4.0/).

The restricted-use classified data may be re-disseminated to a third party only based on a separate agreement with the **Contracting Authority** and for a specific purpose (see also *Article 4*, points 2 and 3).

For discovery of the owner of the data, see *Article 3*, point 3

Liability of damages

Article 10

The Contracting Authority shall manage the **Data Provider's** data with the same attention as it does

with its own data by applying the standard security measures of the organisation.

The Contracting Authority is not liable to any immaterial and indirect consequential damage caused to the **Data Provider** through using or sharing the data by **the Contracting Authority** unless it can be proven to have caused the damage due to negligence or willful misconduct.

Coming into force

Article 11

The *Agreement* will become effective on a date of the signing of this agreement and will be in force for here agreed period of time or an unlimited period of time.

The *Agreement* is effective from xx.xx.xxxx – xx.xx.xxx / an unlimited period of time

Termination of the Agreement

Article 12

The Agreement may be terminated immediately by mutual agreement.

The Agreement may be terminated in six-month time by the **Data Provider** with no specific rationale.

In case of termination of *the Agreement* by any reason, the data, which was already transferred to the NISN will not be removed or deleted since it may have been already used for a specific purpose, e.g. land use planning decision, and thus needed for a record.

Non-fulfillment of obligations

Article 13

If any problems in the implementation of this *Agreement* cannot be settled amicably, they will be resolved by a competent court in Skopje.

Force majeure

Article 14

None of the parties shall be responsible for matters, which have occurred not by their fault, but have influenced the realisation of the obligations of this *Agreement*.

In case of occurrence of such circumstances, both parties shall inform it the other party, in writing, describing the newly emerged circumstances and the actions that will be taken thereof.

Changes to this Agreement

Article 15

All changes to this *Agreement*, including the Annexes, need to be done in writing and need to be accepted by both parties.

This *Agreement* or the rights that it provides, cannot be forwarded to a third party, unless both parties accept of the changes in writing.

Article 16

The *Agreement* is made in 4 (four) copies, 2 (two) copies for each of the parties.

7. Signatures of the parties of this Agreement

List of Annexes

ANNEX II to the Rulebook on exchange of biodiversity data: Agreement On Using of Biodiversity Data of NISN

AGREEMENT

The Ministry of Environment and Physical Planning, Square "Presveta Bogorodica" No.3 Skopje, Republic of North Macedonia,

represented by_____(hereinafter referred to as the "**Contracting Authority**").

and

„_____ ", address_____,

represented by_____, (hereinafter referred to as the "**Partner**")

Subject of the Agreement

Article 1

The subject of this *Agreement* is to provide the **Partner** with access to copy, download and use biodiversity data, which is stored and managed at the National Information System for Nature of the Republic of North Macedonia (NISN).

The *Agreement* shall facilitate the proper use of essential biodiversity data, which is stored and managed at the NISN, including data classified as restricted-use data by the data owners.

The right to use the NISN managed data, including restricted-use data, is granted by signing of this *Agreement* by both parties.

The extent of the right of the **Partner** is listed in Annex 3 to this agreement.

Terms used in this Agreement

Article 2

Restricted-use data – Data that contain particularly sensitive or confidential information. Species data is typically classified as restricted-use, if there are evident reasons to believe that opening this information to public causes threat to the protection of the species. Another reason for restricted-use classification is typically research embargo based on the data policy of the research institute. Finally, the data owner may want

to restrict the use for any other rational and justified reason.

Data Policy of National Information System of Nature (DPNISN) – The policy describes the principles concerning the sharing of data stored in NISN. It will be openly available for anyone interested. The policy forms the bases for the **Contracting Authority** on
e.g. how the restricted-use data can be utilized by a party who have been authorised through this agreement with the **Contracting Authority**.**National Information System for Nature, NISN** – The NISN system is built to manage information concerning biodiversity, geodiversity, protected areas and related information
e.g. habitats and threatened species of North Macedonia. The NISN is governed and managed by the Ministry of Environment and Physical Planning. The data in NISN may include openly available data as well as restricted-use data.

Custodian of data – Data Custodians are responsible for the safe custody, transport, storage of the data and implementation of agreed terms with data owners. Data Custodians are also responsible for the technical environment and database structure of NISN.

Owner of data – Data owner holds all rights of the data including user rights, dissemination rights, and is protected by law regarding ownership.

Authentication – Event, where users identity is confirmed.

Data Provider – Organisation or a person who is sharing data for other organisations or persons. Data has to be under the ownership of the **Data Provider**.

Background

Article 3

The **Contracting Authority** is the responsible organisation in managing the NISN and it holds the full rights to use the data stored in NISN for fulfilling its legal obligations e.g. the reporting to all international agreements, which are ratified and also to EEA (European Environment Agency).

The **Contracting Authority** is a **Data Custodian** of all the data stored in NISN. The accumulation of data in NISN is based on shared information by the **Data Providers**. These provisions are based on bilateral agreements between the **Data Providers** and the **Contracting Authority**.

The **Contracting Authority** has the right to re-disseminate the data owned by the **Data Providers** required that the re-dissemination is in compliance with the *Data Policy of National Information System of Nature* (*DPNISN*) and that re-dissemination is based on an official agreement with the end-user i.e. the **Partner** to this *Agreement*.

Data Policy of National Information System of Nature (*DPNISN*) shall be presented as an *Annex* (Annex 1) to this *Agreement*.

Financing

Article 4

The activities triggered by signing this *Agreement* may include financial implications since activities may require resources from the **Contracting Authority**. The disseminated data has no monetary

value and thus is free of charge. The following list regulates the financial issues that may rise:

1. The dissemination of the data extracted from the NISN is free of charge for the **Partner,** if the process will not require evident resources' allocations by the **Contracting Authority**.
2. The required resource allocations will be notified to the **Partner** and will be *Annex*ed (Annex 2) to this *Agreement*.
3. The potential resources' needs are determined mainly by dissemination method required by the **Partner.** These methods may include e.g. data extract from the database in tabular format according to specific needs by the **Partner** or tailoring the user identification management system to correspond the agreed access rights for the **Partner.** These required methods shall beincluded to the *Annex* of the *Article 7* (Annex 3)*,* alongside with the description of the purpose to have an access to the data.

General conditions of the *Agreement*

Article 5

The Agreement includes general conditions that are relevant concerning both the **Contracting Authority** and the **Partner**:

1. The ownership of the data will not change in the process of dissemination of the data. All changes in relation to the ownership are subject to separate agreements between the data owner (in the case of NISN i.e. Data Provider) and the **Partner**.
2. Each collection of data (dataset) in NISN has an owner, who is specified and communicated in the metadata description of the data.
3. The annotations, updating the data, need to be done in the primary source of the information. If the NISN is the only data warehouse for the shared data, the annotations should be done in the NISN. If the data is already stored in another database, which is in active use as a primary data management system, the annotations need to be done in this system.

Authorised users of the data in NISN

Article 6

The use of the restricted-use data stored and managed in the NISN requires authorisation. The potential use of the restricted-use data are e.g. land use planning, research, sustainable use of natural resources and decision making. The authorisation is arranged by signing this Agreement between the **Partner** and the **Contracting Authority.**

The purpose of the use by Partner

Article 7

The purpose of the use of the data, based on the request by the **Partner** to **Contracting Authority**, must be documented and *Annex*ed (Annex 3) into this *Agreement*.

The Annex 3 needs also to specify the needed format of the data, to specify whether the appropriate means of using the data is e.g. a data file (tabular format) download or tailored access rights to NISN.

The extent of the use and specification concerning the requested data should also be included to the Annex 3.

The **Contracting Authority** takes the purpose of the use into the consideration and makes the decision accordingly also reflecting the decision with the *Data Policy of National Information System of Nature*.

The conditions of the use by Partner

Article 8

The **Partner** is obliged to obey all conditions of the use of the data, which they will have an access to through this *Agreement*. The conditions for data usage are as follows: The data must be solely used for the purpose described in the *Annex* (Annex 3) according to the *Article 7*.

1. The extent of the user rights are specified in the Annex 3.
2. If the condition in the Annex 3 specifies one-use only precondition, once used, the data needs to be removed, as appropriate, from the data storage of the **Partner** following standard security procedures.
3. If the data re-dissemination is based on the tailored user rights of NISN, the user is prohibited to share the right to anyone else by sharing the username, password on any other identification information to another person or organisation.
4. The data shall not be re-disseminated to a third party – with no exceptions.

