BISON

BIODIVERSITY AND INFRASTRUCTURE SYNERGIES AND OPPORTUNITIES FOR EUROPEAN TRANSPORT NETWORKS

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TABLE OF ABBREVIATIONS

Abbreviation	Meaning
BBOP	Business Biodiversity and Offsets Programme
CIEEM	Chartered Institute of Ecology and Environmental Management
EIB	European Investment Bank
EU	European Union
GF	Gravity Factor
IUCN	International Union for Conservation of Nature
MAMCA	Multi Actor Multi Criteria Analysis
MS	Member States
NGO	Non-Governmental Organisation
STRIA	Strategic Transport Research and Innovation Agenda
UNEP	United Nations Environment Programme
WCPA	World Commission on Protected Areas

EXECUTIVE SUMMARY

The BISON project is led by a consortium of 39 European members and associated countries. It aims to tackle the integration of biodiversity with the development of transport infrastructure, including roads, railways, waterways, airports, ports, or energy transport networks.

Within the BISON project, WP3 has the overall objective to **identify and describe current good practices** and new technologies including nature-based solutions to be deployed to mainstreaming biodiversity in existing and future transport infrastructures. The identification of new emerging trends to be addressed in the present scenario of climate change and its effects on biodiversity and transport is also envisaged. The compilation of practices and recommendations to guarantee the user's safety and infrastructure resilience as well as contributing to achieve the UN Sustainable Development, the European Green Deal and the EU Biodiversity Strategy for 2030 Goals are main focus of this WP. Moreover, its outputs will encourage the cooperation between European countries to design and operate transport infrastructures that will reduce or even avoid impacts on biodiversity through e.g. traffic related mortality, habitat loss and fragmentation and environmental pollution, while enhancing infrastructure green areas to promote ecosystem functions such as creating suitable habitats for biodiversity and reconnecting populations. These relate to the effects of global warming but also to pathogen spread, technical innovations and socio-political and economic constraints that are expected to alter chances to maintain infrastructure efficiency and ecosystem services.

This Deliverable (D3.1): "*Report on principles and criteria to select good practice*" of the BISON project is the first deliverable produced in the context of this WP3 – *Existing and future synergy between Infrastructure and Biodiversity.* This report presents the methodology and the process used in the BISON project to evaluate and weight information about technology, methods, processes and thus to identify good and best practises among currently implemented in the participating countries.

Emphasis is given to the criteria and principles that have been defined and will be used for the identification of good practices, their evaluation process by internal and external experts and the conclusion to a list of respective best practices.

In the following sections, the creation of a glossary is begin described (Section 2.1) dedicated to the main terms used in WP3 and Task 3.1 but also used for the needs of the whole BISON project, while the description of the methodology that is used in the context of this Task for the identification of the good practices and the criteria that are going to be applied for narrowing them down to the final list of the best practices follow (Section 0).

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1. INTRODUCTION

Europe is connected by an extensive transport network of highways, roads, railroads, waterways, cycling paths, air and sea routes complemented with energy transportation infrastructures such as powerlines and pipelines. These transportation networks compose a common feature of European landscapes, they connect people and provide access to essential services and resources. Transportation promotes economic activity and is often associated with economic development. Improving the connection of a city or a region to a large trade and transportation network can boost the local economy and create new jobs.

However, increasing economic activity is often observed in the main connected zones. It also often comes with the negative environmental impacts of human settlements. The transportation networks not only provide goods and services to people, but also shape and influence the surrounding environment. Usually, once the region achieves a certain level of connectivity, any additional transport infrastructure does not provide the same benefits (i.e. decreasing the economy of the small areas alongside the transport infrastructure and only benefiting to the main urban areas newly connected). But it may have a significant impact on the environment, especially biodiversity, by introducing for example invasive alien species into ecosystems causing wildlife mortality, and creating barriers between natural areas. Transport networks can also promote development of urban and other artificialized areas to relatively rural and less populated areas in Europe, putting pressure on natural habitats. The construction of large transport projects such as the Suez Canal can change the key characteristics of the entire ecosystem. Since the canal was built, more than 500 alien marine species have been introduced into the Mediterranean Sea [Zenetos, et al., 2021].

All man-made infrastructure networks (roads, railroads, waterways, powerlines and pipelines) can create barriers and divide the natural landscape into smaller isolated areas. Multi-lane highways through natural areas provide physical barriers to flora and more particularly to fauna. In addition it reduces the total area surface available to wildlife, that mainly affects the widest range territory species, and combining with the lack of connectivity between different habitats, it makes these populations more vulnerable. Animals need to move to find food resources or breeding partners, and to adapt their ranges to new conditions created by climate change. They are at risk of being injured or killed when trying to cross roads or rails (the transport network is here considered as a filter and not a barrier to some species). Even fences bordering transport networks to prevent animal road kills, without fauna passages crossing the transport infrastructure, can sequester populations of certain species in ways that limit the gene pool, and eventually increasing their extinction probability.

