TRANS
lighthouses

MORE THAN GREEN

Lighthouses
of transformative
nature-based solutions
for inclusive communities

Funded by
the European Union

Report on Good Practice Case Assessment According to the TRANS-lighthouses Framework

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Purpose of this Deliverable

Roles and Objectives in Relation to Other Work Packages

The deliverable report D3.1 picks up on the frameworks, formulated dilemmas and challenges elaborated in Task 2.1 and Task 4.1. It operationalizes them to extract and assess best practice cases on co-creation, governance arrangements and successful inclusiveness of women, young, vulnerable, underrepresented groups and under-researched groups from literature and data banks such as OPPLA. It provides a starting point for Task 3.2 to develop and build a set of indicators for Nature Based Solutions (NBS) critically reflecting and reviewing the material in terms of socio-ecological aspects in relation to the diversity of knowledge(s) and stakeholder-centred perspectives, epistemologies and power. It will also support the Living Knowledge Labs at the Pilot Cases and lays the foundations for the deep research over both the Assessment and Pilot Cases from TRANS-lighthouses in Task 3.3.

With the Pilot and Assessment Cases building up their strategies, roadmaps, work plans, Local Democracy Labs, Labs of Living Knowledge and Reflexive Monitoring for co-creation supported by WP5, at this early stage, this Deliverable Report focuses on scientific literature and case studies from data banks. It draws lessons learned on topics and dilemmas identified as relevant and important to co-create more inclusive, more just NBS and identifies knowledge gaps.

The outcomes of this initial deliverable report will be picked up and evolved for the next steps documented in the next follow-up Deliverable Report D3.2. In this following second report, a closer look will be taken at the materials as well as working with the Assessment cases to elicit epistemologies and lessons learned.

Executive Summary

The concept of Nature Based Solutions (NBS) brings together solutions and approaches that are inspired and supported by nature and simultaneously provide environmental, social and economic benefits towards more sustainable communities. The advantage of collaborative planning and co-creation of NBS is well known in theory but lacks further scientific evidence especially on the expected socio-cultural benefits and indirect drivers impact a proper and successful implementation. TRANS-lighthouses (TRL) aims to unlearn, rethink and reframe the main components of NBS and their co-creation processes to achieve better, more social and more ecologically just NBS by studying the different TRANS-lighthouses cases.

Within TRL, WP3 aims to frame and accompany the research and assessment. The aim of this first WP3 report is to extract and provide materials to assess best practice cases on co-creation and successful inclusiveness of considering gender, age, societal status and demographics of vulnerable, underrepresented. and under-researched groups from the data banks such as OPPLA. The first elaborations presented in this report lay the foundation for reflecting, understanding and systematising the material and discursive elements that shape the process of implementing NBS for the further work and joint reflections.

The focus of this first Deliverable Report D3.1 is related to the project objectives of understanding and mapping on where knowledge exists on more inclusive, more than green NBS. It identifies gaps and interests to lay the foundation to orient the next working steps towards supporting co-designing and testing new solutions.

In a first step, the theoretical foundations provided by the Guiding Frameworks from Task 2.1 and 4.1 are operationalized with search terms to conduct a literature and Data Bank search. With identified more than 1.700 potentially relevant entries in the Web of Science and over 350 cases in the OPPLA data bank and reflecting the rapid development of technology, we applied Artificial Intelligence (AI) tools to support us summarising and creating an overview on the large amount of material. We both used Scopus AI and an own customised approach using Google tools. The intention was to reflect and better understand outcomes generated by AI as well as to have possibilities for hybrid approaches using pre-selection of literature and more precise description of outcomes to verify and cross-check. The generated material by AI will be further analysed and reviewed in the upcoming WP3 tasks on creating an ontology of inclusive NBS.

To find out the relevance of the identified topics for co-creating NBS and working with the TRL cases, an online survey was conducted with a valuing and ranking exercise of the different topics. Using open ended questions in addition, key topics of interest for the different TRL activities in the Assessment Cases, as well as for research could be identified. Most relevant aspects were to have a closer look at human-nature relations as well as tools and methods for more inclusive approaches, how knowledge is produced and benefits achieved through NBS and Living Knowledge Labs.

For starting to work with the Assessment Cases, a first overview on the Assessment Cases was created by analysing survey outcomes collected by Task 6.2. The survey originally collected aspects of social mobilisation and citizen engagement. We took the material and answers and analysed it through the four lenses of the T2.1 framework dimensions: Societal aspects, nature and human-nature relations, economic aspects and participatory governance.

Finally, iterative roadmapping developed a first draft template to develop roadmaps and work plans for the Assessment Cases. The intention of this approach, done together with the Assessment Case representatives and the WP3 partners was to reflect both the diversity of the cases and the need for a common scheme to frame and systematically create and collect information in a comparable way. The first draft template is presented as an appendix of this report.

MAIN SECTION

1 Introduction

1.1 Setting the Frame for the Report

The concept of Nature Based Solutions (NBS) brings together solutions and approaches that are inspired and supported by nature, promising to simultaneously provide environmental, social and economic benefits towards more sustainable communities. It is widely agreed that answers are needed on the effects of climate change and biodiversity loss. The term NBS[1] is being used to reinforce the global common agenda[2] on this issue. The International Union for Conservation of Nature (IUCN)[3] and the European Commission (EC) have been intensively using the term NBS since 2015 and 2013 respectively, although its first mention in mainstream scientific literature was in the early 2000s, as part of solution designs for agriculture (Potschin et al., 2016; Eggermont et al., 2015).

Furthermore, the first mention by the World Bank occurred in 2008 (Sowinska-Swierkosz and García, 2022). Despite the 20 definitions of NBS found by Sowinska-Swierkosz and García, 2022, we will consider in this deliverable, the ones proposed by European Commission in 2015, which recognized NBS as being "inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience" (Faivre, et al., 2017; European Environment Agency et al., 2021). Since then, funds, resolutions and policies, initiatives and research have been adopted to strengthen and disseminate NBS worldwide.

According to Faivre et al. (2017), Nature-Based Solutions operationalize the concept of ecosystem services in real-world situations to promote sustainability on a more explicit level. This occurs through innovative governance and adequate investments, as well as by means of an intense participatory co-creation process with local communities (Caitana et al., 2024). At the end, the main purposes of NBS are: to reinforce the human-nature relation, to amplify the opportunities within the governance structure and to bring a greater diversity of nature into cities, which then become more resilient.

Innovatively, the UNEP (United Nations Environment Program - coordinating the environmental issues of the United Nation) resolution approved during the UNEA 5 (UNEP, 2022), includes the safeguarding of communities' and indigenous peoples' rights. Despite the potential of the NBS to the sustainable and bio-based products and technologies, the resolution points out the risks associated with local communities and indigenous peoples. Unlike the definitions produced until then, the resolution inaugurates an international NBS agenda in which traditional communities are prioritised. Another relevant aspect underlined by the resolution is the respect to the local, national and regional circumstances, aligned with the 2030 Agenda for Sustainable Development (UNEP, 2022). The commitment of UNEA to support the implementation of NBS to convene intergovernmental consultations in order to undertake actions related to the NBS assessment and compilation of best practices using the best available science is also part of the priorities of the resolutions and aligned with the purpose of this deliverable 3.1 as well.

The amplification of the NBS concept scope promoted by UNEA 5[4], also confirms the Horizon 2020 project - URBiNAT proposal fostering an extended conceptualization, for example. The inclusion of "participatory" and "solidarity" solutions as part of its NBS catalogue is one of the ways

[1] Other terminologies have been used such as *ecosystem-based adaptation*, a term which emerged in the 1990s in discussions of the role of biodiversity in reducing climate-related risks, including soft engineering approaches (Potschin et al., 2016, p. 2). Initiatives have been promoted by the European Commission, namely Green Infrastructure, Ecosystem-based Disaster, Risk Reduction and Natural Water Retention Measures (Faivre et al., 2020).
[2] Green Deal, IUCN Standard for NBS, EU Action Plan for disaster risk reduction, the EU biodiversity strategy.
[3] Nature-based solution definition - Resolution WCC 2016 - 069. See also IUCN Global Standards https://portals.iucn.org/library/node/49070
[4] The United Nations Environment Assembly is UNEP's governing body. it has 193 members and meets every two years

to demonstrate the potential associated with this conceptual amplification. In the case of the TRANS-lighthouses project, the construction of an evaluation framework based on NBS socio-politics dimensions confirms the notion that it is not enough to discuss the technical aspects of the solutions. Indeed, they need to be embedded in contemporary societal challenges, viewed through people-centred approaches reflecting transformation and creating new human-nature relations.

The advantage of collaborative planning and co-creation is well known. Identifying, understanding and addressing stakeholder values, interests, and knowledge are crucial steps in successful in-depth participatory processes (Burgers and Farida, 2017). While the benefits of co-creation of NBS with stakeholders are described in literature (e.g. Ferreira et al., 2023, Lupp et al., 2023), there is a lack of further scientific evidence especially on the expected socio-cultural benefits. Furthermore, indirect drivers such as not well conducted participation processes impact a proper and successful implementation. This could impede the ability of NBS to unveil their full potential and hinder the processes to gain momentum or foster the uptake of NBS.

The advantages of assessment methodologies for science, decision making and programme impact are well known as well. The monitoring and evaluation of NBS is crucial to verify whether particular outcomes were achieved or not, and to confirm whether desired or undesired changes took place and, also, under what circumstances (Gertler et al., 2018; Weiss, 1997). Through the assessment results, it is possible to define the value for money of the project to funders and also provide feedback for the participants on how their contributions have been adopted (Durham et al., 2014).

Beyond the UNEA recommendation on the use of evaluation to identify best practices and support the NBS implementation, within the task force "Integrated Assessment Framework'', the Handbook on Evaluating the impact of NBS gathers diverse best practices and useful indicators for measuring the NBS effects and impact. A large variety of indicators have been developed and tested. However, screening the set of indicators in the handbook and the appendices, it becomes evident that there is a lack of indicators related to socio-cultural aspects of NBS and often, in many NBS projects, such data is not collected. Most of the presented indicators relate to ecological and technical aspects. Also from the retrospective Isar-River restoration examined in the EU-Horizon project PHUSICOS, only a number of indicators linked to water quality and some aspects of biodiversity are regularly and systematically monitored after the river restoration. None of them took a deeper look at the social and cultural dimensions and several indirect indicators were chosen to provide evidence when an assessment framework tool for NBS was developed within the project (Pugliese et al. 2021). This secondarization of the social and cultural and well-being impacts to the environment is also visible in the European Commission Report (2021), as well as the absence of evidence on the distinct uses of NBS by different groups.

This lack of evidence is underlined in the report on "Guidelines for Co-creation and Co-governance of NBS - insights from EU-funded projects" (Ferreira et al., 2023) as well. Conceptual challenges, especially related to the need for the development of a comprehensive understanding of the social, political, moral and cultural dimensions of NBS are addressed. The romantic discourse around the co-creation process (Remme and Haarstad, 2022), for example, makes it difficult to reflect on their pitfalls. In consequence, little attention is given to the unequal distribution of the benefits and adverse effects (Remme & Haarstad, 2022; Torres et al., 2021). Other authors have argued that the political emptying (depoliticizing) of the co-creation processes makes vulnerabilities, asymmetries and political commitment less visible (van der Jagt et al., 2022).

TRANS-lighthouses (TRL) aims to unlearn, rethink and reframe the main components of NBS and their co-creation processes to achieve better, more socially conscious and ecologically just NBS by studying the different TRANS-lighthouses cases, each at different stages of implementing NBS. Through assessing the NBS co-design and co-implementation process, the project aspires to understand the diverse social, cultural and economic impacts and factors associated with the NBS approach. It also aims to co-create new approaches to design and implementation, striving to accomplish fair, inclusive and transformative outcomes. The socio-political dimension serves as the lens through which this project examines the limits and adverse factors that prevent

marginalised NBS actors from emerging and/or sustaining themselves in order to have a meaningful societal impact, and the different territorial contexts that block and contribute to hindering the co-creation process. Additionally, the institutional constraints and crystalized practices that could undermine the intended social cohesion objectives of NBS will be examined.

Inspired by those challenges pointed out by the Handbook and Guidelines, the TRL project has designed a specific work package WP 3, focused on assessing NBS cases to deepen the analysis and understanding of the social, political and cultural contexts, as well as to understand the material and discursive elements that shape the NBS implementation. Organised in 6 different tasks, the task 3.1 subject of this deliverable, aims to map cases and select relevant practices to subside the research tasks 3.3, 3.4 and 3.5 to implement their working programme. With a substantial focus on reviewing the existing literature on NBS, this task scrutinises the current state of scientific production on the socio-political dimensions of NBS as a tentative way to select the most suitable cases and relevant socially-oriented practices. One of the questions, but also the challenge faced by this task, has been how to empirically define the sociopolitics dimensions of NBS. The more robust the frame of reference for the evaluation tasks, the greater the chances of achieving appropriate recommendations for the decision-making context.

The TRL project gathers 10 assessment cases to serve as empirical context for testing the framework designed under the T2.1 and fine-tuned in T3.1. The cases cover diverse thematic topics, such as ***agriculture,*** through composting and regenerative farmers practices; ***nature tourism*** and environmental education, through natural parks construction; ***forestry and mountain*** territories, using communal and technical practices for maintaining mountain terraces and adapting forests; ***alternatives solutions*** for ecosystem made by citizens, such as eco-communities; **heritage led initiatives**, based on regeneration and adaptive reuse in historic city centres; ***eco-cultural*** topics related to the ecomuseum centred in the human experience of interaction with the landscape; **water management**, through co-constructed communal water plan. In Summary, TRL assessment cases cover tourism, agriculture, forestry, mountain, culture, environment, and water thematic topics. These cases will be explored in the tasks 3.3, 3.4 and 3.5, following the main results achieved by T3.1.

This deliverable is organised in three main chapters and an outlook. Chapter 1 establishes the framework and outlines the objective of the deliverable within the context of WP3 and the conceptual tasks. Chapter 2 describes the material and methods used, including the procedures adopted and the results of the data bank review. TRL has defined a scope of the terms and questions-guide to orient the task and support the systematic research. T3.1 has tried to employ Artificial Intelligence (AI) as a strategy to identify the main literature associated with the design of the research. The results of this approach are systematised in chapter 3. The contributions of AI to improving NBS is still a topic for further reflections. Chapter 3 also presents the first findings and results, including those related to the Oppla database. In chapter 4, the outlook provides a set of applications of the results achieved and the research tasks of the WP.