Reporting of the usage by the Partner

Article 9

The **Partner** shall report to the **Contracting Party** of the use of the data obtained from NISN on yearly bases, or if the data is shared with one-time-use precondition, reporting should be done by the end of the following year from the re-dissemination event.

Reporting format template needs to be *Annex*ed to this *Agreement* (Annex 4).

Obligations of the Contracting Authority

Article 10

The **Contracting Authority** is obliged to:

1. Provide means for simple dissemination of the data including tabular format download (Excel and similar);
2. Provide on-line access to the NISN database, if so agreed according to the *Article 7* Annex 3;
3. Provide user identity management system for user authentication for authorised use of NISN restricted-use data, if so agreed according to the *Article 7* Annex 3;

4. Create a profile for the user(s) of the **Partner** to specify user access information and the extent of access rights for the data managed in NISN, if so agreed according to the *Article 7* Annex 3.

Quality of data

Article 11

The understanding of the quality of the data is essential for all users and therefore it is agreed that:

1. The **Partner** fully understands the limitations of the data quality;
2. If needed to guarantee certain quality level of the data, the **Partner** is obliged to ask support from the **Owner** of the data. **Owner**(s) are specified at the metadata description of the collection of the data (dataset).
3. The general quality of the data is communicated in the metadata description by the **Owner**;
4. The **Contracting Authority** may also classify the data as it finds appropriate and shall provide adequate information on the classification for users of the data.

Confidentiality

Article 12

The parties of this *Agreement* shall not disseminate any information provided by the other party, which is considered confidential by legal regulation.

Intellectual Property Rights of data

Article 13

The intellectual property rights of the data are not be changed by storing or disseminating the data in the NISB, i.e., the data remain under the ownership of the organisations and/or the individuals who possess them originally.

Each data used must pertain a reference of the primary source of the data, regardless of it being a person or an organisation. This reference should be included in a separate metadata description or e.g. an http-URI address as a permanent digital identifier for the document.

Liability of damages

Article 14

The Partner shall manage the data accessed with the permission according to this *Agreement* with the same attention as it does with its own data by applying the standard security measures.

The Contracting Authority is not liable to any immaterial and indirect consequential damage caused to the **Partner** for using the data from NISN.

Coming into force

Article 15

The Agreement will become effective on a date of the signing of this agreement and will be in force for here agreed period of time or an unlimited period of time.

The Agreement is effective from xx.xx.xxxx – xx.xx.xxx / an unlimited period of time

Termination of *the Agreement*

Article 16

The Agreement may be terminated immediately by mutual agreement.

In case of misconduct or disobedience of the conditions of this *Agreement,* each party may terminate the contract immediately.

Non-fulfillment of obligations

Article 17

If any problems in the implementation of this *Agreement* cannot be settled amicably, they will be resolved by a competent court in Skopje.

Force majeure

Article 18

None of the parties shall be responsible for matters, which have occurred not by their fault, but have influenced the realisation of the obligations of this *Agreement*.

In case of occurrence of such circumstances, both parties shall inform it the other party, in writing, describing the newly emerged circumstances and the actions that will be taken thereof.

Changes to this Agreement

Article 19

All changes to this *Agreement*, including the *Annex*es need to be done in writing, and need to be accepted by both parties.

This *Agreement* or the rights that it provides, cannot be forwarded to a third party, unless both parties accept of the changes in writing.

Article 20

The *Agreement* is made in 4 (four) copies, 2 (two) copies for each of the parties.

Signatures of the parties of this Agreement

List of Annexes

ANNEX III to the Rulebook on exchange of biodiversity data: Data Policy (DPNISN) of the data stored in the National Information System of Nature of the Republic of North Macedonia (NISN) managed by the Ministry of Environment and Physical Planning (MoEPP)

1. General

1.1. Purpose of the Data Policy of National Information System of Nature (DPNISN)

The National Information System of Nature (NISN) compiles North Macedonian biodiversity and related data in digital form into a data warehouse. Data contained in the NISN data warehouse, not classified as restricted-use data, is open and public information. Access to read and use data classified as restricted-use, requires a separate agreement with the requester of the data in question. This DPNISN describes also the principles the managing authority, the Ministry of Environment and Physical Planning (MoEPP) of the Republic of North Macedonia, complies with when agreeing on disseminating restricted-use data from the NISN data warehouse.

1.2. The National Information System of Nature (NISN)

NISN is a virtual centre administered by MoEPP. This policy is not intended to contradict the MoEPPs other policies, if any, on data management to direct the implementation of its statutory duties. In the event of conflicts, the data policy of NISN will be observed.

1.3. The DPNISN acts as binding guidelines for data management at NISN. It applies to all NISN data and those working with the data, persons employed by the MoEPP and persons in any contractual relationships with the MoEPP. In addition, all persons with access to data management at NISN through user rights granted to them will be bound to observe this policy.

1.4. NISN embraces the European FAIR data principles (FAIR - Findable, Accessible, Interoperable, Reusable; Wilkinson (2016)) but also incorporates specific restrictions stemming from national legislation, researchers' needs, and data owners' requirements. This is done through classification of the data as regards to openness and then agreeing on disseminating restricted-use data from the NISN data warehouse, using the principles derived from this policy.

2. Definitions of terms of Data Policy of NISN

This data policy employs the following terms with the following meanings:

Data refers to entities consisting of individual records stored in digital form. The number of records can vary from a handful to millions; they can include text, numbers, photographs, audio or comparable content, as well as related metadata.

Information (data) system refers to a system based on one or more electronic databases in the service of activities meeting particular needs through data management. Information systems consist of information and rules for managing the information, related personnel and equipment resources, as well as data transfer equipment and operational instructions. Systems may include information from other data systems.

NISN information system refers to the information system maintained by the MoEPP. The system may be programmed either by the MoEPP staff or programming may be acquired from or provided to the MoEPP by an external party.

Metadata refers to information describing datasets, such as description of the content, method and time of creation, as well as the collector of the dataset, etc.

Primary dataset *(primary copy)* refers to the original copy of the dataset that will be kept up to date. This version has metadata and an owner.

Secondary dataset *(secondary copy)* refers to a complete or partial copy of the primary dataset, which will not kept up to date.

Data- /Dataset creation describes the manner or method in which data and datasets sets are compiled into target systems and the related processes.

Data / Dataset maintenance refers to keeping data up to date and available for use. For primary datasets, updates will be made immediately visible in the storage system. For secondary datasets, outdated data will be replaced with up-to-date data in new copies.

Dataset type refers to datasets that are typically the result of a single process, including individual and descriptive metadata. This concept can be used to specify principles: a certain dataset type includes data covered by the same principles.

Data updating refers to amending the original data contained in the primary dataset, in other words replacing information with new or corrected information either partially or completely.

Openness of data refers to content not classified as restricted-use being open for anyone for any purpose, as long as access right principles, such as attributing sources in accordance with good scientific practice, are observed. Openness can be restricted by user licenses and confidentiality criteria

3. Acts, regulations and policies guiding Data Policy of NISN

The Data Policy of the NISN is guided by the same acts and obligations as the MoEPP.

In this Data Policy, MoEPP complies with policies, strategies and programmes related to the open access to digital data agreed upon both at national and international levels including the EU, specifically the policy to increase the openness of data by the Republic of North Macedonian Government.

Other regulations that have an effect on NISN Data Policy are the following acts and regulations concerned with online services and government as well as related to the creation, use, distribution, utilisation and storage of digital data:

EXAMPLES: Nature Conservation Act, the Administrative Procedure Act, the Act on Information Management Governance in Public Administration, the Personal Data Act, the Act on Electronic Services and Communication in the Public Sector, the Act on Electronic Signatures, the Archives Act, the Act on Collecting and Preserving Cultural Material and copyright regulations.)

The Data Policy of the NISN also takes into consideration the policies in North Macedonian legislation and strategy influenced by the EU's PSI (Public Sector Information) and the INSPIRE (Infrastructure for Spatial Information in Europe) directives.

4. Scope of Data Policy of NISN

The Data Policy covers all data managed by NISN. Datasets are received for management, storage and distribution on the basis of agreements.