Transport also generates pollutants that can extend beyond the scope of the transport network (e.g., . concentrations of particulate matter, ozone, nitrogen dioxide or heavy metals that can affect humans, plants and animals health). Some areas, such as mountainous areas, coastal areas, wetlands and the sea, can be particularly vulnerable to traffic pollution. Similarly, oil spills and the release of harmful substances into the ocean can cause serious damage to marine life. Recognizing these risks, many measures have been taken at the European and international levels. Noise pollution from transport is another issue, and its impact is not limited to terrestrial ecosystems [European Environment Agency, 2016].

Different initiatives regarding different phases of transport infrastructure development, such as better connections through tunnels or bridges, provision of appropriate fauna passages, measures to reduce risk of collisions between wildlife and traffic, etc. should be promoted and undertaken to ease pressure on Europe's biodiversity and ecosystems. In fact, these initiatives can be planned on a much larger scale than a single infrastructure project involving different stakeholders (planners, investors, citizens, different government-level authorities, etc.).

To this extent, European policies (such as the Green Infrastructure Strategy and the Connecting Europe Facility) promote the integration of biodiversity into the design, construction and operation phases of infrastructure. However, due to a deficit of knowledge about causal chains, lack of tools, involvement of relevant stakeholders and the broader understanding of infrastructure impacts on ecosystem changes, both national and international standards for infrastructure are difficult to achieve.

Green infrastructure planning is a proven tool for achieving environmental, economic and social benefits through nature-based solutions. The reliance on "grey" infrastructure can be reduced in the framework of climate change, which can often be harmful to the environment and particularly to biodiversity is expensive to build and maintain.

According to the European Commission, ***Green Infrastructure*** is a *strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptatio*n. This network of green (terrestrial) and blue (aquatic) spaces can improve environmental conditions and therefore citizens' health and quality of life. It also enhances a green economy, opens job opportunities and supports biodiversity[1].

Moreover, in 2017, STRIA[2] recognised some of the main challenges concerning the biodiversity barriers, with proposed avenues to manage these, whilst Horizon Europe[3], through the development of research and innovation, aiming to contribute to the Green Deal[4] and the European Biodiversity Strategy[5].

Such recent EU transport policies have significantly increased consideration for nature and biodiversity in transport infrastructure development and operation. These concerns need to be taken into account early in the planning phase. Transportation infrastructure projects, including those related to the Trans-European Network, help in improving the quality of life across Europe by providing services and public goods to remote areas. At the same time, EU legislation also covers the potential impacts of infrastructure projects taking place outside protected areas, but which can still affect them. This approach can be translated into a variety of actions in the field. For example, in the case of railroads and road networks, there can be changes to the proposed routes to preserve a larger area and avoid landscape fragmentation. Similarly, tunnels, viaducts can be designed and constructed to improve connectivity between protected areas and facilitate the movement of animal populations. EU funds may be withdrawn if the project does not comply with these rules.

National-level efforts and initiatives towards mainstreaming biodiversity in transport are just as important as most people. In many cases, long-term strategies are developed at this level, funding decisions are made, and a place where scalability opportunities are available. Key factors to promote this mainstreaming and enable its implementation include [OECD, 2018]:

- mainstreaming biodiversity in relevant transport national plans and strategies;
- ensure coordination and consistency between the 2 sectors relevant institutions and clearly define their roles,
- responsibility of the different actors;
- evidence-based generation required for sound decision-making;
- mainstreaming biodiversity in transport also in the national budget.

[1] https://ec.europa.eu/environment/nature/ecosystems/index_en.htm
[2] https://ec.europa.eu/jrc/en/publication/strategic-transport-research-and-innovation-agenda-stria-roadmap-factsheets
[3] https://ec.europa.eu/info/sites/info/files/research_and_innovation/strategy_on_research_and_innovation/documents/ec_rtd_orientations-he-strategic-plan_122019.pdf
[4] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
[5] https://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm

Although, there are still differences on the alignment level of the EU Member States (MS) to the EU policies, there are relevant developments also at the MS level and stricter environmental regulations, policies and practices are already changing some projects. For example, in the case of an inland water transport project to deepen the Weser River in Germany, which would give ships easy access to the port of Bremerhaven, environmental NGOs questioned the project plan, arguing that deepening the river changes salt content, creating stronger currents and threatening river-dependent wildlife and riverbanks. The European Court of Justice has ruled that the project deteriorates the water quality of the Weser River and violates the EU Water Framework Directive. As a result, the project has been cancelled [European Environment Agency, 2016].

The BISON project aims to research and address such issues and relevant challenges, focusing on infrastructure development and preservation of biodiversity, respectively, in order to achieve social and economic well-being.

As the identification of good practices either in EU or national level towards mainstreaming biodiversity in transport and the definition of their impact and their transferability in other countries and/or other transport modes is crucial to also for facilitating the mainstreaming itself, the aim of this report, in the context of BISON WP3, is to describe the methods to be applied for the identification of current good practices (including new technologies and nature-based solutions) in transport infrastructure in European countries with potential to be replicated and expanded.