1.2 Objective of the Deliverable

The overarching objectives of the TRL project are to create transdisciplinary perspectives that recognize diverse forms of knowledge, by exploring diverse experiences within cultural, social and ecological human-nature relations, and serve as a triggering force for a more equitable human-nature relationship amidst the current planetary crisis (loss of biodiversity, climate crisis) promoting a transition towards greater human engagement within wider ecologies. It aims to delve deeper into the distribution of benefits stemming from NBS, as well as the allocation of knowledge, leadership roles and ownership of NBS. The intention is to refine NBS concepts and co-creation processes with the support of a plurality and diversity of actors grounded on the Ecology of Knowledge. It assesses the potential and limitations in NBS design and implementation processes.

Within TRANS-lighthouses, WP3 aims to provide a framework and guidance for research and assessment (Figure 1). It aims to deepen the analysis of social, political and cultural contexts and

translate the different concepts. The intention is to facilitate the composition of a mosaic of transformative NBS and to comprehend the material and discursive elements that shape the process of implementing NBS. Starting with studies of best cases derived from data banks of projects, WP3 identifies gaps and draws lessons learnt. It then accompanies the pilot cases with deep research putting the stakeholders and their views and perception in the centre of the process. WP3 will also comprise activities serving as an interface between outcomes for the communities, scientific results and policy makers.

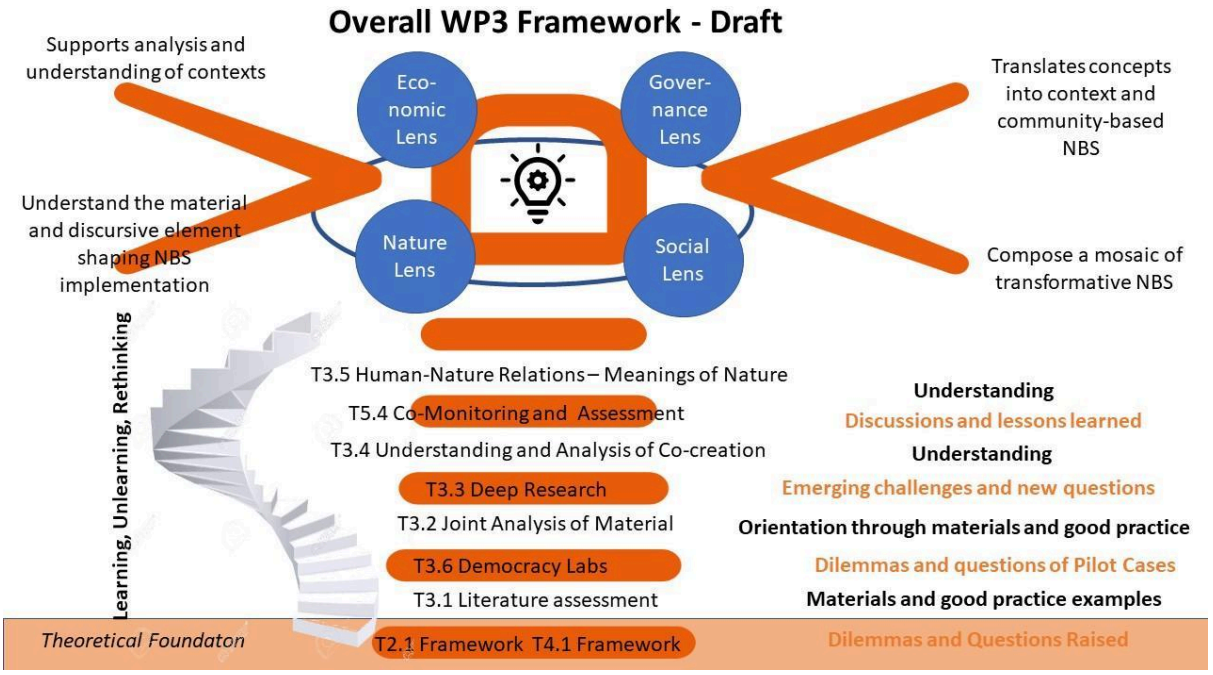

Figure 1: Position of Task 3.1 and Deliverable Report within WP3

The first WP3 Task 3.1 works on assessing and analysing relevant practice NBS cases. It is an initial step to develop and provide guidelines for the deep, stakeholder-centred research. A screening of databases and literature has been conducted based on a mapping framework based on theoretical and conceptual fundamentals elaborated in WP2. Following the principle that NBS are beneficial for all stakeholders and inclusiveness, a focus is laid on strategies to involve and engage beyond the usual suspects in the co-creation of NBS as well as looking for under-researched groups.

The first deliverable report in WP3 picks up on the elaborated framework from Task 2.1 to extract and assess best practice cases on co-creation and successful inclusiveness of women, young, vulnerable, underrepresented groups. and under-researched groups.

The aim of this report is to extract and provide materials to assess best practice cases on co-creation and successful inclusiveness of considering gender, age, societal status and demographics of vulnerable, underrepresented. and under-researched groups from data banks such as OPPLA[5]. It provides insights to materials on good practice and identifies gaps and lacks in co-creation processes based on a systematic review. Emerging dilemmas such as the evident gaps in documented case studies will be identified and addressed within the different cases in TRL, putting the missing aspects, absences and underrepresented groups in NBS co-creation processes into the spotlight. These first elaborations presented in this report lay the foundation for reflecting upon, understanding and systematising the material and discursive elements that shape the process of implementing NBS. To capture perspectives and the needs of the cases, as well as the discourses to be explored within the consortium, perspectives are gathered and an

[5] Oppla is the EU repository of NBS. It provides a knowledge marketplace on topics such as natural capital, ecosystem services and NBS. More information can be found at https://oppla.eu/about

initial analysis of the Assessment Cases is conducted. By bringing together the starting points and what assessment cases could offer, the foundations are laid to provide analytical results, pathways and roadmaps for assessment cases and NBS best practices, lessons learned and epistemologies, thereby facilitating cross-learning opportunities.

With the intention of focusing on each of the four dimensions – economy, participatory governance, social aspects and nature (in terms of human-nature relations) – to examine inclusive co-created NBS in coastal, agricultural, forest and urban contexts, Task 2.1 formulated a number of dilemmas to lead to more inclusive co-creation processes (Umantseva et al. 2024). Task 4.1 created a framework on governance aspects for analysing the status and progress of governance systems in the assessment cases and pilot cases. (Ferreira and Santos, 2023).
The main formulated aspects to look at in TRANS-lighthouses are as follows:

- Does inclusion of marginalised groups and inclusion of marginalised knowledges[6] make a difference? According to the T2.1 framework, their inclusion does not always translate into inclusion of knowledges. Inclusion of diversity of local and marginalised actors in NBS projects does not necessarily lead to transformative processes towards more sustainability (Umantseva et al. 2023 referring to Woroniecki et al., 2020).

- How can NBS create more than sustainable development? Social inclusion of vulnerable groups considering gender, age, societal status and demographics as well as indigenous people in NBS are commonly highlighted as strategies of sustainable development. However often economic and technological solutions are prioritised and perspectives of diverse economies are missing, e.g., degrowth perspectives, transitions towards non-extractivism in human-nature relations and overcoming growth-oriented and instrumental solutions (Umantseva et al. 2023 referring to Vanhulst & Beling, 2014).

- How to achieve NBS beyond using social inclusion? Participation sometimes seems to be instrumentalized to legitimise projects with already predefined agendas (Umantesva et al., 2023 referring to Woroniecki et al., 2020).

- Several dilemmas in D2.1 are linked to the relation of humans with nature. Umanseva et al. (2023) raise the question of unresolved tensions between caring for nature and caring for people in NBS approaches as well as the reciprocity between humans and nature within the NBS concept. They refer to criticism of the concept of Ecosystem services reflecting that NBS also need to shift towards finding ways to reframe human-nature relations towards reciprocity and non-extractivism, to go beyond just adding more nature but to transform the relationship of humans with nature. Another aspect raised is how marginalised local and indigenous knowledge and practices are included into the concept of NBS.

- With the economic perspective of NBS, questions arise on how to achieve transitions towards non-extractivist economies and how NBS based on local economies could be scaled and whether concepts of alternative economies could contribute to more inclusive NBS. There is a need to explore how diverse types of NBS projects, both within and beyond market relations, could work towards transforming human-nature relations.

- For participatory governance and participatory approaches, WP4 and namely T4.1 identifies three different governance archetypes as starting points for the work in WP4. They are Informative and corporate archetypes, advisory and consultative as well as cooperative and co-productive ones characterised by different levels of participation and starting points of co.-creation processes. The developed Governance framework structures and elaborates six dimensions of governance. The ***social dimension*** includes aspects of social specific interests of actors and discursive legitimacy, the ***relational***

[6] Marginalised knowledges are resulting from inequalities which privilege better off groups, not having the resources, capacities and position within political and social processes to voice interests and set agendas or resulting from worldviews giving greater value to technocratic or scientific knowledges. See Woroniecki et al. 2020 and references in this article for more details.

dimension looks at roles represented, strategies for interactions, relation (building trust), leaderships (opportunities to participate). In the ***material dimension***, human and material resources are analysed. The ***processual dimension*** is looking at initiatives, agendas and co-creation processes, while the ***organisational dimension*** is related to organisational transversality, meaning upscaling and replicability, tools and responsiveness, for example, how contributions are integrated. Finally, the ***political dimensions*** relating to the objective of participation, values and effects of the participatory projects.

With WP3's objective of framing and accompanying the research and assessment within TRL to deepen the analysis of social, political and cultural contexts and translate the different concepts, the initial step involves developing guidelines for the deep, stakeholder-centred research. The task starts with a screening of databases based on a mapping framework based on a theoretical and conceptual foundation elaborated in WP2. Starting with studies of best cases derived from data banks of projects and literature, this step contributes to identifying gaps and supports drawing first lessons learnt. Thus, this Deliverable Report will work on the following questions and goals:

- What scientific literature and evidence from previous NBS projects exist on the four dilemma dimensions described: 1. inclusion of marginalised groups and knowledges; 2. reciprocal relations with nature or human-nature relations; 3. economic aspects and economical models beyond extractivism, and 4. Participatory Governance tools and approaches, including those beyond the usual suspects?
- How are the different aspects seen within TRL?
- How could already existing evidence, lessons learned and epistemologies in the TRL Assessment Cases be unveiled and shared in a systematic way?

The focus of this first Deliverable Report is to address the project objectives of understanding and mapping where knowledge exists on more inclusive, more than green NBS. It aims to identify gaps and areas of interest to establish the next working steps towards supporting co-designing and testing new solutions. The report intends to provide a foundation for a systematic structure of work plans and planning the road ahead for this activity.

Providing first insights on the formulated guiding questions, Deliverable D3.1 will be a first step to support the next stages of WP3. It supports the development of a systematic approach to categorising the cases and describing intersectional and inter-relational approaches. From the compiled material of WP2, WP3 and WP5, eligibility criteria and validation will be conducted to select the study cases and their epistemologies, and to determine useful material from the data banks. Material will be reviewed in depth and fine-tuned in accordance with the articulations brought forward namely by the Pilot Cases and their Living Knowledge(s) Lab processes.

2 Material and Methods

2.1 Methodological Approach

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The methodological approach is based on a number of main steps.

- Operationalizing the Guiding Frameworks, namely from Task 2.1 and 4.1, their key questions and dilemmas, identifying the core topics and elements and identifying key topics.
- Formulation of search terms based on the frameworks
- Literature and Data Bank search
- Evaluation of the outcomes of the literature and case study search
- Summarising results with the help of Artificial Intelligence and reflecting outcomes
- Relevance of the identified topics for co-creating NBS in the TRL cases based on valuing and ranking exercise.
- Creating a first overview on topics to work with the Assessment Cases
- Roadmapping to develop and iterate a common scheme to elaborate roadmaps and work plan for the Assessment Cases

These steps prepare the foundation for the following tasks T3.2 and the other assessment tasks 3.3, 3.4 and 3.5 to support and implement their working programmes.

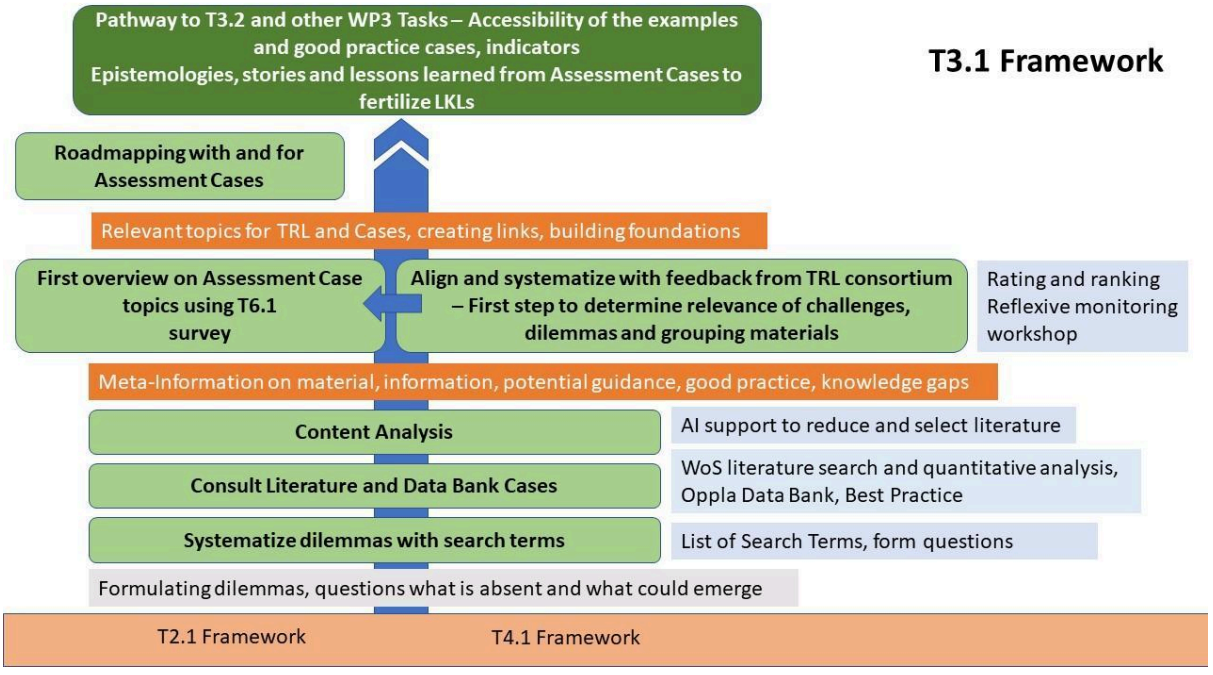

Figure 2: Overview of the methodological approach in T3.1

2.2 Operationalization of the T2.1 and 4.1 Frameworks

Building on the Conceptual Framework elaborated in Task 2.1 and the Governance Archetype Framework in Task 4.1, the different dilemmas and topics to key words were operationalized for the search in scientific literature and for case studies in data banks. The elaboration of search

terms was developed by reviewing the draft texts of deliverable D2.1 and extracting key words and key topics formulated in the different sections of the report.