The following types of datasets may be included:

1. Monitoring and mapping data: data compiled, combined and processed in order to produce maps or statistics, or to implement monitoring
2. Observation data without collection specimens
3. Spatial and location data related to dataset types such as collection and observation locations or regions, location within collections, etc.
4. Material documenting collection specimens or observations, such as photographs, audio recordings, drawings, etc.
5. Nomenclatures and taxonomic hierarchies
6. Results of scientific measurement and classification
7. Data on collection specimens; collection specimens include complete organisms, macro- or microscopic parts of organisms, tissue samples or DNA, and fossils.
8. Data on collections that contain strains of living plants, fungi or microbes; strains may consist of one or more individual specimen or growth, or several specimens or growths produced by a single seed or spore lot, or a vegetative reproduction or propagation event. These may be in various states of their lifecycle (for example, spore, seed, seedling, full-grown).
9. Various analysis results: sample dating results, isotope ratio and element composition assays, DNA sequences and genotype assays, etc., and related process knowledge
10. Personal data related to dataset types listed above, such as name and organisation of the data producer, contact details, etc.

5. Goal of Data Policy of NISN

The general goal of the DPNISN is to promote the usability and use of data managed by NISN in support of research, education, administration, nature conservation, business life and society.

In order to reach this goal, the policy strives to promoting actions to

- create consistent practices for storing, publishing and distributing data;
- ensure that primary copies, or updatable versions of data (also known as master copies), are available for all data in electronic form with metadata and owner details attached;
- enable the distribution of biodiversity datasets for open use as quickly, efficiently and exhaustively as possible;
- increase cooperation between data collectors, creators and users.

The data policy steers the MoEPP staff and that of its contracting partners in managing and handling data received and shared by NISN. It also contributes to different parties observing consistent principles when submitting and using data. By defining principles of data management and distribution, the policy indirectly improves the quality of data.

6. Principles of data creation, maintenance and use

Data creation

Secondary datasets are stored (copied) into the data warehouse of the National Information System of Nature from primary dataset sources. Copying is based on written agreements made between source material owners. Existing data is transferred to NISN either automatically, through data transfer interfaces to be programmed in the future or by utilising other efficient methods. New data is accumulated into NISN either from the primary dataset storage systems of its contracting partners or the primary dataset storage systems that will be established as part of NISN's services. Secondary copies will be stored in the NISN data warehouse either as scheduled or in real time, depending on the dataset in question.

Data is owned by the organisation or the person identified as its creator. Transferring data to NISN for storage and distribution does not affect the ownership of the data. Data ownership refers to the right to make decisions on data use and transfer to the NISN data warehouse. The managing authority of NISN, MoEPP, becomes a data custodian to the data stored in NISN data warehouse. This is arranged with a separate data transfer agreement.

Dataset maintenance and storage

Shall the NISN establish primary dataset storage systems as part of NISN's services, the primary data they manage are treated the same way as any other data copied from other primary sources.

Only non-updatable secondary copies of all primary datasets will be stored in the NISN data warehouse irrespective of their ownership, management or updating responsibilities. Data management and storage will be conducted in accordance with decisions and instructions that comply with the acts, regulations and policies listed in chapter 3 of the data policy.

Copies of biodiversity data transferred to the NISN data warehouse will be standardised with the NISN master databases primarily before storage. Among other things, the master databases include the national nomenclature and taxonomic data.

A metadata listing distributed through public websites will be maintained for datasets. Information on new datasets will be added to the list no later than after the data is completed, at the time of data transfer or, in the case of datasets compiled continuously, without delay after data transfer to the NISN systems has begun.

Data usage

As a rule, digital data managed by the National Information System of Nature is public and free to use, open data. As a rule, data is shared in compliance with the principles set by the Creative Commons licenses [?]. Selection and implementation of CC licenses [?] is conducted in accordance with agreements made with data owners. Data publication will be conducted in accordance with decisions and instructions that comply with the acts, regulations and policies listed in chapter 3.

Data managed by NISN may include data classified as restricted-use on the basis of either general legislation [?] or decisions made by the MoEPP or as agreed in the agreements with data providers. Availability of and access to restricted-use material is limited and subject to agreement.

In connection with the establishment of the NISN, a national and binding decision in principle containing general policies for availability and access restrictions, as well as a list of sensitive species [?] in North Macedonia, will be drafted.

Openness can be restricted in several ways, the most common of which is making location data less specific. Access to data dependent on time or related to a location other than the observation location, such as overwintering or nesting sites, can be restricted with good reason.

NISN may have datasets whose openness and availability is restricted by the request of data owners. The rights related to sharing this type of data are also defined in accordance with the user access rights stated above on a case-by-case basis. The MoEPP will evaluete carefully all data requests concerning restricted-use data in NISN, and apply the principles of this data policy. As a rule, the requester will be asked to clarify the rationale behind the request, to specify the needs for data, to specify the form and means the data should be delivered, to set the timeframe for the data usage. Also the requester needs to agree for not using the data for any other purpose than what was specified and in addition there is absolute ban for re-dissemination of the received data. The process is finalised by signing of mutual agreement between the MoEPP and the requester, in which all above principles are detailed.

The MoEPP decides, depending on the data requester's need, what is the most suitable means to share the requested data. The means vary from one-time download as tabular format to tailored access rights to NISN service.

Data will be stored in the NISN data warehouse in the form they were received in from the data owners. The restrictions stated above will only come into effect when data is transferred from the data warehouse to the public service of the NISN website and made available for use. In regards to the restricted-use categorised data, the managing authority MoEPP has an unlimited access to the data for official duties.

Data openness must not violate data protection. Restrictions to the openness of data and their justification are described in the metadata. Open data is made available to the academic community, public administration, organisations, businesses and private citizens for free use through the NISN portal (nisn.gov.mk), managed by MoEPP. Other public distribution channels for open data may be established.

The open and public nature of NISN data is promoted by sharing data and metadata from the data warehouse for publication in the Global Biodiversity Information Facility portal and other similar services.

7. Responsibilities

***Drafting, updating and administering the** DPNISN*

Decisions on the organisational structure of NISN will be made as part of the project which is in charge of the realisation of NISN. Drafting, updating and managing the DPNISN will be conducted in accordance with the future organisational structure as well as decisions concerning related responsibilities.

The MoEPP is responsible for maintaining the data policy. The policy will be managed as part of the NISN enterprise architecture [10]. The MoEPP will review update needs annually. In addition, the MoEPP will evaluate the compatibility of the policy with corresponding partner policies.

REFERENCES

[?] Sensitive data refers to data that the public is restricted from. Access to this data is limited to certain individuals, groups or organisations only. Sensitive classification is based on the assumption that publishing the data in question may harm that which it concerns. Link to the list: http://...

[?] https://creativecommons.org/licenses/by/4.0/deed.en

[?] https://creativecommons.org/licenses/?lang=en

Annex I: Example of a field form drafted for inventory of open habitats - grassland, heath and schrub

Inventory form MOEPP / Open habitats - grassland, heath and schrub

Annex I name: **Code: 62D0**

EUNIS name: **EUNIS code(s):**

General information

Name, surname		**Site / plot / polygon nr.**	
Date		Polygon coordinates (WGA 84)	
Altitude (masl).		**Corner N:E**	
Vegetation type(s)		**Size (ha)**	

Projective vegetation coverage estimation (0-100%)	
Trees	%
Shrubs	%
Grasses	%
Herbs	%
Mosses	%
Lichens	%
Bare soil	%
Litter	%
Rocks	%
Boulders, stones	%

Disturbances of soil no - 0, extensive – 1,	
Fire	
Trampling	
Trails	
Roads	
Animal disturbance	
Other/Comments (point out)	

Way of current use no - 0, extensive – 1,	
Mowing	
Grazing	
Woody vegetation removal	

Human disturbance	
Ditches (Y/N)	
Buildings (Y/N)	
Excavations (Y/N)	
Dumping places (Y/N)	

Overgrowt	**Allien species**	**Position in relief forms**

no - 0, slow – 1, moderate – 2, intensive - 3	
Trees	
Bushes	
Schrub	
Grasses	
Other/Comments (point out)	

Species	Coverage /abundance if possiblre
	%
	%
	%
	%
	%

Slope exposition (N, NE, E, SE, S, SW, W)	
Incline (°)	

Threats

extensive – 1, moderate – 2, intensive - 3

Code	Point	Code	Point

General remarks

Species, abundance

Remarks on species values (all species groups)	
Annex II and IV species	
Annex V species and other species with commercial and/or medicinal	
Balkan and Nationsl Endemic / Red listed species	
Other important species	

Recommended conservation actions	
Type of action	Detailled description (intensity, extent,continuity of action)

Removal of schrubs and trees	
Grazing /mowing	
Other actions / conservation measures needed at the site to maintain and improve ecosysten servises of this particular site7habitat	