2. METHODOLOGY FOR THE SELECTION OF GOOD PRACTICES REGARDING THE MAINSTREAMING OF BIODIVERSITY IN TRANSPORT

Within the scope of the BISON project and more specifically within WP3, the collection of information about relevant technologies, methods, processes, and tools currently applied in each country participating in the BISON project takes place, in order also to identify good practices concerning the mainstreaming of biodiversity on transport and promote its replication.

In order for this to be achieved, enquiries to key actors from both sectors (biodiversity/transport) in each participating country have been used to collect information while at the same time, criteria and principles have been suggested and described so as to provide tools for the selection - in a second step – of best practices to be applied. Finally, an analysis on the gaps[6] and barriers[7] that create difficulties for the application of these practices will be conducted, also in cooperation with the work and the information processed in WP4 and WP5 to provide solutions based in research and transfer technology allowing to overcome the impediments and to make progress. Main works undertaken for this scope, as well as the next steps are described in the Figure 1 and in the sections below.

[6] “Gaps”: Defined here as the lack of application of best practice.
[7] “Barriers”: Defined here as the elements that create difficulties for the application of the best practice.

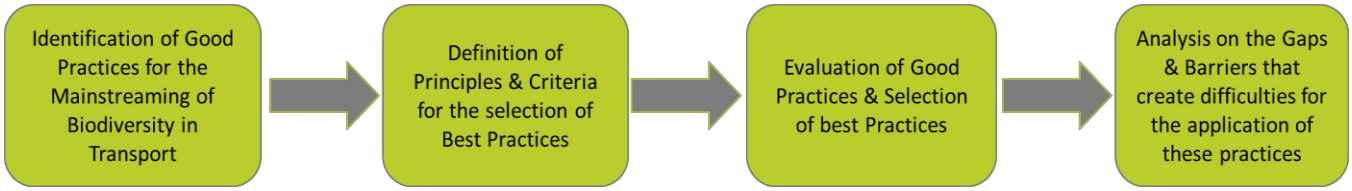

Figure 1: Main steps of Task 3.1

2.1. Good / Best Practices Glossary

As the first step for the realisation of this work, partners of WP3 in cooperation with the whole BISON Consortium have developed a dedicated glossary in order to be able to achieve common understanding among the different BISON partners and the different BISON actions.

2.1.1. Compilation of definitions

For this purpose, different sources have been used and examined, including different dictionaries, organisations, institutions, projects, etc.., such as the following (see Table 1 below):

Table 1: Sources examined for the definition of the Good and Best Practices terms

Source	Definition
Oxford dictionary	**Best practice -** a way of doing something that is seen as a very good example of how it should be done and can be copied by other companies or organisations.
Cambridge dictionary	**Best practice** - a working method or set of working methods that is officially accepted as being the best to use in a particular business or industry, usually described formally and in detail.
Collins dictionary	**Best practice** - the way of running a business or providing a service that is recognized as correct or most effective.
Merriam-Webster dictionary	**Best practice(s) -** a procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption.
UNEP	**Best environmental practice** - The application of the most appropriate combination of environmental control measures and strategies. (Stockholm Convention 2009)
	Best management practice - Established techniques or methodologies that, through experience and research, have proven to lead to a desired result. (Business Biodiversity and Offsets Programme (BBOP) 2012)
IUCN	**Best practice** - A superior or innovative method that contributes to the improved performance of an organization, and is usually recognised as 'best' by other peer organizations. It implies accumulating and applying knowledge about what works and what does not work in different situations and contexts, including learning from experience, in a continuing process of learning, feedback, reflection and analysis (on what works, how and why) (IUCN Glossary, 2021).
	Good practice - Practice considered to be appropriate and expected, i.e. conventional rather than cutting edge. In contrast, best practice can be defined

Source	Definition
	as leading practice, which is good to advocate for but cannot be expected in all circumstances (Bull et al., 2018).
EU	**Good Practice**- A broad definition of the term 'good practice' has been adopted. It encompasses a process or a methodology that represents an effective way of achieving a specific objective, one that has been proven to work well and produce expected results, and is therefore recommended as a model or as a useful example (Banelytė et al., 2015)
INTERREG	**Good practice -** An initiative carried out under one of the programme's topics. It can be for example a methodology, project, process or technique which has some evidence of success in reaching its objectives. There are already tangible and measurable results of the initiative. Moreover, a good practice has the potential to be transferred to other geographic areas**.**
Wikipedia	**Best practice** – It is a method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of doing things, e.g., a standard way of complying with legal or ethical requirements. Best practices are used to maintain quality as an alternative to mandatory legislated standards and can be based on self-assessment or benchmarking. Best practice is a feature of accredited management standards such as ISO 9000 and ISO 14001.