The WP2 framework identifies four dimensions of Inclusive NBS in the TRANS-lighthouses project to be deepened (Umantseva et al., 2023).

1. Social: Including marginalised groups and knowledges
In this dimension, the framework describes a need for collecting more knowledge on inclusive and just NBS. Besides focusing on just NBS for all, the report formulates the need to find ways to also learn from and build on marginalised knowledge grounded in local communities.

2. Nature: Enabling reciprocal relations with nature
To develop renewed reciprocal relations with nature to advance the transformative potential of NBS, rethinking the human-nature relations is necessary and needs to be better understood. Ways need to be found to enable and support relations of care and reciprocity between humans and nature,

3. Economy: Strengthening economies beyond extractivism
Another dilemma is understanding of how NBS are positioned within economic processes. With a strong focus on anchoring NBS in community ownership as a core idea for TRL, there is a need to work on better understanding how community economies can be supported to strengthen NBS and rethinking economies.

4. Participatory Governance:
Enabling transformative governance and institutional change and anchoring democratic ownership at community level in terms of new, innovative ways for participation, there is a need to better understand how to strengthen inclusive approaches by finding ways to further evolve, mature and anchor participatory processes.

Analysing the Deliverable 2.1 and Deliverable 4.1 and the dilemmas described in the report, a list of topics and resulting search terms was extracted by content analysis of the draft texts to form the bases to be further investigated by literature reviews and data bank analyses. In some cases, where issues were named but not explicitly mentioned by words, respective search terms were added. For example, the report mentions different groups of young people, but not specific groups and terms such as “children” or “adolescents”. With the attention of TRL on the groups and to collect specific information on these groups, they were added to the list. The identified topics to be investigated were grouped pairwise combinations with NBS AND the respective term. Asterixis were used for plural forms or to include both verbs and main words:

Social: NBS AND
social inclusion, race*, racism, gentrification
Childhood, children, youth, adolescents, elderly, handicap*, disabled, immigrants
gender, women, girls, ethnic*, indigenous, relig*

Nature (Human-Nature relation): NBS AND
climate justice, perception, human nature relation, livelihood, traditional knowledge, cultural practice

Economy: NBS AND
socio-econom*, just transition, jobs, job creation, degrowth, plural economy, solidarity, alternative economy

Participatory Governance: NBS AND
vulnerable groups, human rights, just OR just*, equ* (=equity, equal), equity, conflicts, Inclusion AND method*, particip* AND method*, functional diversity, governance, democracy, societal Impact, upscal*

The key words were presented during the second TRL consortium meeting held online on October 24 and 25 to discuss their overall relevance and discussed with the conceptual partners of the task, namely WP2 and WP4 participants. Receiving positive feedback on the list of search terms, the set was confirmed to be comprehensive for the topics of interest in TRL and to work with for the literature and data bank search.

2.3 Analysing Literature and Cases from Data Banks

A literature search was conducted using the **Clarivate Web of Science database** between mid-September and mid-October 2023. The Web of Science data bank provides access to multiple databases that provide reference and citation data from scientific literature. This source is frequently used for systematically collecting references for literature reviews on a specific topic. Web of Science claims to indexing and including only the highest quality journals and publications in the respective fields. Looking at findings of assessing the most frequently used scientific databases for finding scientific literature, Web of Science and Scopus, these data banks have a stronger coverage of the natural sciences, medical sciences, and engineering and technology disciplines and less in social sciences and humanities (Stahlschmidt and Stephen, 2020). Typically Scopus has a higher coverage of literature while Web of Science with its restrictive indexation policy largely represents mostly a set of well established core journals in their covered disciplines (Stahlschmidt and Stephen, 2020).

Searches were made using a pairwise combination of "NBS/Nature Based Solutions" and the identified search terms mentioned in the previous section. We utilised the PRISMA (Reporting Items for Scientific Reviews and Meta-Analyses) method (Moher et al., 2009) to identify the most relevant papers. First, we assessed the titles of these papers for relevance and categorised them accordingly. When there was an obvious link to the core topics of NBS (and neighbouring concepts) and Co-Creation in the title, the paper was considered eligible. When it was clear that no links existed to NBS and Co-creation, the paper was dropped out. For unclear cases, in the next step, we assessed the abstracts of the papers to determine which of the papers would contain topics that are relevant to the scope of the work. With a clear link to NBS and co-creation in the abstract, the paper was considered eligible. If there was no hint, it was excluded. The list of eligible publications was then compiled in a spreadsheet.

For **case studies**, the **Oppla data bank** was searched for good practice cases in a similar way with a combination of one of the search terms and "NBS". Found eligible cases were put to a spreadsheet. Trying to identify and select cases and projects from the EU Cordis Data Dank in mid-January 2024, using one of the search terms e.g. "adolescents" and combining it with "NBS", the procedure led to inconsistencies providing entirely different, non-reproducible outcomes and non-valid cases. The Cordis Data Bank was revisited several times during a period over a week but no improvement of providing better outcomes or more consistency could be achieved. For this reason, this data bank was excluded from further analyses at that point of time.

2.4 Summarising the Materials using data management tools and AI (Artificial Intelligence)

With the available large amount of published research in multiple databases, it is increasingly difficult to collect the relevant information and create an overview. With the rapid development of specialised AI (Artificial Intelligence) tools, they can provide support to assist extracting relevant information to provide an overview of specific topics. The AI field, specially the Generative AI, is delivering completely new tools to process text. From those tools, summarisation stands out as a way to better deal with huge amounts of information from scientific papers in a certain domain (Nowigence, n.d.) .

Looking at scientific literature reflecting the quality of AI generated outcomes and the quality of such tools for literature review, Ngwenyama and Rowe (2024) state that reviewing literature with AI works quite well for search and screening. However, the authors note that tools such as GPTs produce narrative text with indifference to veracity, contextual relevance, and ethical or consequential implications. Nonetheless, AI can be valuable to provide rapid reviews and users should be aware of the trade-off on less precision. From a more critical perspective, Wagner et al, (2022) conclude that AI can certainly automate repetitive tasks and support others. However, the authors argue that it requires human interpretation and insightful syntheses. Having surveyed several AI-based tools for literature reviews, the authors recognized that much remains to be done to support the more repetitive tasks and to facilitate insightful contributions. Thus, AI can be useful but it is required to validate outcomes and generated results need to be critically reflected.

Picking up such critical perspectives and other aspects explained already in chapter 2.4, besides using the Scopus AI Beta Trial version, we opted for an customised AI approach to create literature summaries to analyse, understand and evaluate outcomes of such approaches.

2.4.1 Scopus AI Beta Version

Upon the availability of the Scopus Artificial Intelligence Beta trial version in December 2023, while working on collecting literature for Task 3.1, it was decided to test this AI tool for collecting and providing text overviews on the identified different topics related toco-creating NBS. As described earlier, the Scopus data bank has more entries and slightly different emphases on covered topics resulting in a broader coverage and greater number of journals and publications listed in the database. The use of more than one data bank offers opportunities for comparison between the outcomes of the same inquiries.

Thus, the Scopus AI tool could be considered a valuable asset for streamlining literature reviews, as well as to assist in the development of theoretical frameworks and to create overviews on the state-of-the-art in a topic or subject, based on a first synthesis of the material in the database that is accompanied by a set of references (Aguilera-Cora et al., 2023).

The Scopus AI Beta version intends to generate evidence by proposing short texts that assume direct answers, and can be used through natural language instead of search equations. As a result, in addition to a short text synthesis, it also provides reference lists. Scopus AI Beta Version makes use of published peer-reviewed literature from the Scopus database from 2013 onwards. Generated by using this database, Scopus AI is different from other generative AI tools. The output is based on sources that have undergone quality checks and validation through the review process, that is a criterion for eligibility to be included in the Scopus data bank. Nonetheless, it is advised to always verify the outcome provided by the tool (Aguilera-Cora at al., 2023).

According to Elsevier as the provider of Scopus AI, the tool uses metadata collected from 27,000 academic journals from 1.8 billion citations, and the Scopus Databank includes over 17 million author profiles (Elsevier 2024). Scopus AI is based on a Large Language Model (LLM). Unlike other LLMs, Scopus AI's knowledge base consists of the metadata of the Elsevier Scopus database (TUM 2024). The tool can generate topic summaries based on the publications recorded in Scopus, suggest follow-up questions to the original question and provides links to original research to allow further and more in-depth investigations (TUM 2024).

With the opportunity offered to the Technical University of Munich researchers to test Elsevier´s AI tool Scopus AI Beta version for trials during the period between November 20 and December 15, 2023, it was decided to test and make use of the tool for the literature review task. Based on the search term lists above, full sentence questions with a combination of NBS (Nature Based Solutions and Co-Creation where needed to specify) and the topics have been formulated and put to the AI interface.

2.4.2 Development of a Custom Approach to Handle and Extract Information with AI

AI tools like those from Scopus with restricted, usually costly access often provide no insights into how the tool choses and selects literature. Given the necessity to critically evaluate outcomes generated by AI, we felt we needed to better grasp the inherent potential, concepts and compromises involved, and to explore the different possible ways available to obtain different types of results and analyse their quality.

Dealing with huge amounts of texts collected even from data banks such as the Web of Science, with its restrictions to only provide references from the most acknowledged journals in the respective disciplines, Generative AI and Large Language Models can offer a solution to manage, sort and support the analysis of the collected data. The idea behind developing our customised solution was to handle a large amount of literature in a more traceable way and to better understand such tools and their delivered outcomes.

At the time of elaborating this text in early 2024, Generative AI was often still slow in processing what is called prompts[7] and data, and consequently, costly. In the latter regard, Francisco Reis, one of the key authors of this report and collaborating with Universidade dos Açores submitted a successful application to Fundação de Ciência e Tecnologia, Portugal, for a 25.000 US Dollars grant to be used during a full year in Google's Cloud AI services. Thus, Google's Cloud AI services were preferentially used in our quest to evaluate different papers summarisation strategies.

The most fundamental choice using Generative AI is linked to selecting the Large Language Model (LLM) for our use (https://en.wikipedia.org/wiki/Large_language_model). The initial available models were gemini-pro 1.0 and text-bison. The parameters influencing the outcome results were temperature from 0 to 1 (0 more grounded, 1 more hallucinations), maximum output tokens and, of course, the prompts.

Testing out the models, we obtained some initial encouraging results in a platform that was developed by Francisco Reis to manage the prompts used, the data used and the results obtained. This platform has a browser front-end, responsible for the user interface, and a Java backend, responsible for the database and for the API call to Google's AI online services. This platform could also automatically retrieve abstracts from papers from which we had the respective DOI. The platform can be used when registered (coarse user interface and no manual yet available) at https://spreadsheetmanager.com where the information from the Web of Science or OPPLA inquiry outcome are placed in spreadsheet rows and their respective abstracts (in certain cases abstracts can be fetched automatically) are placed in a dedicated column.

2.5 Exploring Dilemmas and Topics for the Work with the Assessment Cases in TRANS-Lighthouses

2.5.1 Assessing Survey Results by T6.2 on the Assessment Cases in the Light of WP3

In Task 6.2, an overarching approach on reflexive monitoring was chosen to analyse critical turning points, identify learning outcomes, share findings, reflect on the methods and promote learning (Gouveia et al., 2024). Within the initial tasks of TRANS-lighthouses, a diagnostic survey in September 2023 was conducted by T6.2 to activate reflection, exchanges and guidance to design a framework dedicated to citizen involvement based on existing and previous experiences of the

[7] An AI prompt is a set of instructions or a request made to an artificial intelligence (AI) system. A prompt specifies the task that the AI is supposed to perform and can contain relevant contextual information, examples, and other details that help the AI understand and complete the task effectively.

communities regarding participatory activities. Assessment and Pilot Case representatives were asked to respond to the questions. The responses collected through a Google Doc survey to create categorical and reflexive analysis for WP6 were picked up by Task 3.1 for the purpose to determine the topics and dilemmas the cases want to work on.

Building on the four dimensions formulated in the T2.1 framework, the collected survey texts written by the case representatives to respond to the questions were assessed. A content analysis according to Mayring (2000) was conducted by looking at the individual survey response texts through the four lenses determined by the social, nature (with a focus on human-nature relations), economic and participatory governance dimensions. The respective questionnaires used for collecting the information from the different case sites can be found in the Appendix materials of Deliverable D 6.2 (Gouveia et al,, 2024),

2.5.2 Relevance of Topics for the full TRL Consortium through an Online Survey launched by T3.1

To reach out to everyone in the TRL consortium, a second standardised survey approach (Atteslander, 2003) was developed to reach out to a broad range of stakeholders to capture the different perspectives and relevances of the topics as well as to collect the variety of perspectives among participants. The survey picks up the different topics emerging from the WP2 framework and uses the search terms that were used to operationalize the search in the literature and case study data banks. In a first step, the survey with its set of questions were given to the consortium members to collect voices and perspectives from everyone working on the project and to collect feedback for further refinement and adaptations for further steps when the survey is opened up to larger groups such as the Living Knowledge Labs. First, the participants were asked to indicate the relevance of the different topics with two methodological approaches - indicating relevance of each individual term on a 1-5 Lickert-Scale and then ranking the terms sorting them according to their relevance in declining order. Then, in open-ended questions, participants were asked to formulate their topics of relevance to be worked on during TRANS-Lighthouses, what the different Assessment Cases and more conceptual project tasks could create, contribute and elaborate for meaningful outcomes from their perspectives. The resulting texts are analysed, summarised, grouped and categorised using qualitative content analysis following Mayring (2000). Finally, some questions were asked to collect some background information such as demographic data and knowledge about NBS.