Representativity of site 1 = excellent, 2 = good 3 = average (slightly degraded) 4= bad, degraded, restoration impossible	
Structure	
Function	
Restoration possibilities	
Typical species composition	
Overall representativity of site/habitat **A: excellent** **B: good** **C: significant** **D: non-significant**	

Annex II: Example of a field form drafted for inventory of forests and other wooded habitats

Inventory form MOEPP / Forests and other wooded habitats

Name: **Code:**

EUNIS name: **EUNIS code(s):**

General information

Name, surname		**Site / plot / polygon nr.**	
Date		Polygon coordinates (WGS84)	
Altitude (masl).		**Corner N:E**	
Vegetation type(s)		**Size (ha)**	

Projective coverage of vegetation (0-100%)	
Tree layer	%
Scrub layer	%
Grass cover	%
Herb cover	%
Moss cover	%
Lichen cover	%
Bare soil cover	%
Litter cover	%
Rock cover	%
Stone /Boulder cover	%

Coarse dead wood (>20 cm) estimation per hectare or (1- single, 2- scarse, 3- abundant)	
Dead tree	
Snag	
Log	

Old alive trees (underline)	**Multiaged stand** (underline)
No, Single, Scarse, Abundant	Yes No

Logs at different decay stages estimation per hectare or (1- single, 2- scarse, 3- abundant)	
I stage	
II stage	
III stage	
IV stage	
V stage	

Openings (Y/N)	
Fire marks (Y/N)	
Natural regeneration (Y/N)	

Stand age (years)	

Soil disturbances no - 0, minor – 1, moderate – 2, intensive - 3	
Trampling	
Trails	
Roads	
Animals	
Other	
Selective cuttings	
Clearcuts	

Allien species	
Species	Coverage

Position in relief forms	
Šlope exposition (underline)	N, NE, E, SE, S, SW, W
Incline	o
Drainage (Y/N)	

Threats minor – 1, moderate – 2, intensive - 3	
Code	Point

Code	Point

Remarks

Tree species, layer (c=canopy, i=intermediate, s=sapling), abundance

Species	**Layer**	**%**

Species	**Layer**	**%**

Species	**Layer**	**%**

Species	**Layer Ardas**	**%**

Species	**Layer Ardas**	**%**

Species, abundance (1-5)

ACTA SPI								
ALLI URS								
ANEM RAN								

Recommended conservation / restoration actions	
Type of action	Detailled description (intensity, extent,continuity of action)
Support of certain tree species based on management plan	

Increase of natural structures and regeneration	
Other actions / conservation measures needed at the site to maintain and improve biodiversity and ecosysten services of this particular habitat	

Remarks on species values (all species groups)	
Annex II and IV species	
Annex V species and other species with commercial and/or medicinal	
Balkan and Nationsl Endemic / Red listed species	
Other important species	

Representativity of site 1 = excellent, 2 = good 3 = average (or slightly degraded) 4= bad, degraded, restoration impossible	
Structure	
Function	
Restoration possibilities	
Typical species composition	

Overall representativity of site/habitat **A: excellent** **B: good** **C: significant** **D: non-significant**	

Annex III: Example of a field form drafted for inventory of threatened species (vascular plants)

FIELD OBSERVATION SHEET OF THREATENED SPECIES Macedonia / MOEPP	**VASCULAR PLANTS**
Species (scientific name):	
Code (habitat directive)	
Date:	
Name::	
Address:	
Phone;	
First visit (yes/no)	
Monitoring visit (yes/no)	
LOCATION	
Site name:	
Province:	
Municipality:	
Village:	
Name of protected area:	
Code of area:	
Land-owner (private/public/unknown):	
Name:	
Real estate number:	
Description of location:	
Altitude (m.a.s.l.):	
GPS coordinates: (WGS84, lat, lon)	
GPS polygon(s):	

SITE DESCRIPTION	
Habitat type:	
Code:	
Precise location:	
Extent of suitable habitat:	
Description of habitat:	
Accompanying common/typical species:	
Competing species:	
Alien species:	
Rare/threatened species:	
CONSERVATION MEASURES	
Threat factors at site:	
Recommendations for restoration and management:	
Comparison to earlier inventory(ies), changes:	
POPULATION CHARACTERISTICS	
Area of population (m^2/ha):	
Nr. 1 x 1 m grid occupied by species:	
Number of adult individuals (vegetative, generative)	
Seedlings observed:	
Condition of adult individuals:	
Phase of flowering:	
Previous year individuals (present/not/amount):	
Herbivory present (degree):	
Fungal infections present (degree):	
Earlier information on population:	

OTHER INFORMATION	
specimens collected + location:	
photos (by whom and where stored)	
free comments:	
SPECIES WAS NOT OBSERVED IN MONITORING	
Site has been disappeared	
How:	
Site has been changed	
How:	
Species was not found:	
Because:	
OTHER INFORMATION:	

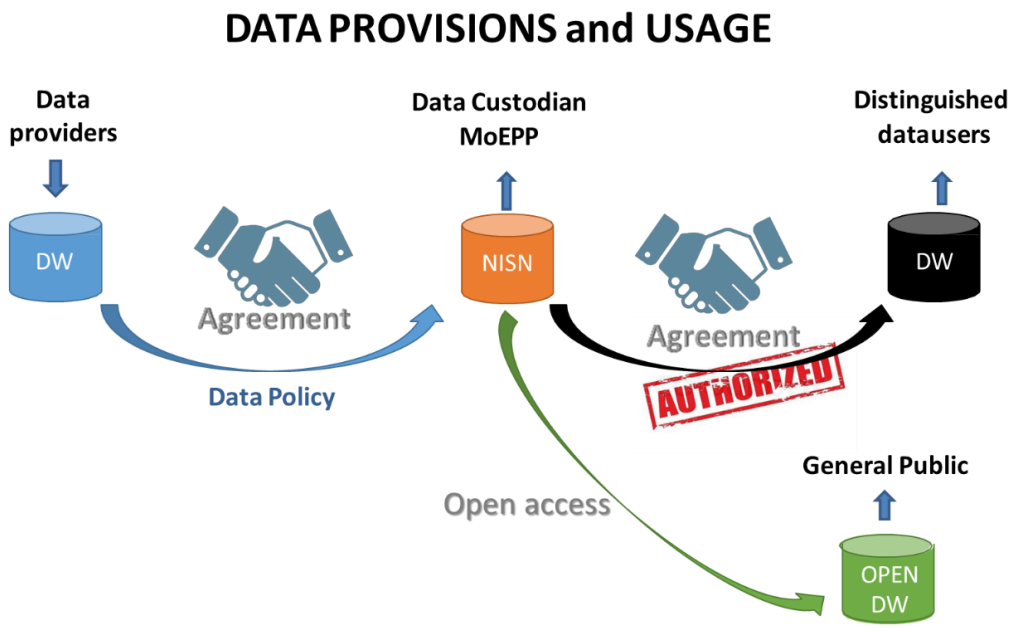
compare to: http://www.ymparisto.fi/fi-FI/Luonto/Lajit/Uhanalaiset_lajit/Maastolomakkeet

Annex IV: Recommendations on practical steps forward in efficient and effective establishment of NISN

As for next steps forward regarding the establishment and implementation of NISN, the following are recommended:

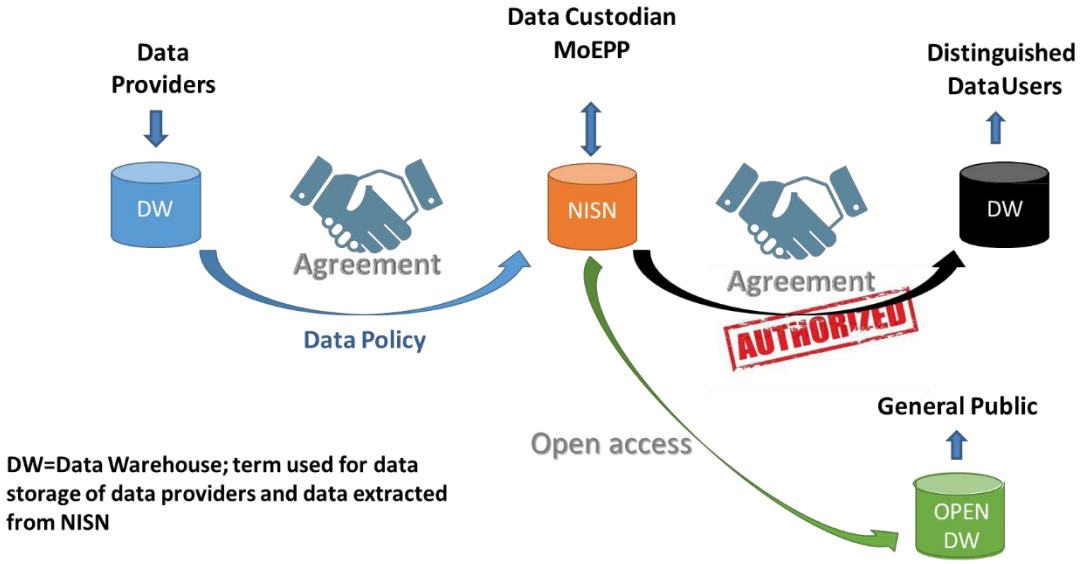
- To increase knowledge and add capacity of MoEPP staff regarding GIS applications, their everyday use and the associated software management
- To investigate and evaluate the available open access applications on biodiversity data management and their applicability to the conditions in North Macedonia, and to estimate the potential in developing NISN based on such an existing open access application
- To investigate and evaluate similar applications used in nature protection organizations in other countries to estimate the potential in developing NISN based on some relevant international (commercial) example
- To define the first level structure of the system (ie. which modules should be included from the start in it)
- To define the first level data content of NISN as for the basis of establishment of the system
- To negotiate between stakeholders (eg. future data providers and distinguished data users) how to establish and implement the system, and to discuss about the procedures of data provision and usage