In addition to the description of the terms above, several sources have been examined regarding the good and best practices guidelines, in relation to topics and areas relevant to BISON project, (e.g., IUCN WCPA Best Practice Guidelines for Protected Area Managers Series, CIEEM Good Practice Principles for Development of Biodiversity, EIB Guidance Note for Standard 3 on Biodiversity and Ecosystems, etc.), as well as other relevant projects (e.g, LIFE Best Practices projects on Nature and Biodiversity[8]).

2.1.2. BISON definitions

After the implementation of the analysis described below and integrating the feedback by the whole BISON Consortium, WP3 partners have concluded to the following definitions (see the green box below), which will be adopted and used throughout the whole BISON project.

[8] Best Practice Projects - Nature and Biodiversity | EuroAccess Macro-Regions (euro-access.eu)

- **GOOD PRACTICE(s) – a methodology, process, project or technique that represents an effective way of achieving a specific objective, one that has been proven to work well and produce expected results, and is therefore recommended as a model or as a useful example**. [*Practice considered to be appropriate and expected. In contrast, best practice can be defined as leading practice, which is good to advocate for but cannot be expected in all circumstances,* IUCN 2021]

  In the framework of BISON T3.1: Good Practices are examples proposed by partners though the questionnaire or other ways to contribute.

- **BEST PRACTICE(s) – a superior or innovative method, process, project or technique that contributes to the improved performance of an organization, business or activity, and is usually recognised as 'best' by other peer organizations.** It implies accumulating and applying knowledge about what works and what does not work in different situations and contexts, including learning from experience, in a continuing process of learning, feedback, reflection and analysis *[IUCN 2021].*

  In the framework of BISON T3.1: partners and external experts will evaluate good practices proposed by stakeholders through a Multi-Actor Multi-Criteria Analysis (MAMCA) and those ranking with the highest scores will be selected as 'Best practice'.

2.2. Identification of Good Practices and Principles and Criteria for their Evaluation

The aim of the work that is implemented within Task 3.1 is to collect information about technologies, methods, processes, and tools currently applied and considered to be good practices towards the mainstreaming of biodiversity in transport.

For this to be achieved, an extensive desk-based literature research has been implemented. More than 20 different literature sources have been reviewed including generic policy documents and regulations at EU level, as well as focus has been provided to relevant information concerning EU Member States individually. However, in addition to these, the effort to compile good practices is mainly based on active stakeholder consultation, as enquiries to key actors in each participating country have been used to collect information. In general, for creating awareness about BISON project and this action in particular different stakeholders (transport operators, authorities, environmental organisations, research institutes, user organisations, national enforcement bodies, etc.) have been first contacted through the BISON survey[9]. All internal to the BISON Consortium experts have been contacted in a second period to complete the collection of good practices collected with the questionnaire through a dedicated template, which has been developed, categorising the data among the different transport modes, different life cycle phases of an infrastructure project and the main transversal topics that concern these phases (see Appendix Table A.). This template has been uploaded on a shared folder, providing unlimited access to all involved experts and stakeholders for a period of 2,5 months. This template once completed will be used for gaps analysis. In all cases, dedicated follow-up actions have and will take place when needed.

As various relevant initiatives are being developed and were identified with the goal of supporting, enhancing and promoting the alignment of green and grey infrastructure. Some selection criteria were needed to support the screening exercise, while developing a longlist of the relevant "good practices". The preliminary selection of the examples to be included in the initial list of good practices, concerning

[9] https://bison-transport.eu/questionnaire/

biodiversity and transport co-existence, will take place by internal (to the BISON Consortium) experts and will be mainly based on the following parameters:

- *Compliance with regulation*, and possibly going beyond minimum compliance.
- *Effectiveness*, or the degree to which the practice has a tangible positive impact on the green and grey infrastructure co-existence.
- *Transferability*, or the ease of implementing the practice in other contexts (in terms of location as well as transport modes).

After the selection of the practices that cover the aforementioned criteria, an initial list of good practices will be defined that will be used in the next step of the evaluation process, towards the identification of the Best Practices list.

2.2.1. Selection of the "Best Practices" list

After completing the extensive list of good practices, an internal evaluation will be carried out by Consortium experts, in order to narrow down the list, using specific evaluation criteria. Considering the heterogeneity and sometimes diverse purposes of the initiatives included in the longlist, specific criteria needed to be defined so as to be able to evaluate them as "best practices" or not. To this aim, the following criteria (see Table 2) – selected after analysing the relevant literature and after the feedback of the core members – will be taken into account and used [Veselý, 2011, Ryan, 2016].