The online tool SoSci Survey (Leiner 2019) was selected and prepared by WP3. The survey questions were elaborated in most of the languages represented in the consortium and at the case sites (Danish, English, French, German, Greek, Italian, Portuguese, Spanish, Swedish). The tool was pre-tested for functionality in late February and early March 2024 and opened up for the main run in mid-March. Participants received a hyperlink to the survey and reminders were sent out to encourage participation by everyone. The online survey questions can be found as Appendix 1 to this report.

2.6 Towards Eliciting Epistemologies and Lessons Learned from Assessment Cases through Roadmaps And Roadmapping

2.6.1 Theoretical Background or Roadmaps and Roadmapping

Roadmapping and roadmaps provide a powerful and practical means of supporting organisations reflecting their strategy, long-term planning to foster innovation and foresight activities. The method of roadmapping has proven useful in many fields, such as engineering, company practices and practitioner-led guidance (Kerr and Phall, 2020). Roadmapping and Raodmaps support organisations with planning and alignment. Roadmapping is a form of creating and collecting knowledge and has a lot to offer in supporting the engagement and interaction between different disciplines and communities. As a means of communication, roadmap visualisation conveys information, connects with stakeholders, and mobilises action (Kerr et al, 2012).

Roadmaps and their visualisation can take a variety of forms, ranging from simple tables and graphs, Gantt chart-based schedules, multilayer block diagrams and bubble charts, tree diagrams, flow-based pictorials and schematics, and even geographic maps and metaphor-based illustrations (Kerr and Phaal, 2015). Often, the process of developing a roadmap is considered more valuable than the final roadmap as it stimulates communication and generates consensus between different groups within organisational units (Paal and Mueller, 2009). Roadmaps are often created in multiple iterations over the views and abstraction levels. Roadmapping is done over four steps:

- In the Ideation Phase the structure and the type of information of the roadmap is 'designed'. The scope is determined and the roadmap space is filled with existing ideas.
- The Divergence Phase is used for further exploration, for instance by creating scenarios, fact-finding and brainstorming to identify opportunities.
- The Convergence Phase is used to analyse the resulting 'playing field' and to reduce the content to the essential trends, risks, opportunities, design/technology issues and competence questions.
- Finally, in the Synthesis Phase, the collected information is consolidated in a more comprehensive visualisation. The information can be packaged differently for specific audiences.

2.6.2 Towards an Assessment Case Roadmap Template

Following the steps suggested by Kerr and Phaal (2015), they provide the guiding steps for the creation of roadmaps for the TRANS-Lighthouses Assessment Cases. Table 1 provides an overview of the phases involved in creating a roadmap, in accordance with Paal and Mueller (2009), along with respective activities, methodological approaches and objectives to be achieved at each step.

Phase	Activity	Methods[8]	Objective
Ideation Phase	Exploration phase to create structure and type of information to be contained in the roadmap.	Workshops and Focus Groups to collect state of the case, goals and ideas for the cases, creation of elements in common	Development of a common structure for all cases creating an "Assessment Roadmap Template"
Divergence Phase	Further exploration of cases, questions and creating links between cases and conceptual tasks	Market Place, Focus Groups, Brainstorming, development of the section of Roadmap Template by assessment cases to collect information, feedback from partners	Connect, feedback from other cases and WPs to collect materials that Assessment Cases can offer and what is of interest of other Cases and Conceptual Tasks
Convergence Phase	Identification of topics and fields that different cases will work on in the coming years	Analysis of the different topics, goals of cases and interests expressed by partners, reflections, bi- and multilateral exchanges	Determine specific topics that Assessment Cases and identified partners want to work on in TRL
Synthesis Phase	Consolidation and "visualisation" of the the Roadmap	Elaboration and formulation of individual roadmap documents	Final Roadmap Document, work plans, steps and timelines that can be followed and monitored in terms of progress

Table 1: Steps for the creation of Assessment Case Roadmaps in TRANS-lighthouses

Criteria for developing roadmaps for the Assessment Cases are determined by the needs of the TRANS-lighthouses. It is intended to support conducting the analyses of ecological, social, cultural and governance systems within a common assessment framework. Elaborated Assessment Case Roadmaps will support eliciting lessons learned and epistemologies for the dissemination, replication and upscaling of co-governance innovations and innovative pathways for NBS co-creation as well as to support and to follow up on individual work plans for the cases.

[8] For more detailed descriptions of methods, see Caitana et al., (2023), Gouveia et al., (2024)

3 First Findings and Results

3.1 Operationalization of T2.1 Framework

The summarised outcome for the Web of Science inquiry and cases from the Oppla data bank are shown in the following tables 2-5. The spreadsheet documents with the eligible list of literature from Web of Science and the spreadsheet with the Oppla cases can be found as supplementary materials to this report available online..

NBS and Social aspects	Number of eligible publications found in Web of Science	Number of Case Studies in the OPPLA Data Bank
NBS & social inclusion	28	1
NBS & race*, racism	9, 5	0, results refer to plant species and variants that are resistant to changing climate or specific conditions
NBS & gentrification	24	2
NBS & Children, Childhood	8, 24	18
NBS & youth	18	3
NBS & adolescents	1	0, no results
NBS & elderly	11	7
NBS & handicap*, disabled	1, 2	0, no results, 1
NBS & immigrants	5	1
NBS & gender	28	1
NBS & women, girls	14, 1	3, 3
NBS & ethnic*	6	1
NBS & indigenous	34	3
NBS & relig*	1	0, no results

Table 2: Outcome of the Web of Science and OPPLA searches on NBS and Nature

NBS and Social aspects	Number of eligible publications found in Web of Science	Number of Case Studies in the OPPLA Data Bank
NBS & climate justice	68	108, search term is too broad
NBS & perception	156	10
NBS & human nature relation	52	112, search term is too broad
NBS & livelihood	52	10
NBS & traditional knowledge	55	18
NBS & cultural practice	60	52, search term is too broad

Table 3: Outcome of the Web of Science and OPPLA searches on NBS and Societal Aspects

NBS and Economic aspects	Number of eligible publications found in Web of Science	Number of Case Studies in the OPPLA Data Bank
NBS & socio-econom*	118	36
NBS & just transition	9	28
NBS & jobs, job creation	11, 3	13
NBS & degrowth	2	0, no results
NBS & plural economy	3	36
NBS & solidarity	5	3
NBS & alternative economy	54	36

Table 4: Outcome of the Web of Science and OPPLA searches on NBS and Economic Aspects

NBS, Governance and Participatory Approaches	Number of eligible publications found in Web of Science	Number of Case Studies in the OPPLA Data Bank
NBS & vulnerable groups	17	14
NBS & human rights	40	4
NBS & just*	58	5
NBS & equ* (=equity, equal), equity	58	1
NBS & conflicts	29	6
NBS & inclusion AND method*	8	1
NBS & particip* AND method*,	25	36
NBS & functional diversity	11	199, search term is too broad
NBS & governance	240	34
NBS & democracy	7	1
NBS & societal impact	77	68, search term is too broad
NBS & upscal*	37	15

Table 5: Outcome of the Web of Science and OPPLA searches on NBS and Governance and Participatory Approaches

Looking at the data bank outcomes, the Web of Science inquiry provided far more than 3.000 entries for all topics and taking the first step of PRISMA, the scoping led to a list with more than 1.400 potentially relevant papers to be further examined. More than 350 entries for cases were found in the Oppla database that would be eligible for being assessed in detail. In summary, this means there would be 1.700 texts to be analysed in detail for creating a systematic and comprehensive review to cover all topics identified as relevant for TRANS-lighthouses. Despite familiarity of the authors with some of the found literature and case study entries in the OPPLA databases and several double takes being listed as an outcome of the different searches, with available time and resources, it was not possible to systematically review and analyse the papers and case studies within the timeframe of this reporting task.

A scoping of some of the outcome of scientific literature review and Oppla cases suggest the following:

- In the OPPLA database, a lot of case study descriptions are not updated and only present early or intermediate stages of the project. Even following links leading outside of OPPLA to project websites, descriptions or result sections, information about outcomes are missing and would require in-depth searches through search engines to find publications and final project results. With the project nature of the cases, often there is information about the long term development and impact as well as long-term monitoring.

- Some urban case studies presented in OPPLA such as Burgas, Sofia or the cases from London, cover a variety of topics and appear in many searches. A vast majority cases are in urban contexts and most presented examples are from Europe. Interestingly, while many urban NBS cases deal with several topics and are listed twice or more times in different inquiries, NBS case studies outside urban areas often appear only once for a

specific topic. Explicit upscaling of NBS towards mainstreaming seems to be mainly explicitly considered for rural NBS and linked to restoration activities..

- While inclusivity and vulnerable groups are frequently mentioned, looking in detail, only a few examples in the presented cases and scientific literature provide more detailed evidence and explanation of successful integration of the different groups. For example, there is little literature on specific groups such as women, young, elderly, people with disabilities (physical, cognitive, sensory) and many other underrepresented groups. It might be important to know details about potential specific needs, communication or formats for co-creation not to exclude and to encourage everyone to be part of NBS co-creation processes. Also, description on specific tools and methodologies to achieve inclusive co-creation processes as well as "how to". approaches were described only to a very little extent.

- While literature mainly postulates the importance of inclusiveness and benefits, in the OPPLA cases, there is a lack on both how real inclusivity was achieved or missing in the presented information. To collect more evidence and more detailed information, this would require deeper, longer research and investigation on the presented cases. With many of the collected projects in the data bank already being finished, for several of the presented projects, it seems to be difficult to collect such additional information quickly. Following the provided links in several cases lead to webpages that have not been maintained or updated with outcomes. Therefore, this would request further investigation through search engines or trying to find contact persons who have worked on the projects to gain knowledge about the outcomes, methods applied and the evaluation of the co-creation activities.

3.2 Application of AI tools to Create Texts and Summaries

3.2.1 Outcomes of the Scopus AI

Similar to the presented number of eligible literature from the Web of Science database with literature for every relevant topic, Scopus AI provided an answer for all initial questions based on NBS (Nature Based Solution) and a search term. Texts with references to scientific literature were generated to all questions containing the pairwise application of search terms. Scopus AI offered both a short summary of texts and the option to generate an extended summary. Short summaries were around 300 words and usually provided around 3-5 references and on request extended ones around 6-700 words with up to 6-7, and at later stages of inquiries, up to 12 references on topics that we previously identified having larger numbers of literature in the Web of Science inquiries.

A shift in the number of references could be observed around December 10 when Scopus AI was sometimes unavailable, processed inquiries slowly or incompletely such as not showing the reference articles. It seemed to have received updates and after this date frequently presented a higher number of references (up to 6 for short summaries and up to 12 for extended texts). Also, considered literature extended to articles dating back to 2013 while initially answers only used papers from 2015 onwards.

For all outcomes, Scopus AI suggested up to three follow-up questions. For those proposed questions that have not been investigated before through other search term combinations or that have not been suggested before, the follow-up questions were selected and the tool was asked to give an answer to the proposed question. This procedure was followed until proposed questions became repetitive or self-repeating.

The outcome texts of the questions formulated to Scopus AI can be found as online supplementary materials.

For some of the topics with little evidence in the OPPLA and Web of Science inquiries, Scopus AI used only 2-3 references and the request for an extended summary did not lead to the inclusion of more papers and the generated texts did not present much more information despite generating more extensive texts. In these cases, for some of the suggested follow up questions, An example where Scopus AI was not able to provide an answer can be found in Figure 3.

Figure 3: Screenshot from Scopus AI generated outcome when asking aspects on how NBS can overcome racism

Altogether, more than 500 A4 pages of texts generated from the Scopus inquiries were created. Within the given time frame of the reporting task, it was not possible for their in-depth analyses as well as a validation and cross-check with the Web of Science database on the literature that was selected by Scopus AI. This will be conducted in the next months as part of Task 3.2 with its dedicated working steps to design and analyse the selected data base cases for knowledge sharing as well as building a set of indicators for NBS reflecting and reviewing in terms of socio-ecological analysis in relation to the diversity of knowledge(s) and stakeholder-centred perspectives, epistemologies and power.

Upon briefly scoping the generated materials and the topics that are of specific relevance for TRL for inclusive co-creation of NBS, it becomes apparent that, when seeking more concrete and tangible results, e.g. when looking for inclusion of groups such as adolescents, women or children in co-creating NBS, the generated texts seem to be vague. This hints to a lack of scientific literature, even in the Scopus database, on how to engage specific vulnerable or underrepresented groups into co-creation, on specific tools and methods for inclusiveness, as well as on indicators and evaluation to measure success.

An in-depth review and analysis of the Scopus AI generated texts will be conducted in Task 3.2 as part of developing and building a set of indicators for NBS critically reviewing the materials in terms of socio-ecological analysis in relation to the diversity of knowledge(s) and stakeholder-centred perspectives, epistemologies and power.

3.2.2 Experiences Made with of the Own AI Approach to Handle and Extract Information and Create Outcomes

With work in progress on the approach at the time of elaborating the report, first results could be obtained.

Our requests to generate outputs were formulated as following:

- Summary of a group of abstracts (limited by the max output tokens/characters).
- Summary of a group of abstracts in a maximum number of key points.
- Summary of a group of abstracts in a maximum number of key points and indication of the most relevant papers for each one of the key points.

The platform we developed could give us other useful information like the common abstract in different but related fields (most of them related to NBS) and it also allows automatically fetching of missing abstracts, individually or throughout an entire spreadsheet column.

The first challenge we encountered was the token limit of the available models provided. When we started, the LLM models we had available by Google had a maximum of 32k input/output tokens which is around 100.000 English characters as input plus output of a request (Open AI n.d.). This number of tokens is not sufficient for topics with a lot of literature to summarise. To get going, we decided to summarise not the whole papers but only their abstracts. Even so, the texts of abstracts were often much larger than the 100 thousand characters that 32K of tokens could process. Reflecting possible ways to overcome this limit, we finally opted on summarising each one of the abstracts (by using Generative AI) before prompting for summarising them all in a second step The initial results of this chosen approach were not convincing.

This issue could be solved when Google's Gemini 1.5 Model was made publicly available in April 2024 as it has a 1 million token limit allowing it to process much more characters (Google, 2024) avoiding the need to summarise each abstract individually. From trials with older models we already knew what kind of summarising results were more meaningful, understandable and useful, so we arrived at a set of LLM parameters that, in most cases, delivered the best information in a useful way. Those parameters were: Temperature[9] = 2 (from 0 to 2), Max output tokens 8192 (from 0 to 8192).