Annex V: NISN graphs

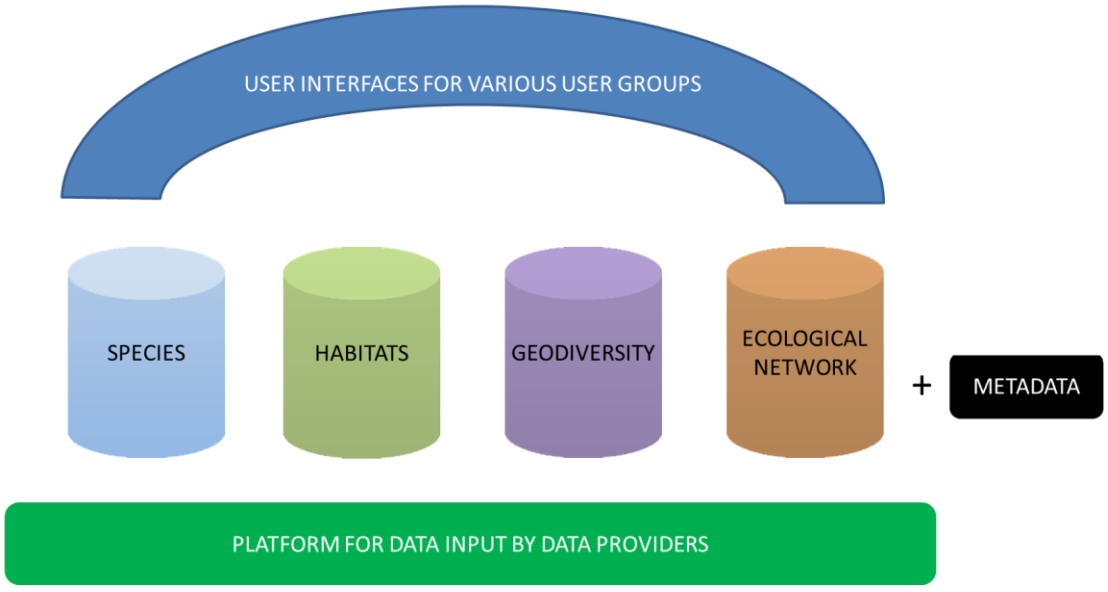


DW=Data Warehouse; term used for data storage of data providers and data extracted from NISN