Table 2: Evaluation criteria

A/A	Criterion	Description
1.	**Effectiveness**	Reflects the extent to which a practice offers a solution to the problem it is supposed to address, namely mainstreaming biodiversity in transport.
2.	**Relevance**	Reflects the extent to which a practice is related to the recognised problem that the BISON project aims to address.
3.	**Functional diversity**	Describes the extent to which a practice offers a holistic solution.
4.	**Efficiency**	Describes the extent to which desired results are achieved at minimal costs (in terms of effort, energy, time and money).
5.	**Multimodality**	Describes the extent to which a practice can address biodiversity problems typically related to multimodal transport (inspired by the central role multimodal transport plays in this project).
6.	**Maturity**	Reflects the extent to which a practice has been tested and their outcomes and impact positively assessed.
7.	**Sustainability**	Reflects the extent to which a practice is on a firm financial (availability of funding), legal (compliance with national and EU legislation) and social (culturally appropriate) basis, thus increasing the likelihood it will last.
8.	**Transformability**	Reflects the extent to which a practice can be adapted to solve different (but relevant) problems.
9.	**Repeatability**	Reflects the extent to which the methods used (in terms of scientific research or engineering) can be used in different but relevant problems/ cases, using clear protocol without "black box" and without high variations in the results due to hidden biases inherent to the method chosen.

A/A	Criterion	Description
10.	**Transferability**	Describes the extent to which a practice can be "scaled up" to other contexts (other locations, other modes of transport, etc.).
11.	**Innovation**	Describes the innovative nature of a practice and the extent to which it can be a game changer.
12.	**Co-benefits**	Describes the positive spill-over effects of a practice, typically in terms of improving alignment in transport and biodiversity not belonging to the original target group or speeding up the service/reducing delays.

The second step will be an additional evaluation with the participation of external experts too, via a dedicated survey. The methodology that will be used is the ***Multicriteria Analysis***[10], through which (1) the experts will establish the weighting of the evaluation criteria, and (2) the assessment of the good practices will be finalised (once again using of the weighted evaluation criteria). This will result to the Task's final list of Best Practices. More particularly, the methodology that will be used for this study will be based on the MAMCA methodology[11] [12] [13], which is an extremely useful model for complex decision-making processes.

The participating experts (including also representatives from the BISON Advisory Group and relevant Ministries) will be asked ***to assess the 12 evaluation criteria*** for evaluating the good practices, on a scale of 1 to 5 (1=not important at all, 2=slightly important, 3=moderately important, 4=important and 5=very important), and this assessment will lead to the weighting of the criteria.

The experts will be also asked ***to rate each one of the good practices, again according to all the evaluation criteria***. The answers will also on a scale of 1 to 5 with single selection (i.e. Not Relevant at All (first evaluation criterion) through to Very Relevant). This analysis and ranking will help us conclude with the **Best Practices on Mainstreaming Biodiversity in Transport Infrastructure'.**

The refinement of criteria and the MAMCA approach will be done for road infrastructure only where most collective experience exists, however a ranking of the practices for the other transport modes will also be performed based solely on the input of the qualitative assessment proposed amended by the respective partners with expertise in the subject matter.

2.2.2. Criteria weighting methodology

As mentioned above, to conduct the assessment and determine the best practices, the MAMCA approach has been selected. This process will consist of 2 steps – one to determine the Gravity Factor of each criterion selected for the assessment and one to conduct a rating per criterion for each practice.

[10] Multi-Criteria Analysis (MCA) is a decision-making tool developed for complex problems. In a situation where multiple criteria are involved, confusion can arise if a logical, well-structured decision-making process is not followed. Another difficulty in decision making is that reaching a general consensus in a multidisciplinary team can be very difficult to achieve. By using MCA the members do not have to agree on the relative importance of the criteria or the rankings of the alternatives. Each member enters his or her own judgements, and makes a distinct, identifiable contribution to a jointly reached conclusion.

[11] This evaluation methodology specifically focuses on the inclusion of the different actors that are involved in a project, the so-called stakeholders. Like the traditional multi criteria decision analysis (MCDA), it allows including qualitative as well as quantitative criteria with their relative importance, but within the MAMCA they represent the goals and objectives of the multiple stakeholders. As such, the stakeholders are incorporated in the decision process.

[12] Macharis, Cathy, Laurence Turcksin, and Kenneth Lebeau. "Multi Actor Multi Criteria Analysis (MAMCA) as a Tool to Support Sustainable Decisions: State of Use." Decision Support Systems 54, No. 1 (December 2012): 610–20. doi:10.1016/j.dss.2012.08.008.

[13] Dr. Cathy Macharis (2011). The Multi Actor Multi Criteria Analysis (MAMCA) methodology. Retrieved from: https://transp-or.epfl.ch/documents/slidesSeminars/MACHARIS11.pdf

Phase 1: Determining the Gravity Factor per criterion

The Gravity Factor of each criterion describes the importance that experts allocate to that criterion and is applied to the rating of the good practices throughout the ranking process.