The second challenge was of pure technological nature and was linked to the cloud technological platform we used based on Google's AppEngine Standard. Using the Java 17 version on our backend, the long waiting calls to the Vertex AI API were largely inefficient and could not be scaled to many users. In February 2024, with Java 21 was made generally available in AppEngine and we did the needed migration to this version new non-blocking Virtual Threads (Oracle, n.d.)

Summing up the problems that had to be overcome, what stands out is that the full and generalised use of a radical innovation such as Generative AI may pose several challenges, sometimes arising from where researchers and developers least expect.

The use of recently available Gemini 1.5 and non-blocking Virtual Threads in Java. In future versions and other technologies like "advanced vector support" and "foreign functions", ways will be available which can also speed up Generative AI server (not API) workloads. For example, Thenewstack.io (2024) illustrates how this AI field and software engineering are experiencing unprecedented and rapid evolution. For example, we invested heavily in a two step summarisation that, for our needs, is now superfluous with tremendously more capable models like Gemini 1.5 and Claude 3 accepting multifold numbers of tokens compared to predecessor models..

[9] The temperature controls the degree of randomness in token selection. High temperature can lead to a more diverse and creative output. With low temperature, a LLM will deliver more conservative and deterministic results. See e.g. https://ai.google.dev/gemini-api/docs/models/generative-models

To provide relevant outcomes for partners within the TRL consortium coming from a variety of backgrounds from research and practice we opted for balancing the outcomes in terms of given summarised information and to allow for further investigations.

We decided to prompt to have 10 bullet points for results. With this number of bullet points, we also oriented ourselves at the outcome of Scopus AI requesting for the extended summaries which initially provided around 6 and in the second phase with up to 12 references to better allow comparisons between the tool. We further tuned the prompt to have an indication of what abstracts/papers were considered more relevant for each bullet point and, why not, to have an explanation of why each abstract was selected with the reference indicated by its doi number..

We arrived at the following prompt that was followed by the data of the abstracts to summarise:

a 10 bullet points summary of all of the following abstracts.
Then indicate the most relevant abstracts for each of those bullet points explaining why.

Abstract DOI_1

Abstract DOI_2

Abstract DOI_3

Abstract DOI_n

Looking at the outputs from the data that follows (outputs are available as supplementary material), it immediately stands out the different format of the results:

- Most results have each bullet point in a separate paragraph, but not all.
- Most results refer to the abstracts by their DOI, but others simply by their order (1, 2, 3, …).
- The result for NBS & Youth has 15, not 10 bullet points. All others have 10 bullet points as requested.
- Some listings of the most relevant abstracts of each bullet point come immediately after the bullet point designation and description, other listings come after all the bullet points.
- In the latter case, some results have the relevant abstracts referring to the bullet point's designations while other results have them referring to the bullet point's number (1 to 10).
- Some results end with a warning text such as "Please note that these are just a few examples and other abstracts may be relevant to various topics depending on specific areas of interest." while most results do not have. Scoping through the outcomes, this seems to be the case where a lot of literature existed or contained a lot of long abstracts.
- The deepness of each bullet point description varies a lot between the results.
- The type of explanation of why an abstract was considered relevant also varies a lot.
- Some very strange formatting can show up such as in NBS & Governance (scroll bars!).

With all these differences between the outcome contents and formatting, remaining challenges will be to understand in detail why this is the case, to find or confirm where we already suspect systematic patterns. Up to this moment, no consistent explanations were found yet. They could e.g. link to the number of abstracts that were summarised and important to both the contents and the format of the result. Or it could be the total length of the data influencing the contents and formatting of the results or a combination of both.

From the work in the past months, summarising some of our insights from working with Generative AI, we found out the following:

- It is a powerful tool with impressive, meaningful results
- Generating outcomes is fast. The overall waiting time is 30 seconds for summarising texts from long lists containing more than 50 abstracts.
- LLM accepting a large number of tokens are essential to create meaningful outputs.
- Comparing Gemini Pro 1.5 with other LLM like Claude 3 (256k tokens) would be very interesting but depend on their availability (Announcement of their public availability vs. real release to the public)

- Finding good enough input parameters for temperature and max tokens requires some experimenting but is not difficult.
- Finding good enough prompts for what we wanted to achieve was not hard.
- Finding the best input parameters together with the best prompts is a big challenge.
- Sufficient understanding of the investigated subject is needed to ensure generating meaningful outputs.

Reflecting the work with our own Generative AI model in the past months, from our experiences, we consider it already as an essential, useful tool for researchers dealing with a huge number of papers in their working fields. In the six months of our study the new LLM and the tools to experiment with them have greatly evolved so much more is expected in the years to come.

Reflecting on the development of an own approach compared to applying given AI tools such as Scopus or more open tools, the advantage in the chosen combined hybrid human-machine approach working with the preselected literature preselected by experienced persons having collected experience in respective field of investigation and some knowledge about literature, this allows validation and quality check on relevance for the topics on both ends with only using a defined set of literature the tool and an additional cross check and review of results by looking at the answers given for reasoning and indicating the most relevant literature from which the AI generated texts were created.

Despite the rapid development in terms of available resources and ability of such AI tools as well as materials they are trained on, we recommend to have more transparent approaches for AI tools, possibilities for hybrid approaches using pre-selection of literature and more precise description of outcomes to verify and cross-check the outcomes in terms of quality and data bases used as relevant sources have slightly different scopes and coverage of scientific literature.

3.3 Relevance of Topics for TRL Collected from Surveys

3.3.1 T6.2 Survey on the Assessment Cases in the Light of WP3

Assessment Cases in TRL are the sets of cases aimed at providing analytical results that contribute to the advancement of pilot cases by cross learning and cross fertilisation. TRL Assessment Cases, along with their experts and local scientific partners, share NBS best practices by assessing ecological, social, cultural and governance systems within a unified assessment framework. 10 cases, spanning urban, rural, forestry and coastal contexts, provide insights, lessons learned and their epistemologies. The Assessment Cases are:

- Brussels (Belgium) as an urban case with the example of climate change adaptation plans,
- Bologna (Italy) as an urban case having worked on transforming urban spaces more green
- Moisdon la Riviére (France) as a rural case on a citizen-led self-sufficient eco-community
- Madrid (Spain) as an urban-rural agricultural case working on composting closing organic cycles and to enhance soil quality
- Zeeland (Denmark) as a rural case on regenerative farming
- Barcelos (Portugal) as a rural and forestry case working on interaction and participation of people with the territory and culture
- Estarreja (Portugal) as a rural case promoting its natural patrimony in various way in order to better link people with nature
- Upper Allgäu (Germany) as a forestry case to activate forest owners and stakeholders to a better management and care of forests in the light of climate change
- Troodos (Cyprus) as a rural and forestry case to maintain dry wall terraces including local and traditional knowledge.
- Lagoa (Portugal, Açores) as a rural, forestry, urban and coastal case to stimulate human wellbeing by outdoor activities, as well as preservation and maintaining ecosystems..

Looking at the different Assessment Cases documents compiled by Task 6.2 in their comprehensive surveys, such as the one on social mobilisation and citizen engagement (Gouveia et al., 2024), and analysing the texts through the four lenses established by the dimensions outlined in the conceptual framework of Task 2.1 (Umantseva et al., 2024), a number of topics, issues and their relevance in the different Assessment Cases could be identified.

Social Aspects

This theme is linked with the inclusive potential dimension of the NBS. According to the deliverable 2.1, there is a need to go beyond technical aspects and look at aspects of just distribution of benefits and mitigation of adverse impacts, co-production processes with communities to ensure that local communities have a voice in NBS decision-making and inclusion of marginalised knowledges (Umanseva et al, 2023 referring to Gaspers et al. 2022 and Grabowski et al., 2022).

Explicit target groups for almost all assessment cases are young persons, children and activities linked to their educational curricula: schools and activities done together or with schools are seen as the most important elements for activities and link with nature. In Estarreja and in the more mature cases such as the Upper Allgäu, work with and by schools have been highlighted as good examples to promote awareness and engagement for NBS.

Key stakeholders for the rural and forest cases include landowners and farmers. Without their will and provision of land, no NBS can be created or might have to deal with adverse impacts. Also, these groups are needed for constructing NBS and for their maintenance and operation. Depending on the cases, there are hints to epistemologies for successfully engaging and involving landowners while others strive to achieve modes and models for their successful engagement.

NGOs play a crucial role in all cases by facilitating involvement and outreach to broader groups such as citizens. NGOs are seen acting as multipliers and having the capacity and knowledge to bring in expertise. While some cases are planning to directly engage or have engaged citizens, NGOs play an important role in connecting or ensuring that the voice of citizens is represented in co-creation. They are seen as important actors to mobilise civil society and/ or represent marginalised groups and knowledge(s).

Technicians and administrative staff are relevant for most cases with the exception of grassroots or bottom up approaches in the two farming cases. These groups in many cases are driving the processes, aiming to encourage the discovery of knowledge and broader engagement.

Nature and Human-Nature Relations

According to the T2.1 framework it is necessary to re-think the taken for granted social conventions in science and society about the ontology of nature, the role of nature in human life, and how society relates to nature (Egmose et al., 2021), With the objective of rethinking human-nature relations and finding ways to enable and support relations of care and reciprocity between humans and nature, the TRANS-lighthouses project aims to work with communities to understand values people attach to nature and how NBS can serve as a catalyst for transforming human-nature relations (Umanseva et al., 2024).

Looking at the survey texts from T6.2, for many cases, a loss of knowledge and relevance of nature in society is described. A goal of the work in all assessment cases, at least to some extent, is to increase awareness of nature, mobilise individuals or stakeholder groups to participate in the co-design of NBS, by including more groups and stakeholders and giving nature more relevance in daily life, and to unveil multiple benefits for society as a whole.

Several cases address the lack or loss of knowledge for nature and traditional knowledge (Upper Allgäu, Troodos, Lagoa, Estarreja, Troodos, also the farming cases in Moisdon and Denmark) as a

barrier for action or taking different pathways. Namely the Troodos Case in Cyprus is an interesting case where traditional knowledge is a key element to work with nature.

A core topic raised in this dimension is the question, by whom nature is represented. In the Assessment Cases, nature is often represented by administrations, technical staff and experts in the more top-down or collaborative approaches (e.g. Brussels, Upper Allgäu). The intention of the technicians and experts to address other groups and NGOs is twofold. The intention is either to reach out for partners and to create more awareness on the needs of nature or to include knowledge to draw a bigger picture, especially in terms of including socio-economical and cultural aspects. The needs of nature are represented in these cases from a more technical, scientific-based perspective.
For bottom- up and grassroots initiatives, the main representatives expressing the needs of nature are farmers and land users wanting to change the relation to nature and their pioneering role in changing towards non-extractive ways of working with nature.

Economic Aspects and Economical Practices

Both the T2.1 framework and the broader TRL project, in the dimension of economic aspects and economical practices, lay focus on economic relations beyond market-based economy – for example, solidarity economy and rethinking towards transformative economies beyond extractivism. Referring to Chausson et al. (2023) the T2.1 conceptual framework identifies blind spots arising from uncritically approaching NBS within mainstream economics and paradigms, such as economic growth assessed through GDP. Aspects to reflect include the commodification of nature by approaching it as attractive new avenues for capital valuation, investments and accumulation (Gómez-Baggethun & Ruiz-Pérez, 2011; Remme & Haarstad, 2022) or the distribution of the costs, risks and benefits associated with diverse financing mechanisms and the absence of evidence on how the values, knowledge and practices from people are integrated in the market-based mechanisms for NBS (Chausson et al., 2023).

The original T6.2 survey did not explicitöy ask for economic aspects in their survey. Nonetheless, for many cases, information about economical aspects and practices could be extracted from the texts.

Some cases such as the Brussels Water Management Plan aim to achieve direct material benefits in terms of market goods and services, such as reduced costs for water management and increase of property values. But reflections also go beyond market based mechanisms to unveil benefits for everyone, especially for marginalised groups providing access to more and higher quality greenspace and recreation.

In certain farming and forest cases, a lack of knowledge or vision, momentum or need for collaborative efforts to unveil economic benefits is identified. For some cases, frameworks such as the Common Agricultural Policies, more profitability and known business models of extractive land uses are factors that were identified as challenges to be tackled to implement NBS. In the farming cases, activist approaches try to overcome shortcomings by more holistic approaches and transformation taking into account multiple benefits or trying to develop new economical practices.

Participatory Governance

Co-creation in public governance catalyses structural changes in the way the public sector perceives the involvement of citizens in urban issues, and simultaneously in the way individuals and collectives evaluate the potential of their participation and intervention in decision-making and impact. In addition, recognising that co-creation in the production of knowledge changes the way in which knowledge is appreciated, recognised, shared, learned and related. Co-creation in the governance sphere also produces indirect effects in urban governance in general, not only regarding NBS. The co-governance model, in which hierarchical centrality disappears in favour of greater coordination through exchange, makes it possible to solve different social problems with a variety of responses, as has been recognised in studies on urban governance (Ostrom, 1996).

Assessment Cases offer a variety of governance archetypes and changes and shifts in governance models when starting to work with NBS. The variety of governance types stretch from top down archetypes that strive to include more stakeholders, a change from top-down to collaborative approaches, as well as bottom-up and grassroots models. In all cases, co-creation techniques are considered as tools to raise awareness, willingness to change behaviour and to create a more collaborative atmosphere among participants. With the progress of the project, other layers of the governance model adopted by the cases will be more understandable. Is particularly relevant to evaluate the application of new techniques associated with the project topic, namely socio-politics dimensions.

In terms of participation with respective tools and methods, the pioneering work on democratisation of innovation from Von hIppel (1988) laid the groundwork for understanding the participatory process nowadays. One of the ambitions of this concept is the active involvement of the multiple stakeholders, multiple forms of knowledge and multiple political agenda. Institutions and projects bear the responsibility of providing the objective conditions to this democratic exercise, such as access to information, the inclusion of underrepresented groups, ongoing accountability and rewards practices. With the advances in the NBS public debate, participation is increasingly linked to advanced forms of active involvement, better represented in the concept of co-creation. NBS co-creation has been adopted intensively as part of the political and academic agenda. In the case of TRANS-lighthouses assessment cases and their solutions, the engagement of citizens occurs in different contexts, in the local communities and local governance systems. The set of assessment cases brings together a diversity of stakeholders involved in different stages of the NBS implementation. Examples include municipal governments, schools and youth, local residents and families, land owners, experts and local networks of associations are referred. The active involvement of citizens is underlined in almost all the assessment cases, in some indicating more advanced stages of engagement, in others, participation is a future goal. Several techniques, tools and methodologies are also mapped by the cases to ensure the adequate inclusion of the stakeholders groups, ABCD methodology, walkthrough, focus group, workshop, to name but a few, as well.