FOUR USER GROUPS OF NISN

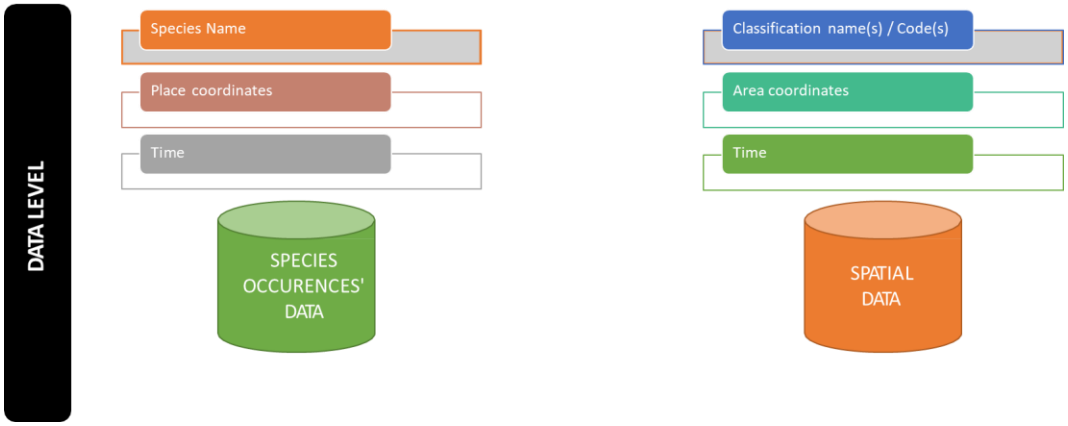


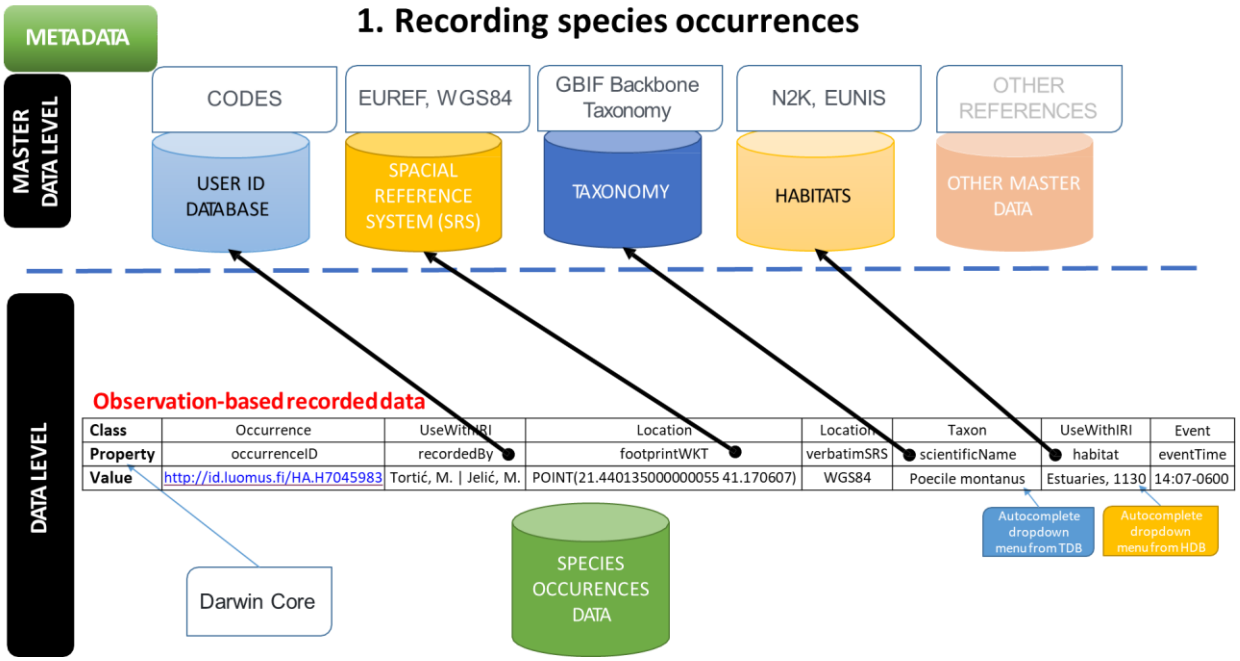
BASIC CONCEPT MODEL OF DATA AND ITS INPUT & OUTPUT IN NISN



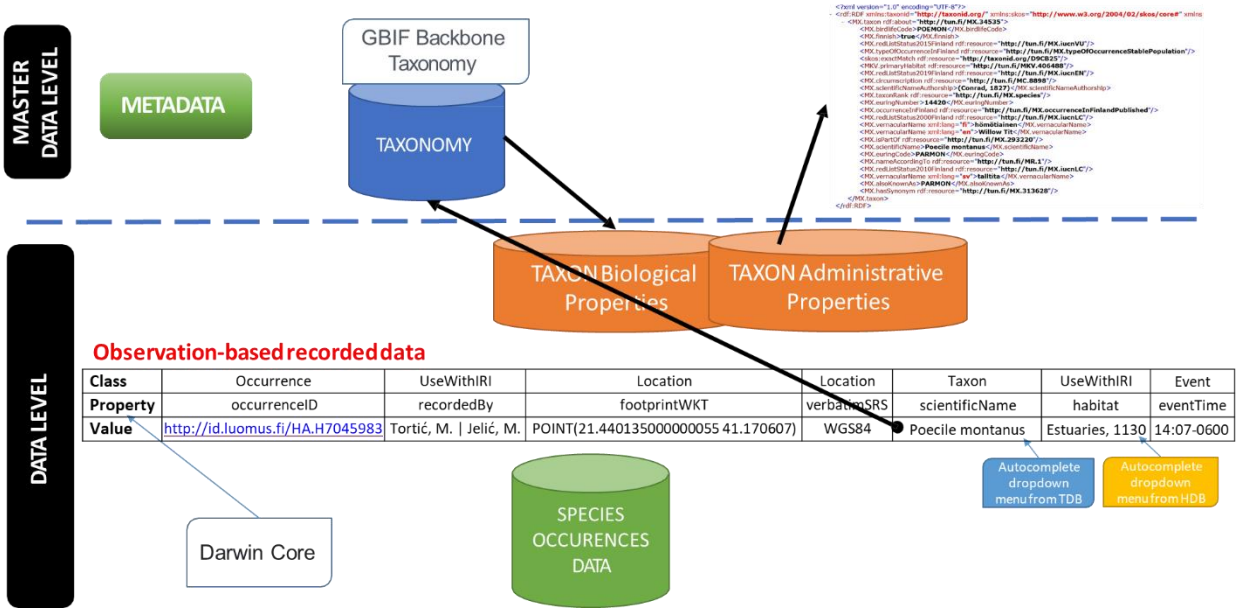
DATA MANAGEMENT in NISN

Essential Properties



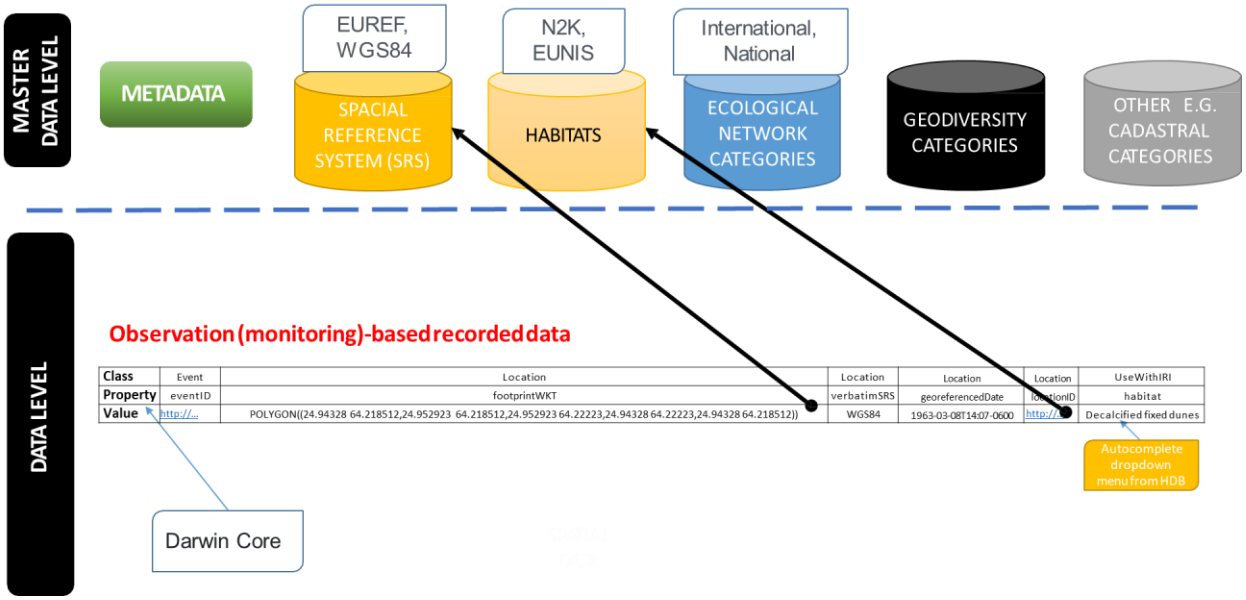


1. Recording species occurrences

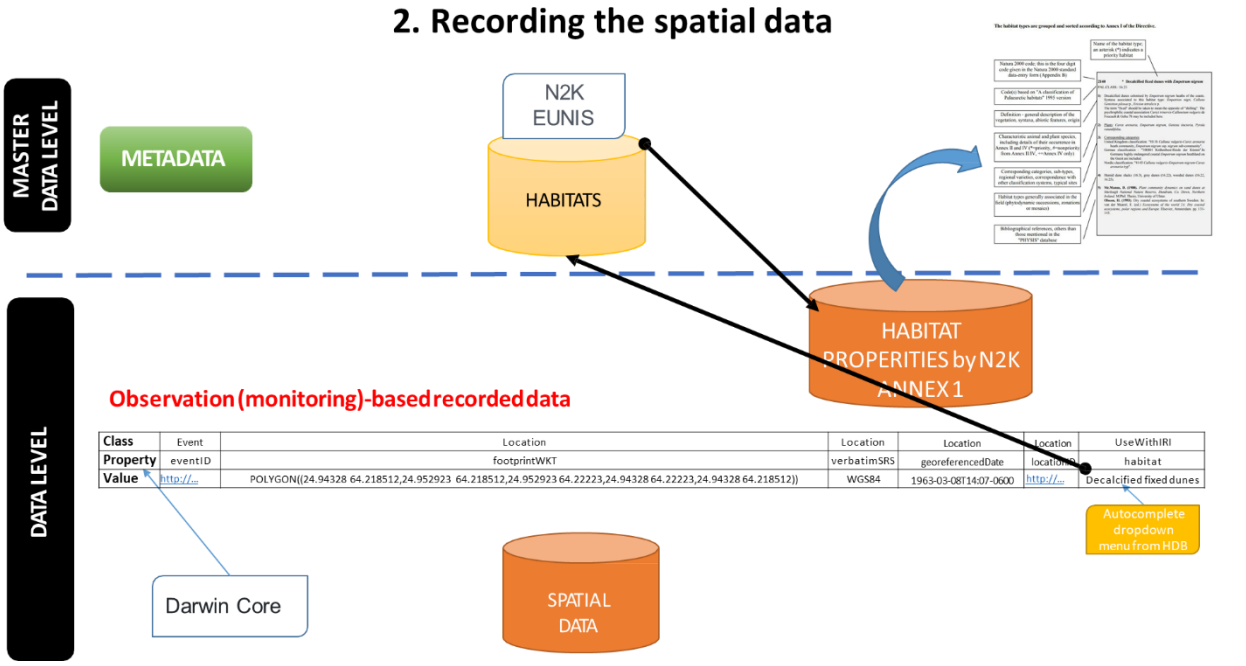


1. Recording species occurrences

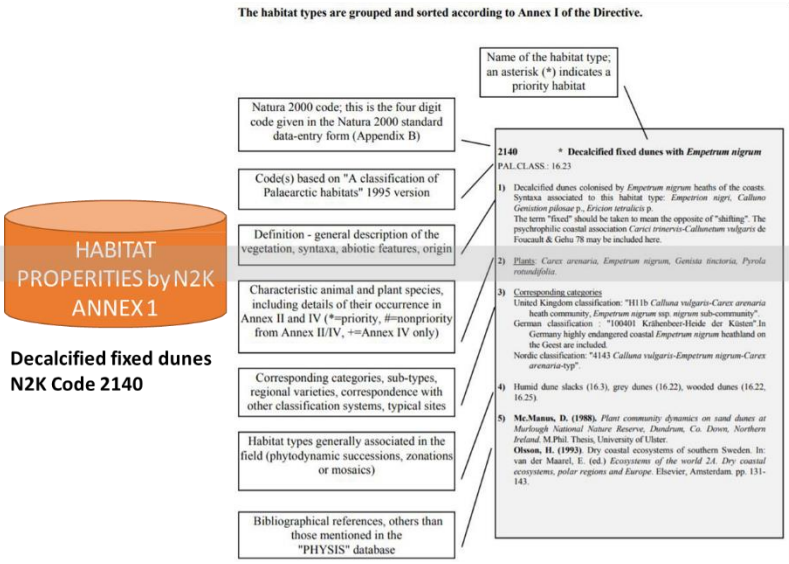
2. Recording the spatial data



2. Recording the spatial data



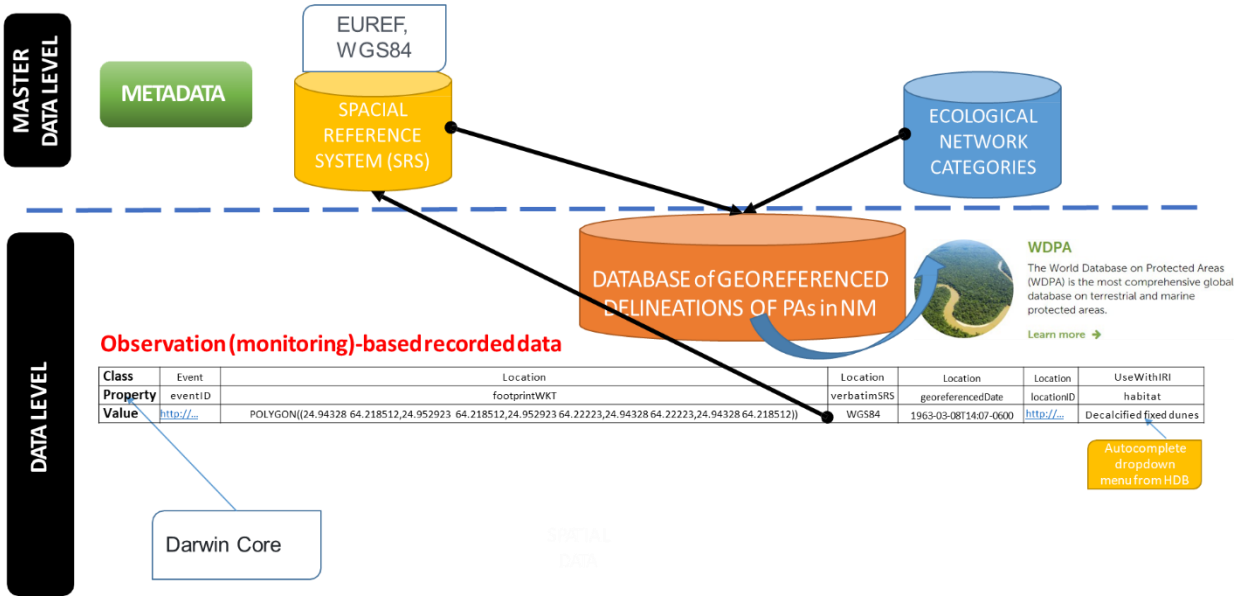