In the first step, the 12 selected criteria will be evaluated by experts so as to determine the Gravity Factor of each criterion (GFi), by assigning them a specific value on the Likert scale (1, …, 5). The following are denoted for the determination of the Gravity Factor (GFi):

$$W_i = \frac{\sum_{j=1}^{G} j \cdot a_{ij}}{N} \cdot G$$

i = 1, 2, …, 12

Wi : the weight of criterion

i GFi : the gravity factor of criterion

i aij : the number of experts that rated the criterion in each Likert scale, i=1,……..,10…..x

N : the number of experts' replies, for the first step N = x

j : the Likert scale categories, j = 1, 2, 3…, G; where G=5

The weight of each criterion (Wi) will reflect the sum of the number of expert replies per rating grade, divided by the number of expert replies and multiplied by the maximum score of the scale:

The weighted average of each criterion will then be normalised, by dividing it with the sum of all 12 weighted averages. The result of this is the Gravity Factor of each criterion:

$$GF_i = \frac{W_i}{\sum_{i-1}^{11} W_i}$$

Phase 2: Performing ranking per criterion for each practice

In the second step of the process, again the participating experts will perform ranking per criterion for each practice. To determine which of the practices the most important ones, the overall weighted average (OW) of each practice should be determined so as to sort the highest scoring practices. The evaluation scale used in this step is the same as in step one.

The Likert scale applied in this case will hold 5 grading categories, denoting a total number of categories G = 5 and j = 1, 2, …, 5.

$$C_i = \frac{\sum_{j=1}^{G} j \cdot a_{ij}}{N} = \frac{\sum_{j=1}^{5} j \cdot a_{ij}}{10}$$

The following are denoted:

Ci: the relative value of each criterion, as assessed by the group of experts, i = 1, 2, …. 12

This reflects the sum of the number of experts' replies times the grade received on the Likert scale, as a result of a matrix formed through the rating process.

aij : the number of experts that rated the criterion in each Likert scale, i=1,…..,10,…x

N : the number of experts, for the second step N = 1x

j : the Likert scale categories, j = 1, 2, 3 …, G; where G=5

Wi : The weighted average of criterion i

GFi : the gravity factor of criterion i, as determined by the experts' criteria ranking in step one. The first to be determined is the relative value Ci of each criterion, with the following formula:

Thus, Ci can vary from 1 to 5.

The weighted average of each criterion is generated by the criterion's relative value times each Gravity Factor. More specifically:

$$W_i = C_i \cdot GF_i$$

And the overall weight OW is determined as follows:

$$OW = \frac{\sum_{i=1}^{n} C_i (GF)_i}{n \cdot \sum_{i=1}^{n} (GF)_i}$$

Where n = the number of criteria and takes values from 1,2 …, 12; whereas:

$\sum_{i=1}^{n} (GF)_i = 8{,}24$ (adding all the individual criteria gravity factors that will be defined)

After the determination of the overall weight (OW) for each practice, the scores will be compared and practices will be accordingly prioritised.

2.2.3. Description and presentation of best practices

After the evaluation is complete and the final list of the best practices is developed, all selected best practices will be further analysed to be presented in detail. For this process to be facilitated, a template has been developed (Figure 2). In more particulate, the following information will be provided through this template:

- the title of the best practice;
- its organisation/operator;
- the country(ies) and/or city(ies) where the practice has been applied;
- its relevant Life cycle phase;
- its relevant transport mode(s);
- a relevant reference for further description;
- the practice's description;
- its impact;
- its transferability.
- its rating that will be defined after its evaluation