3.3.2 Relevance of Topics for the full TRL Consortium through an Online Survey launched by T3.1

By April 7, 2023, first outcome results were drawn based on 34 individuals who had answered the survey at that time, with 20 finishing all questions. The ranking task exercise seemed to be challenging for several respondents as only 20 completed this question and continued with the survey. In terms of the average age, the graphic below shows that most of the respondents are between 35 and 44 years old (Figure 4). Most of the respondents were from Southern Europe (Figure 5) and linked to a Pilot Case with a second group linked to Work Packages (Figure 6). Around one third of the respondents stated that they had only some knowledge about NBS before the project started (Figure 7). In this way, the outcomes are similar to PHUSICOS where several of the respondents in a qualitative interview stated that they had little knowledge before (Lupp et al., 2021). At least for the initial round among the core members of TRANS-lighthouses, there is a lack of respondents below 25 and above 65 meaning that specific demands and needs of these groups are not captured at this stage. It is planned to continue collecting data with this survey and systematically increase collecting feedback from larger groups such as participants of the Living Knowledge Labs at the different case sites.

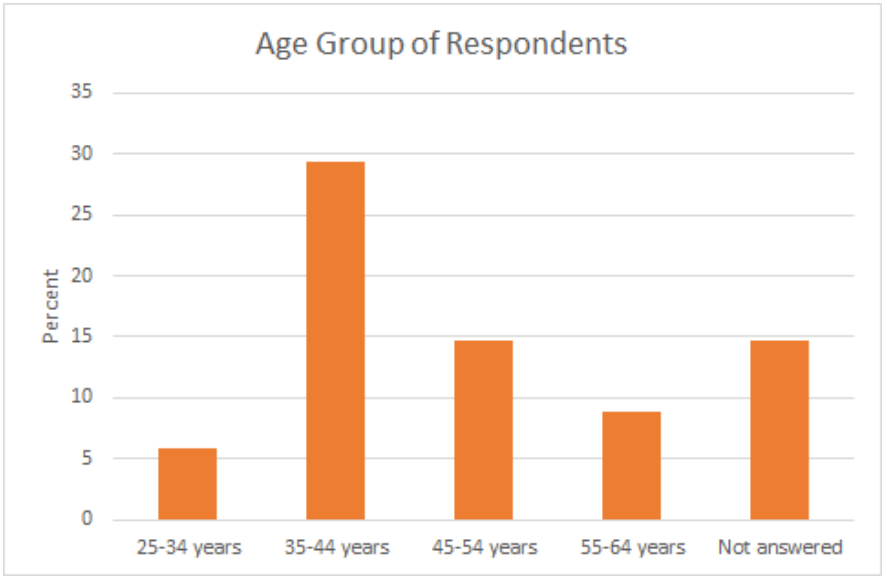

Figure 4: Age groups of the respondents to the survey

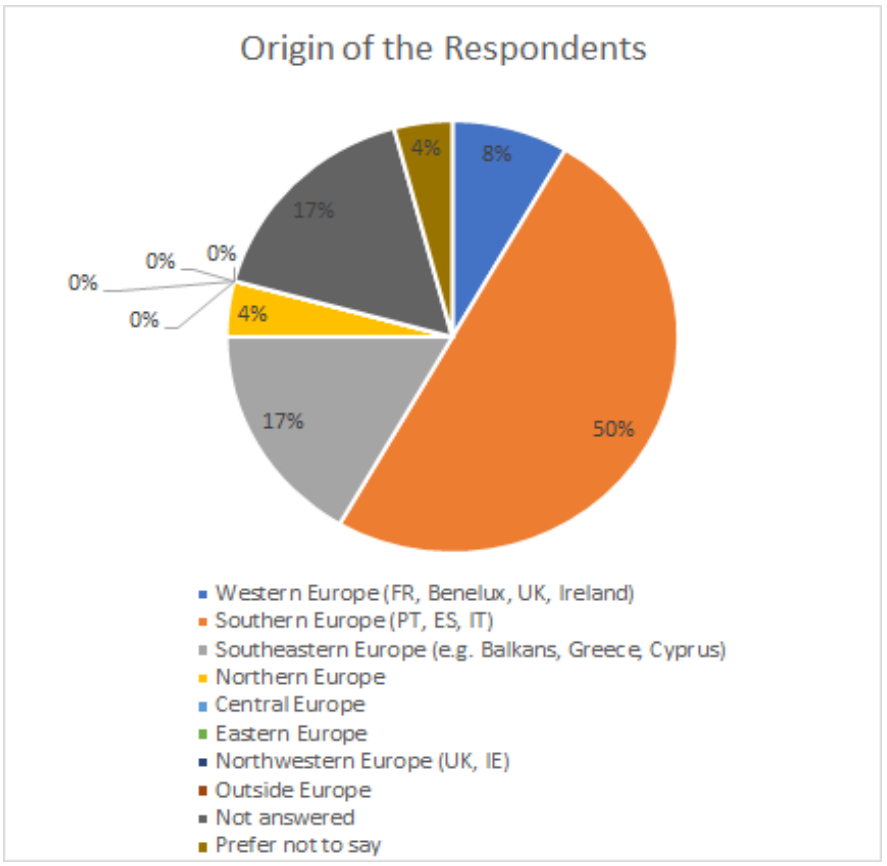

Figure 5: Geographic origin of the respondents

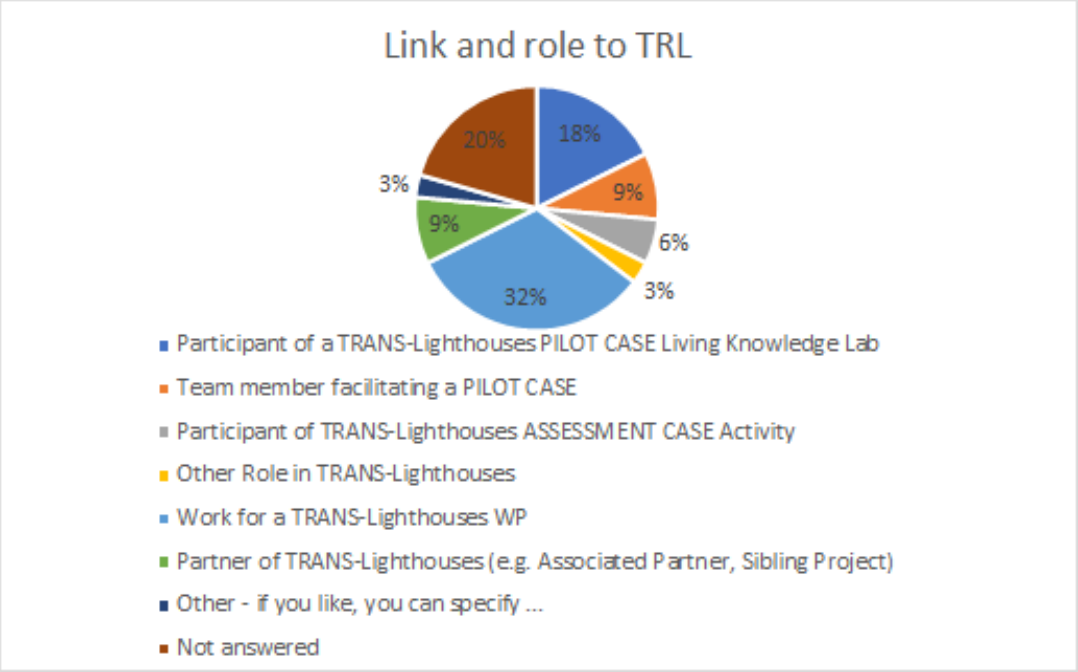

Figure 6: Role and connectedness towards TRANS-lighthouses

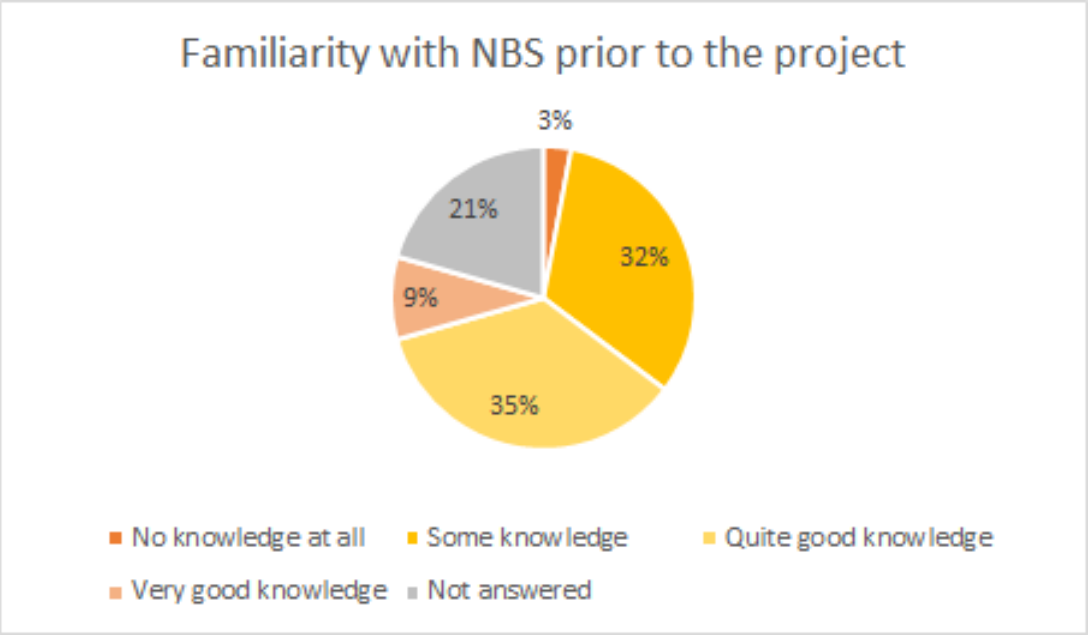

Figure 7: Familiarity with NBS prior to the TRL-project

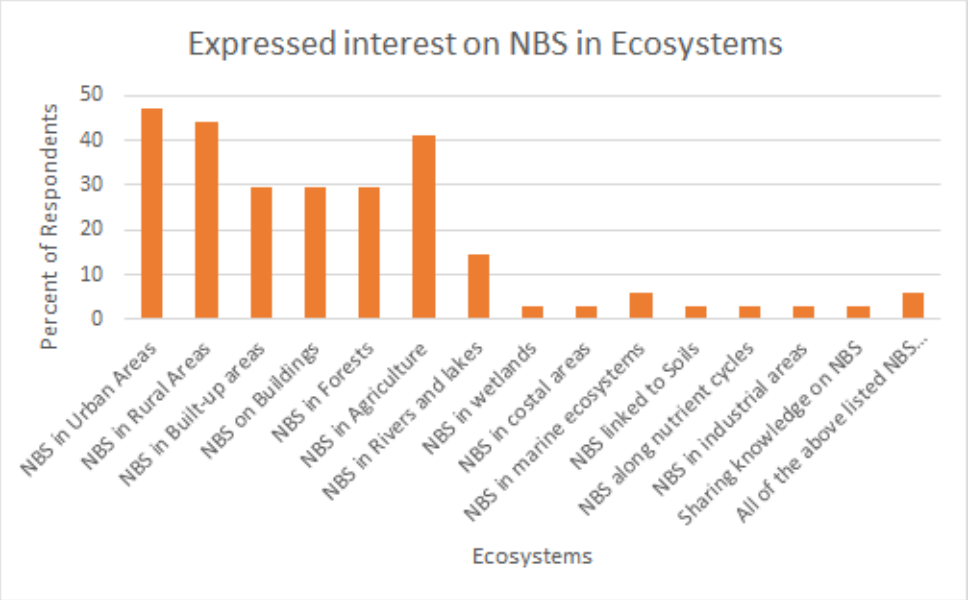

Figure 8: Expressed interests in Ecosystems where NBS are implemented (several options could be chosen, last five elements were extracted from open-ended entries; n=34)

Expressed interest on NBS in urban and rural areas were almost equally weighted. In terms of territorial typologies of TRANS-lighthouses, after the urban context (Figure 8), NBS in agriculture was of very large interest followed by forest and NBS on buildings. In case of coastal areas, one of the territorial typology priorities in TRL, is one of the least selected options. To some extent, this mirrors the current material in literature and existing data banks with implemented NBS mainly in urban areas.