2. Recording the spatial data



Decalcified fixed dunes

- N2K Code and its bases
- Definition – general description
- Associated species
- Corresponding categories like "United Kingdom classification"
- Primary Habitat
- Associated habitat types
- Vernacular and other known names
- References
- Etc.

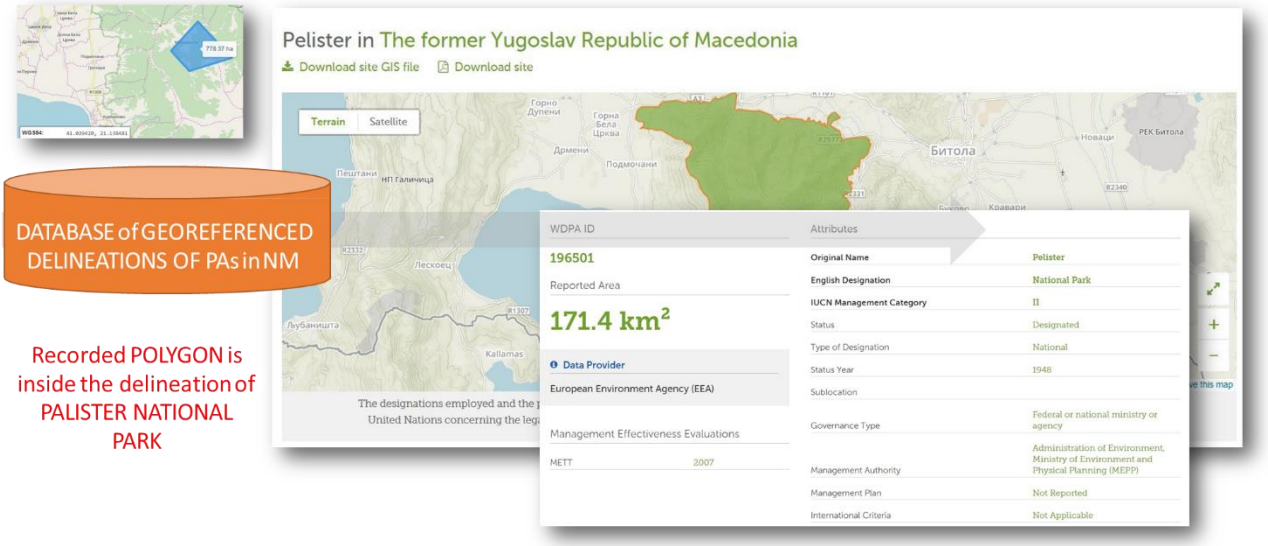
2. Recording the spatial data



2. Recording the spatial data

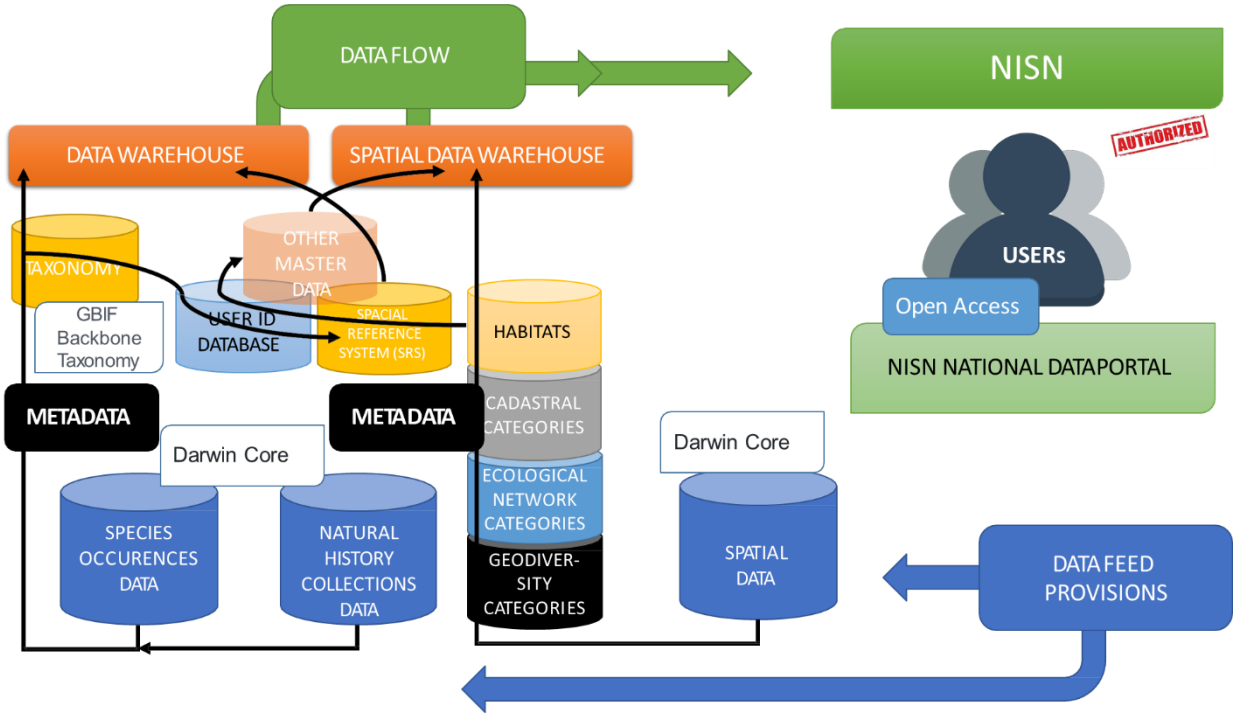
POLYGON((21.139769
41.046491,21.117099999999937
41.027821,21.13221199999998
41.014852,21.168620000000033
41.023153,21.139769 41.046491))