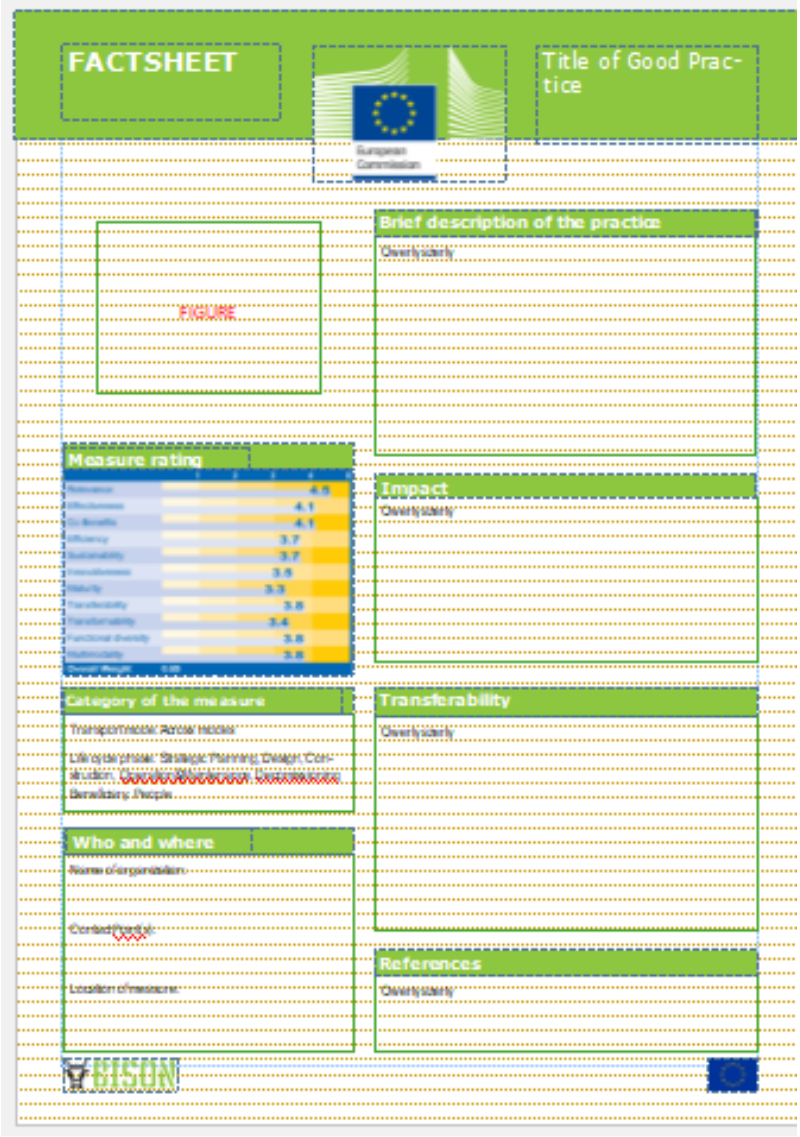

Figure 2: Template for best practice description

In Appendix II below is provided an example of a good practice analysis.

3. CONCLUSIONS

This Deliverable presents and describes the methodology to be used in the context of Task 3.1 for the identification of good practices currently applied to mainstream biodiversity in transport and their evaluation that will led to the final development of a best practices list recommended to be applied in development of European transport infrastructure. .

This list will feed - among others- the work of WP4 and WP5 - to provide solutions based in research and transfer technology allowing to overcome the impediments and make progress. Moreover, the understanding of the criteria used for the identification of best practises could also be of use in the development of new mitigation measures, assisting organisations to evaluate their own measures.

The methodology that will be used for this work is based on the MAMCA methodology[14], which is an extremely useful model for complex decision-making processes. The method is adapted according to the needs of the data of the BISON project and this task, aiming (a) to take under consideration all the aspects of the good practices under examination and to evaluate them considering all their strengths and limitations (through the use of the 12 different evaluation criteria) but also (b) to involve a wide representation of experts that will evaluate them under different perspectives, leading to a widely representative list of best practices.

[14] This evaluation methodology specifically focuses on the inclusion of the different actors that are involved in a project, the so-called stakeholders. Like the traditional multi criteria decision analysis (MCDA), it allows including qualitative as well as quantitative criteria with their relative importance, but within the MAMCA they represent the goals and objectives of the multiple stakeholders. As such, the stakeholders are incorporated in the decision process.

REFERENCES

Banelytė, V., Sternadel, D., Brožaitis, H. (2015). Monitoring good practices in the areas of Employment, Social Affairs and Inclusion - Examples of projects funded by DG EMPL in 2012-2015 Report IV.

Bull, J. W., Baker, J., Griffiths, V. F., Jones, J. P., & Milner-Gulland, E. J. (2018). Ensuring No Net Loss for people as well as biodiversity: good practice principles. *SocArXiv*, 10.31235/OSF.IO/4YGH7

Dudley, N. (ed.) (2008). Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN. x + 86pp. WITH Stolton, S., Shadie, P. and Dudley, N. (2013*). IUCN WCPA Best Practice Guidance on Recognising Protected Areas and Assigning Management Categories and Governance Types, Best Practice Protected Area Guidelines* Series No. 21. Gland, Switzerland: IUCN.

European Commission. Ecosystem services and Green Infrastructure. https://ec.europa.eu/environment/nature/ecosystems/index_en.htm

European Environment Agency (2016). Transport and Ecosystems. https://www.eea.europa.eu/signals/signals-2016/articles/transport-and-ecosystems

European Investment Bank. Guidance Note for Standard 3 on Biodiversity and Ecosystems. Available at: https://www.eib.org/attachments/strategies/guidance_note_for_standard_3_on_bioversity_and_ecosystems_en.pdf

John F. Ryan (2016). Criteria to select best practices - a proposal from the Commission. https://ec.europa.eu/health/sites/default/files/major_chronic_diseases/docs/ev_20161130_co01_en.pdf

Macharis, C. (2007). Multi-criteria Analysis as a Tool to Include Stakeholders in Project Evaluation: The MAMCA Method*, in* Haezendonck, E. (Ed.), (2007). *Transport Project Evaluation. Extending the Social Cost–Benefit Approach*, Cheltenham, Edward Elgar, 115-131.

Macharis, C., Turcksin, L., and Lebeau K. (2012). Multi Actor Multi Criteria Analysis (MAMCA) as a Tool to Support Sustainable Decisions: State of Use. *Decision Support Systems 54(*1): 610–620. doi:10.1016/j.dss.2012.08.008.

Organisation for Economic Co-operation and Development. (2018). *Mainstreaming biodiversity for sustainable development.* OECD Publishing.