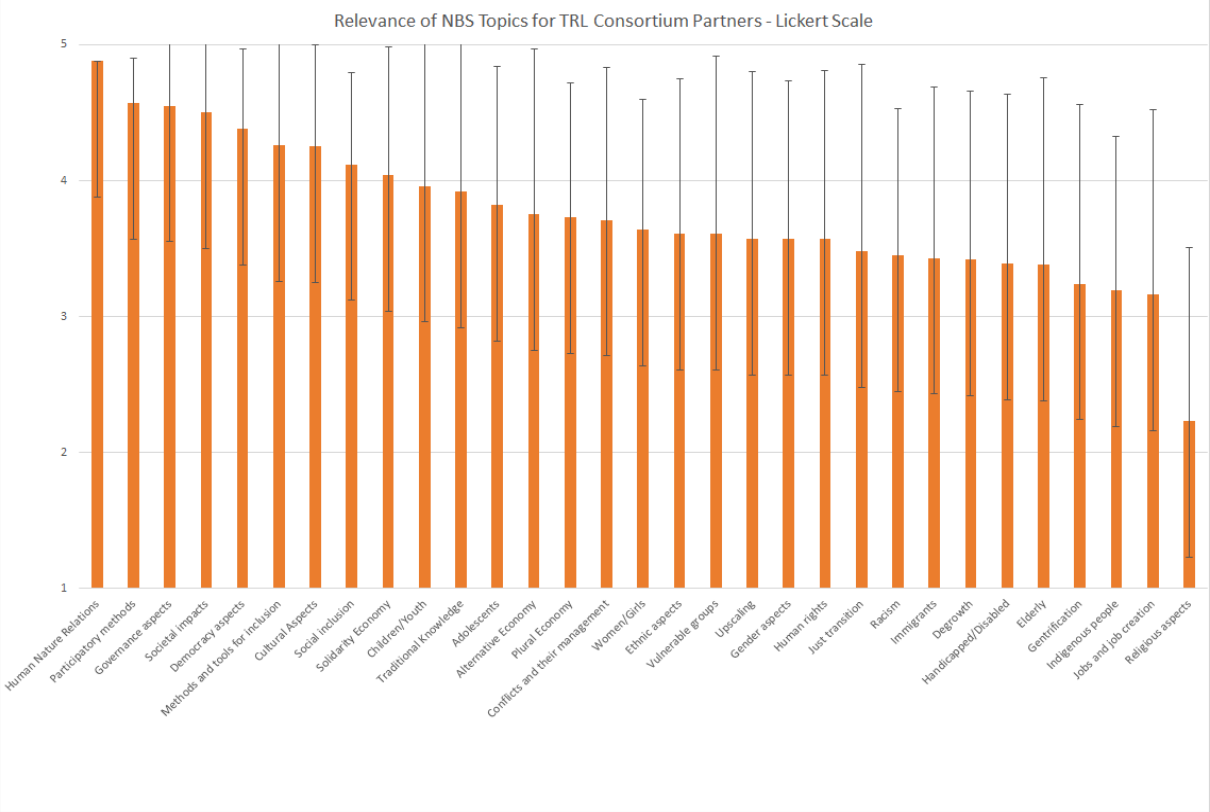

Figure 9: Relevance of topics using Likert Scales 1-5 Lickert Scales (5=most relevant, 1=least relevant)

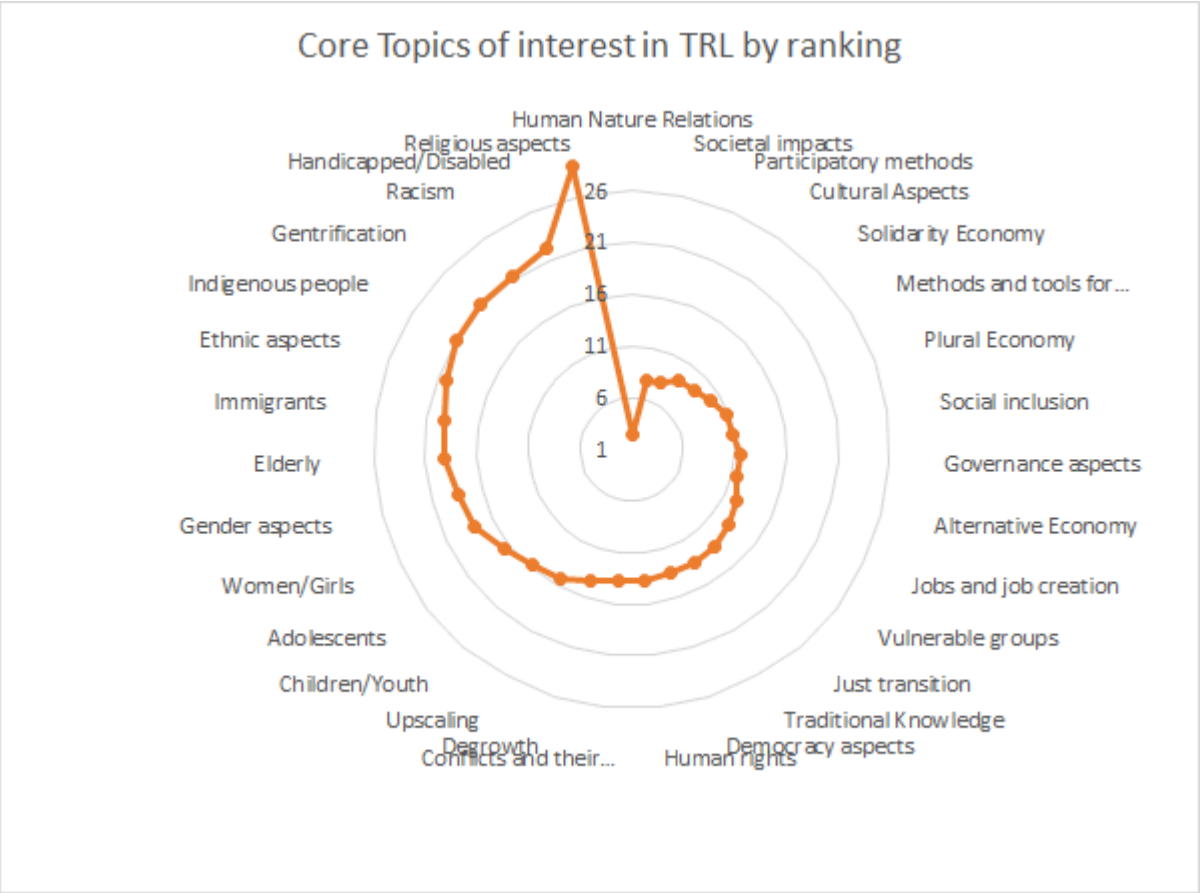

Figure 10: Relevance of topics in ranking exercise: Scale: 1 most important, 30, least important

The overall relevance by using Lickert Scales (Figure 9) and a ranking task of the given topics (Figure 10), the outcome indicates that for the respondents, the highest relevance and interest is the human nature relation. Looking in more detail, while for many of the topics there is quite a high standard deviation, it is quite low for this specific topic. A lot of interest exists in exploring and learning about tools and methods for participation, societal, economical and cultural aspects of co-creating more inclusive NBS. To a lesser extent, aspects of very specific target groups were expressed as very important. Of less importance are aspects of gentrification, racism and religion, linked to the context of NBS. Many of the cases are situated in rural areas, where this might be of less relevance. This outcome might also be due to the survey design where an item was "social inclusion" as the overall description and different groups as separate items to choose for the ranking and rating task.

Topics of Interest to Learn in Pilot Cases

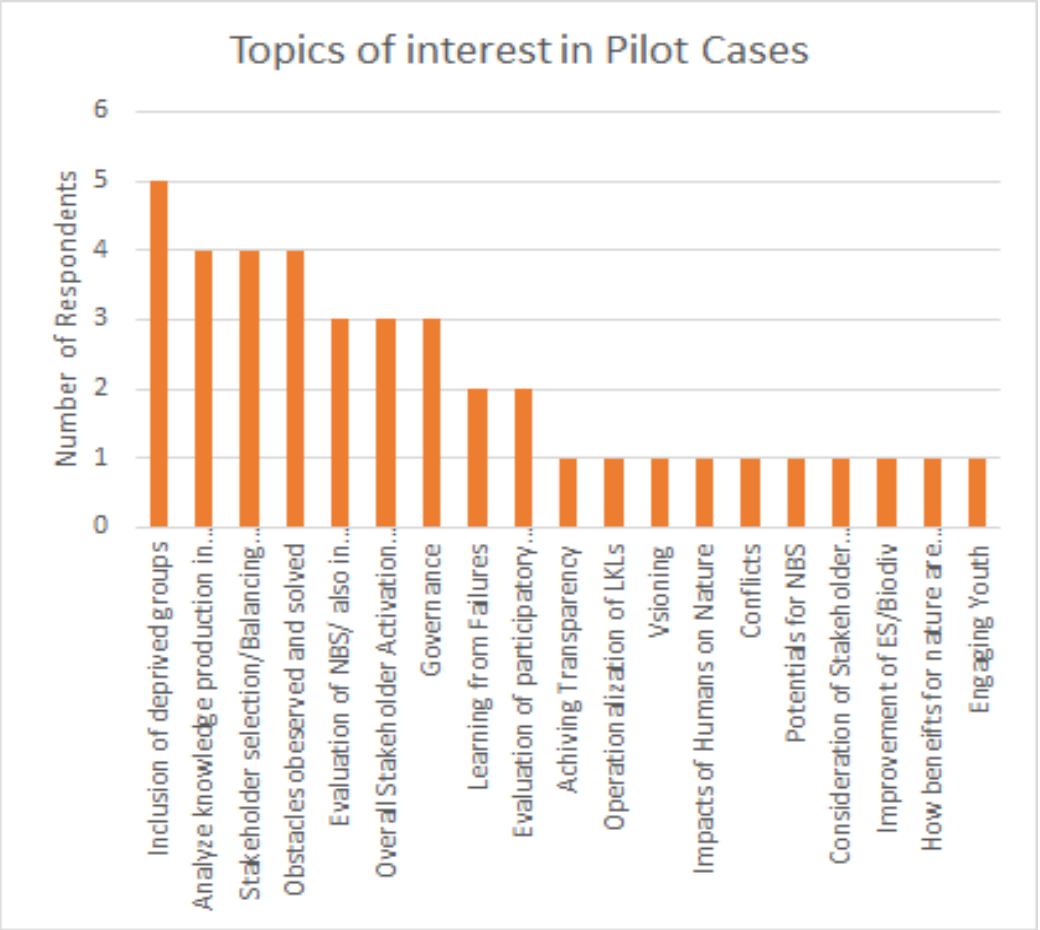

Figure 11: Pilot Case Topics of interest expressed by respondents, open ended questions

Most interest was expressed in how Pilot Cases will include vulnerable groups into their work and how knowledge is generated in the Living Knowledge Labs (Figure 11). Linked to this aspect, it is of interest how cases select and represent the different stakeholders and activate them in their processes including tools and methods. Related to this, it was of relevance for many respondents what obstacles were observed in all phases and how they were overcome. Another area of interest is evaluation of LKL processes and the co-created NBS. Related to this topic, it was expressed to what extent improvements were achieved with the co-created NBS. Further topics of interests expressed once each were conflicts, tools such as visioning or creating a vision as well as overall potentials for NBS in the pilots.

Assessment Case Topics of interests Expressed by Respondents, Open Ended Questions

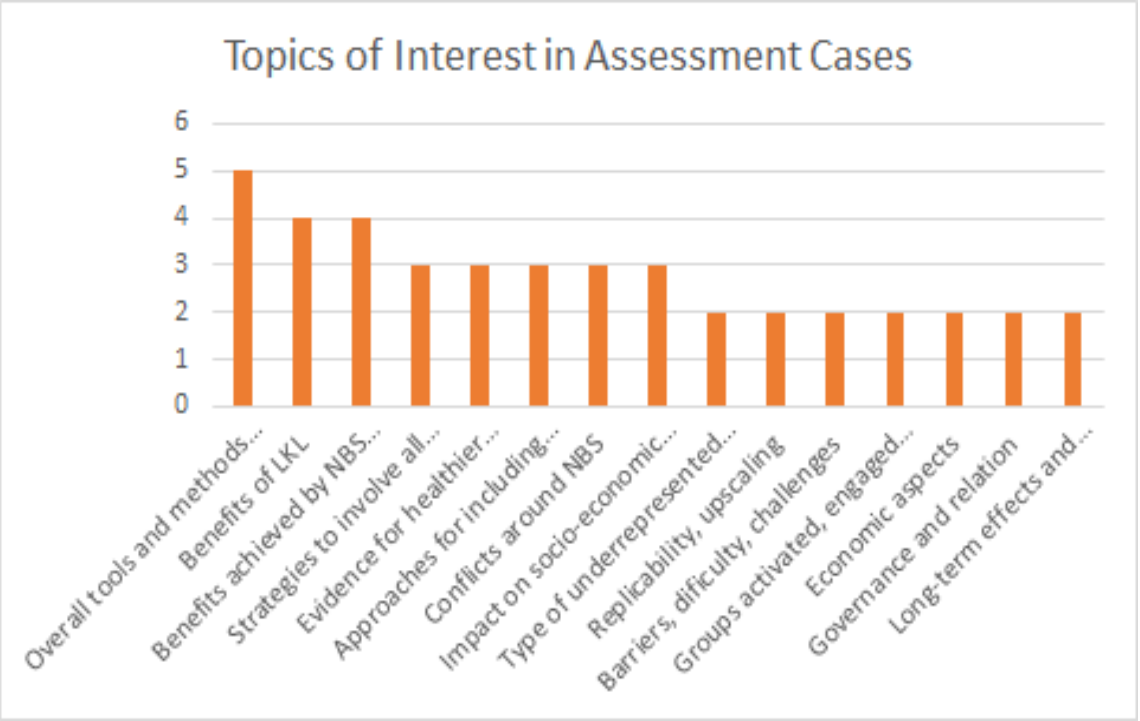

Figure 12: Topics of interest in Assessment Cases (expressed by more than 1 respondent)

For the Assessment Cases, a very broad variety of questions and topics of interests were expressed. Grouping them, The most frequently mentioned ones (Figure 12) were tools and methods for truly inclusive co-creation approaches of NBS, benefits of Living (Knowledge) Labs and evidence for benefits achieved by NBS and, for two respondents, in specific, the long-term effects and benefits of NBS. More specific questions on tools and methods were linked to activation and engagement strategies of stakeholders and underrepresented groups especially for the first stage of the co-creation processes. More specific questions on benefits of NBS were asked in terms of impacts on socio-economic transformation and economic aspects. Then, a topic of greater interest expressed by 3 respondents was evidence for healthier human-nature relations. Further aspects of interests were conflicts, barriers, difficulties and challenges and how they were tackled and overcome. Finally, topics of interest were replicability and upscaling solutions as well as governance aspects. Finally, interests expressed by one respondent each were how continuity over long time was achieved, specific tools and methodologies to involve youth, overall lessons learned from the Assessment Cases, learn about success stories and failures, absences, how participation looked like, what democracy is at local level, how NBS are understood, how it was communicated and data was used, how knowledge was produced, how priorities were defined, how multipliers were activated and what has sparked process. Furthermore, there was a specific interest in exploring the variety of NBS, how visioning was done, what were the role of policies and who represented nature in the processes.