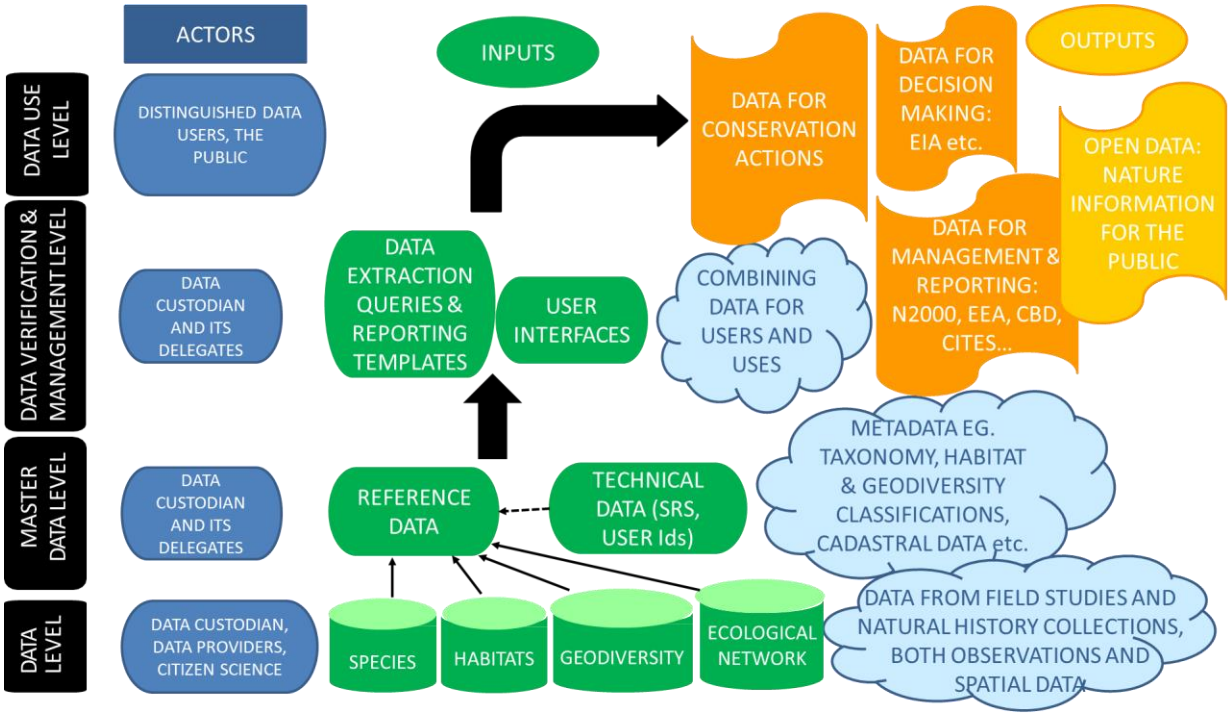
https://www.protectedplanet.net/pelister-national-park

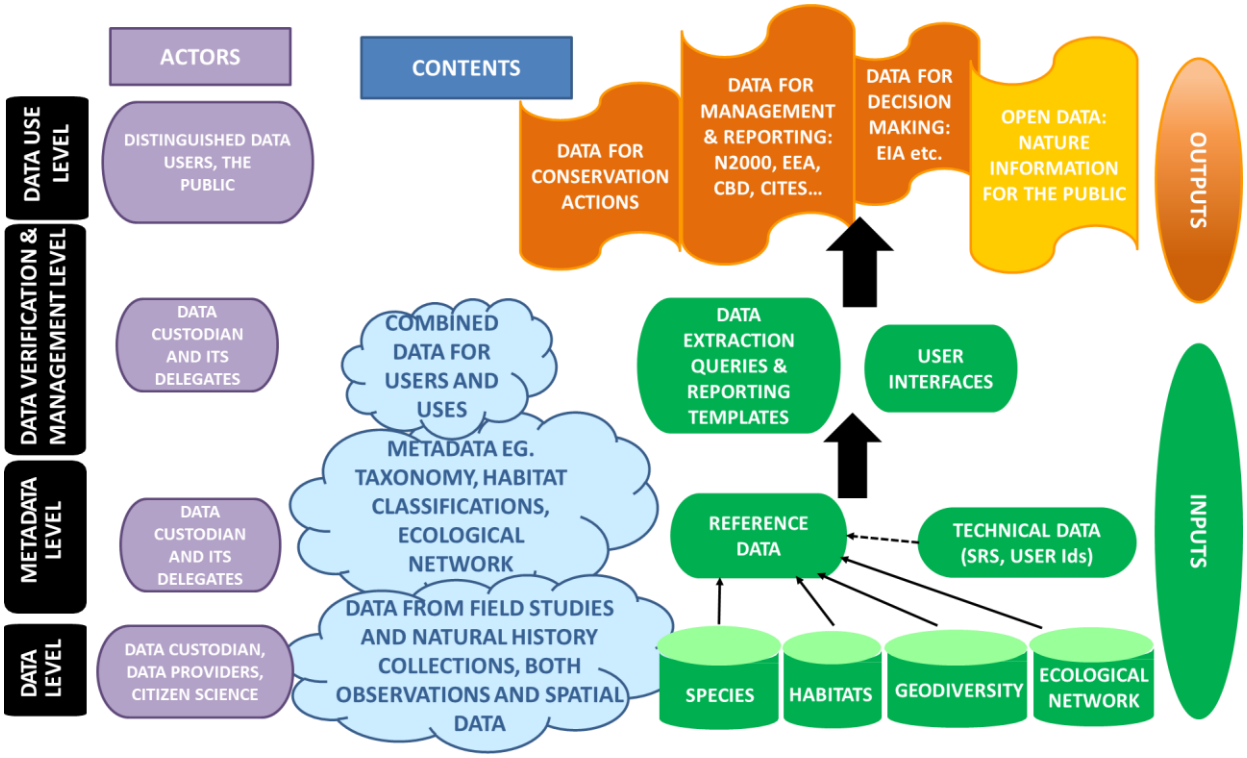


DATABASE of GEOREFERENCED DELINEATIONS OF PAs in NM

Recorded POLYGON is inside the delineation of PALISTER NATIONAL PARK




ACTORS
INPUTS
OUTPUTS
DATA USE LEVEL
DISTINGUISHED DATA USERS, THE PUBLIC
DATA FOR CONSERVATION ACTIONS
DATA FOR DECISION MAKING: EIA etc.
OPEN DATA: NATURE INFORMATION FOR THE PUBLIC
DATA VERIFICATION & MANAGEMENT LEVEL
DATA CUSTODIAN AND ITS DELEGATES
DATA EXTRACTION QUERIES & REPORTING TEMPLATES
USER INTERFACES
COMBINING DATA FOR USERS AND USES
DATA FOR MANAGEMENT & REPORTING: N2000, EEA, CBD, CITES...
MASTER DATA LEVEL
DATA CUSTODIAN AND ITS DELEGATES
REFERENCE DATA
TECHNICAL DATA (SRS, USER Ids)
METADATA EG. TAXONOMY, HABITAT & GEODIVERSITY CLASSIFICATIONS, CADASTRAL DATA etc.
DATA LEVEL
DATA CUSTODIAN, DATA PROVIDERS, CITIZEN SCIENCE
SPECIES
HABITATS
GEODIVERSITY
ECOLOGICAL NETWORK
DATA FROM FIELD STUDIES AND NATURAL HISTORY COLLECTIONS, BOTH OBSERVATIONS AND SPATIAL DATA


ACTORS
CONTENTS
DATA USE LEVEL
DISTINGUISHED DATA USERS, THE PUBLIC
DATA FOR CONSERVATION ACTIONS
DATA FOR MANAGEMENT & REPORTING: N2000, EEA, CBD, CITES...
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METADATA LEVEL
DATA CUSTODIAN AND ITS DELEGATES
METADATA EG. TAXONOMY, HABITAT CLASSIFICATIONS, ECOLOGICAL NETWORK
REFERENCE DATA
TECHNICAL DATA (SRS, USER Ids)
INPUTS
DATA LEVEL
DATA CUSTODIAN, DATA PROVIDERS, CITIZEN SCIENCE
DATA FROM FIELD STUDIES AND NATURAL HISTORY COLLECTIONS, BOTH OBSERVATIONS AND SPATIAL DATA
SPECIES
HABITATS
GEODIVERSITY
ECOLOGICAL NETWORK

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Bibliography and further reading

Birds Directive: Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version of Directive 79/409/EEC as amended)

Habitats Directive: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Also available the consolidated version of 1 January 2007 with the latest updates of the annexes)