Veselý, A. (2011).Theory and Methodology of Best Practice Research: A Critical Review of the Current State. Central European Journal of public policy, 5(02), 98-117. https://www.cejpp.eu/index.php/ojs/article/viewFile/99/81

WSP, T. B., & Beatty, J. B. B. Biodiversity net gain. Good practice principles for development. https://cieem.net/wp-content/uploads/2020/08/BNG-case-study-15.pdf

Zenetos, A., Gofas, S., Morri, C., Rosso, A., Violanti, D., Garcia Raso, J. G., Cinar, M.E. Almogi-Labin. Ates, A. S., Azzuro E., Ballesteros, E., Bianchi, C.N., Bilecenoglu, M., Gambi, M.C., Giangrande, A., Gravalli. C., Hyams-Kaphzan O., Karachle, P.K.,

Katsanevakis, S., Lipej, L., Mastrototaro, F., Mineur, F., Panucci-Papadopoulou, M.A., Ramos Espla, A., Salas, C., San Martin, G., Sfriso, A., Streftaris, N., and Verlaque, M. (2012). Alien species in the Mediterranean Sea by 2012. A contribution to the application of European Union's Marine Strategy Framework Directive (MSFD). Part 2. Introduction trends and pathways. *Mediterranean marine science*, *13*(2), 328-352.

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BIODIVERSITY AND INFRASTRUCTURE SYNERGIES AND OPPORTUNITIES FOR EUROPEAN TRANSPORT NETWORKS

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APPENDIX I

Table for the collection of Good Practices distributed among transport modes and life cycle phases of transport infrastructure projects for gap analysis

MODE OF TRANSPORT	Roads, Railways, waterways, Airports, Ports, Powerlines or Pipelines								
MAIN LIFE CYCLE PHASES OF TRANSPORT INFRASTRUCTURE PROJECT	TRANSVERSAL MAIN TOPICS / DETAILED PHASES	LEGISLATION AND REGULATION	Interactions with other mode(s) of transport	HABITATS MAPPING	IMPACTS	MEASURES	EVALUATION	Other topics	GENERAL ASPECTS
STRATEGIC PLANNING	National strategic planning								
	Regional strategic planning								
DESIGN	Early studies								
	Late studies								
	Detailed project study by the stakeholder								
CONSTRUCTION	Construction								
OPERATION / MAINTENANCE / UPGRADING	Operation & Maintenance								
	Upgrading								
DECOMMISIONING	Restoration (*Late* and detailled project study phases)								
APPLIED IN STUDY PHASES	Avoid, mitigate, compensate measures and evaluation								
STAKEHOLDERS ENGAGEMENTS	All phases								

GOOD PRACTICES EXAMPLES

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APPENDIX II

Indicative example of a Good Practice analysis and presentation, using the dedicated BISON template.

FACTSHEET

European Commission

Alpine Carpathian Corridor (Austria, Slovakia)

Measure rating

	1	2	3	4	5
Relevance				4.5	
Effectiveness				4.1	
Co-Benefits				4.1	
Efficiency				3.7	
Sustainability				3.7	
Innovativeness				3.5	
Maturity				3.3	
Transferability				3.8	
Transformability				4.1	
Functional diversity				3.9	
Multimodality				3.9	
Overall Weight	0.65				

To be completed after the evaluation

Transport mode: Maritime transport (River)

Life cycle phase: Strategic Planning, Design, Construction, Operation&Maintenance

Who and where

Alpine Carpathian River Corridor, c/o Donau-Auen National Park

Project Manager Mag. Christoph Litschauer

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Location of measure: River corridor Austria – Slovakia

BISON

Brief description of the practice

The INTERREG Alpine-Carpathian River Corridor project was launched in September 2017 and has a duration of three years. The project aimed to construct and preserve a coherent 120 km ecological corridor from the Alps to the Carpathians in response to the increasing fragmentation caused by agriculture intensification, the rapid expansion of built-up areas and expanding transport infrastructure. The main objectives are to safeguard these habitats and enable the migration and genetic exchange between wild animal populations. From 2009-2012, several measures were implemented within the framework of this cross-border and cross-sectorial project, such as improving the traffic network by building 'green bridges' over highways at key points / bottlenecks as well as the creation of suitable habitat patches or stepping stones within the corridor. Public awareness campaigns and environmental education for schools within the region are also part of the project. The project costs amount to EUR 4.8 million, whilst the project delivers several additional benefits, such as recreation and ecotourism.

Impact

- Development of conservation and foster activities for selected rivers by experts from both countries.
- Implementation of restoration measures for the improvement of the habitat quality of rivers, monitored with flagship species.
- Improvement of the traffic network by building 'green bridges' over highways at key points / bottlenecks.

Transferability

- Preparation of catalogues of measures for the improvement of flowing waters and their surrounding areas.
- Promotion of cross-sector cooperation.
- Focus on awareness raising and information.

References

GI_transport.pdf (europa.eu)

Alpine-Carpathian River Corridor | Nationalpark Donau-Auen (donauauen.at)

Rivercorridor: Home