Topics of interest Collected from Literature and Data Banks

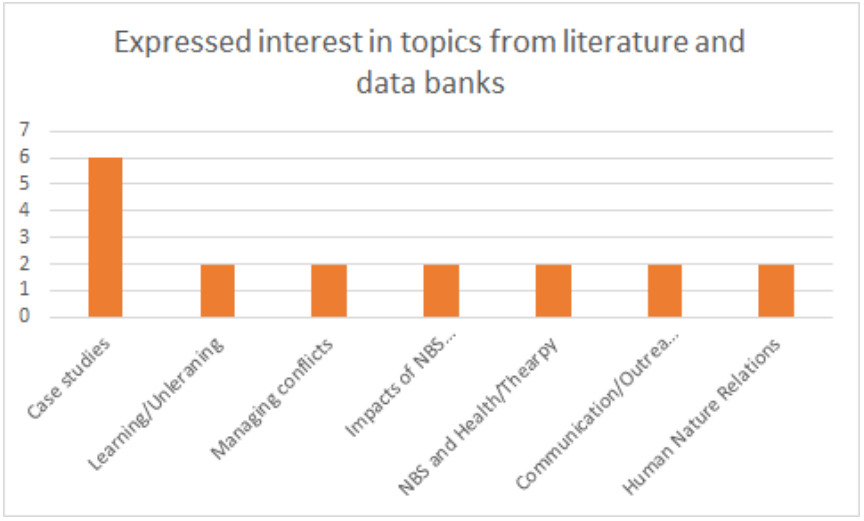

Figure 13: Topics of interest in literature and data banks (expressed by more than 1 respondent)

Most expressed interests in topics from literature and data banks were looking at case studies and experiences made with co-creation of NBS (Figure 13). Specific wishes were made to provide insights on NBS in forestry and agriculture as well as examples with long term experiences. Specific interests were learning more about learning/unlearning, hints in literature and data banks how to manage conflicts, also in specific when views about nature are very divagating. Other topics of interest raised by more than one respondent were the impact of NBS on socio-economy and the environment, communication and outreach, as well as human-nature relations.
Wishes for insights from literature expressed by single persons were to learn more about theories regardingNBS, indicators on NBS co-creation efficacy and benefits, financing NBS, Co-Governance typologies, inclusion of underrepresented/marginalised persons, social problems and NBS, failures, ethical aspects, community building, knowledge creation, solidarity economies, and how stakeholders are taking responsibility for NBS.

Topics of Interest for Research or Investigation in TRANS-lighthouses

A broad variety of topics to be investigated in TRL or new research projects were expressed. Four responses were related to engaging and managing stakeholders in co-creation processes. One aspect was longevity of such processes, keeping persons active and committed over very long times and mechanisms of how these processes can be done in a cost-efficient way. Another aspect related to this field was to better understand how community-driven initiatives work.

A variety of research questions were formulated by individual responses, some of them had a very specific question suggested to be a topic for investigation. A cluster could be seen around investigating the integration of vulnerable people, creating more knowledge on how to best integrate co-creating with vulnerable groups, Identifying needs and worries of vulnerable people and if they change with implemented NBS. Another aspect was how to integrate co-creation with deprived and vulnerable groups into academia and training curricula.

Other suggested issues were linked to NBS and health, NBS and business models, impacts of NBS to food and water security, threats to NBS by climate change and increased demands for resources, the perception of NBS and change over time, NBS and enhancing human-nature relations. Then, topics of interest were expressed in investigating participatory governance systems and how nature could be integrated as a stakeholder. Another field of interest was to better understand creation of knowledge and the use of knowledge to address the climate crisis. Other aspects raised were drawing lessons learned from cultural heritage projects, understanding the role of coalitions and alliances in solidarity economics, human and natural cycles as well as how NBS can address or link to work on societal challenges.

Summarising the Survey Outcomes

In summary, for the work in TRL, participants start with different knowledges on NBS and a significant share of persons, they are new to NBS and will familiarise during the project From an overall perspective, most important topics of relevance are looking at human-nature relations and their changes, tools and methods for participatory approaches, aspects of democracy and economics, especially in terms of solidarity economics and NBS. Inclusion is another aspect of great relevance. With some respondents addressing youth and young persons in specific, a broader perspective for all vulnerable groups seems to be of high relevance. Less relevance is given to specific topics and very specific topics on individual vulnerable groups, racism, indigenous persons or knowledge. The reason for this could be that these were covered at least partly by more overarching formulations in the ranking tasks and could also be an outcome of the way the topics were operationalized for the survey and the context of the work and case studies situated in Europe. Despite the less expressed relevance, these specific aspects should nonetheless not be overlooked in TRL.

Some of the overarching topics of highest relevance can be mirrored in the work with the Pilot Cases. Explicit interest was expressed in aspects of inclusion of different vulnerable groups, how knowledge is produced, stakeholders are selected to create inclusivity and how challenges and obstacles are overcome as well as learning from failures. Another field of interest is the evaluation of NBS and the related co-creation processes.

Most interest in learning from Assessment Cases were methods and tools that were used for their co-creation processes and evaluating benefits that were achieved by using Living knowledge Labs as well as benefits experienced and unveiled by NBS for the cases. In general, a large number of very specific questions were brought forward. Looking at the material surveyed from the Assessment Cases, links and connections can be drawn between assessment cases and the respective inquiry for knowledge and experiences.

3.4 The Road Ahead - towards Assessment Case Roadmaps

For the roadmapping of the Assessment Cases, the first Ideation and Divergence Phase was done during Day 1 and Day 3 of the TRANS-lighthouses Consortium Meeting in Rome from February 28 to March 1, 2024 with Assessment Case representatives. Methods applied were Focus Groups, conversations and interviews (see e.g. Caitana et al., 2023 and Gouveia et al., 2024 describing tools and methods in co-creation of NBS) to get an overview of the most recent state of the Assessment Cases, needs, lessons learned and potential epistemologies to be shared with other cases and conceptual WPs (outcome e.g. for Upper Allgäu, see Figure 14). On Day 3, together with the different Assessment Cases, the common Roadmap structure was conceptualised and a structure was developed to reflect both the diversity of the cases but also a common frame for creating individual roadmaps and work plans (Figures 15 and 16).

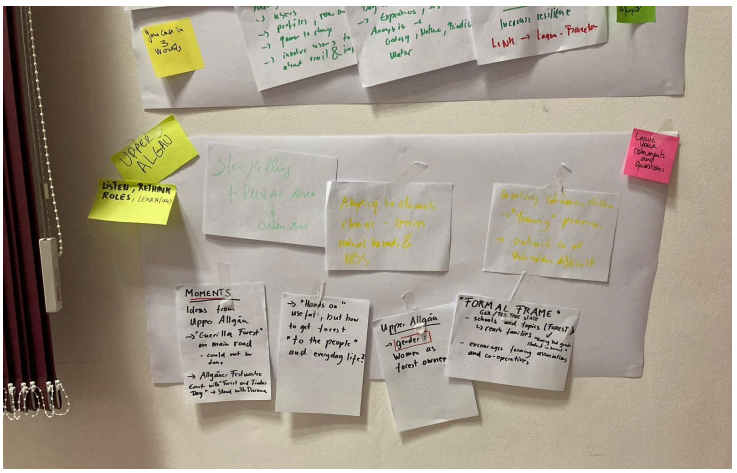

Figure 14: Recent state and summarization of needs, lessons learned and potential epistemologies for Upper Allgäu Assessment Case (Picture: Nathalie Nunes)

Figures 15 and 16: Roadmapping activity: Natalie Nunes (left), Gerd Lupp (right)

Main challenges in creating a common roadmap structure and to create a comparable set of roadmaps from the roadmaps were the variety of Assessment Cases in terms of ecosystems, stages of maturity and planned activities.

The range of Assessment Cases stretch from following and analysing mature co-creation processes of NBS, e.g. Upper Allgäu Mountain Forest Initiative or the Brussels Water Management Plan to cases with activities similar to the TRL Pilot Cases with a strong focus on co-creating and elaborating a NBS solution or work with specific groups such as Lagoa and Estarreja. Some cases will therefore have co-creation activities while others will mainly work on drawing lessons learned and more serve for conceptual tasks and WPs.

Given the diversity of Assessment Cases, together with the case representatives, the structure, steps and elements to be contained for the assessment case roadmap template was elaborated. Main elements were to design one roadmap template to serve the needs of all cases. A key element of elaborating the roadmap was that it needed to cover two perspectives: A work plan for

the case and where the Assessment Case could link, collaborate and team up with other cases and conceptual work packages for lessons learned.

Based on the outcome of topics discussed, in the follow-up of the Workshop, this structure was transformed to a first Roadmap Template Draft Document to be shared, discussed and further elaborated with the different tasks in WP3 to best capture, document and guide the work and creating ties and connections with the conceptual work packages and Pilot Cases. To allow comparability with the Pilot Cases, it mirrors the Pilot Case Roadmap elaborated by Simons et al. (2024). For this reason, the draft Assessment Case Roadmap follows the elaboration by Simons et al. (2024) in many of the elements, how to elaborate the different elements and what materials should be provided. The created first draft document for the Assessment Roadmap is presented as Appendix 2 of this report. As described, this first draft is to be iterated and further evolved with the different tasks to create a template that forms the basis for Assessment Case specific working documents.

4 Outlook

This report is the first of a series of documents and outputs of Work Package 3. The outcomes of the work presented and materials collected in this first task provides a basis and foundation to develop and build a set of indicators for NBS in Task 3.2. With largely compiling materials in the presented work, in this next step, the collected material will be critically reflected and reviewed based on the diversity of knowledges represented in TRL to elaborate stakeholder-centred perspectives, as well as starting to extract the epistemologies and drawing lessons learned from the Assessment Cases. With the provided first outcomes of the first task in Work Package 3, it contributes to the creation of an ontology for NBS.

For the different tasks in Work Package 3, the materials elaborated in T3.1 serve as building blocks for Task 3.3 and support the research process on a comprehensive evaluation on NBS design and implementation. They lay a foundation for the analysis of stakeholders and identified target-groups for co-creating NBS. T3.1 provides theoretical backgrounds and identifies research gaps, guiding investigations to understand the role of actors and ensuring that in co-creation processes and NBS implementation, no one is left behind. Considering the knowledge gaps identified in D3.1 in terms of literature and data banks, indicators and solutions are reflected and new ones can emerge to best measure the effectiveness of the NBS especially in terms of socio-economic and socio-cultural aspects.

For Task 3.4, the presented work supports evaluating the co-creation processes by interlinking the gathered information and knowledge with the research process and suggestions for a systematisation of the work with the assessment cases, especially reflecting on roles and the relational dynamics considering citizens' perception and expectation towards NBS, delivery of ecosystem services as well on reflecting decision processes.

In a similar way, it supports creating an understanding of the meanings and values attributed to nature in different contexts of TRL and how these could impact the positive effects of NBS through practices as a key task in T3.5. It provides building a foundation from literature and cases to create evidence on highlighting the differences and similarities of perceptions, representations and practices between the different categories of stakeholders in the different urban, rural, coastal, forestry contexts of TRL.

With reflecting on dilemmas in local democracy labs and cases in Task 3.6, the collected materials, data bank cases and literature as well as learning from the Assessment Cases can feed and contribute to training material and policy briefs.

For conceptual Work Packages in TRL, the materials can feed into WP2 and namely T2.2 on Human-Nature Relations supporting the work with findings from literature and linking with retrospective analyses from the Assessment cases. While providing material and foundation for the work for 3.2 and an ontology, they can contribute to build a typology of NBS lighthouses in T2.3,

Picking up on the governance archetype framework in Task 4.1. Task 3.1 and others iterates back material and knowledge to WP4 to support the design of innovative governance systems, contribute in understanding cultural, technical and political obstacles, as well as how they were addressed, overcome or remained unresolved. Additionally it assists T.4.3 in triangulating principles of collaborative governance, criteria for democratic innovations, local participatory and governance culture and sets of methodologies, by providing evidence and eliciting knowledge from TRL partners.

For WP5 and namely Task 5.4, the foundations are laid by literature and Assessment Case roadmapping to support connecting and articulating the process of co-monitoring and assessment of the NBS in the local pilot cases. With contributions from WP3, it supports scaling up and setting up dialogues and learning processes between the different TRL cases.

Finally, with WP6 working on citizen science frameworks, as well as approaches and pathways to social mobilisation, citizen engagement and digital and low-tech tools, Task 3.1 with its collection of literature and experiences from both data bank cases and capturing knowledge and experiences made as well as lessons learned in the Assessment Cases, can provide valuable insights and contributions to the different tasks in this work package.

From a broader perspective, several lessons learned from literature and the cases selected can be used to reduce the risks and avoid shortfalls in pilot implementation. The collected knowledge and evidence can help to steer both scientific and practical work towards addressing identified knowledge gaps and strategies for closing them. The collected literature for review provides support and evidence for many research tasks. In terms of AI, the potential of such tools in dealing with large amounts of material was demonstrated, but so were the challenges and limitations of such tools at the time of working with them in late 2023 and early 2024. These included their capability to process data to create useful outputs and the need to critically reflect and review generated outcomes as well as how such tools make their choices.

Ethical Statement

The study involves statements from humans and special attendance is drawn on it in all research and innovation work. They are implemented in line with the highest ethical standards and the applicable EU regulations and guidance, namely the General Data Protection Regulation - GDPR (Regulation (EU) 2016/679), The European Code of Conduct for Research Integrity, Horizon Europe Guide on Ethics and Data Protection (2021), and the Horizon Europe Guide on Ethics in Social Sciences and Humanities (2021). Also, the constitution of TRANS-lighthouses - External Ethical Advisory Board (OEI requirement under WP7, 7.1) is relevant to ensure that all WPs and tasks are following all relevant ethical principles.

Conducting and handling of the surveys and interviews, collected data and maintaining privacy of persons follows the legal basis of the EU, REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing GDPA Directive 95/46/EC (General Data Protection Regulation) and corresponding country-specific regulations for the Federal Republic of Germany – BDSG (new) from 2018 as well as their adoptions in the participating EU countries. In line with the Research Ethics Procedures of the Technical University of Munich and project partner institutions based on the mentioned EU and respective country regulations, the participants received written information on how the data would be used and were asked to give their consent to participate in the interviews according to these guidelines. We obtained consent from all research participants prior to the interviews and handled their confidentiality and interview data according to this consent.

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Appendixes

Appendix 1: Online survey on relevance of topics for the TRANS-lighthouses consortium and partners

Introduction to the survey

A004

Dear participant of the survey,

TRANS-lighthouses aims to gather evidence on Nature Based Solutions (NBS) in order to rethink and reframe the main elements that compose the complexity of creating social and ecologically just NBS.

The following survey intendeds to identify and reflect the interests and needs to better understand and to better support co-creating more inclusive NBS. We will therefore ask a number of questions about relevance of topics that will take around 15 min to be finished.

Collecting data and maintaining privacy of persons follows the legal basis of the EU, REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016 on the pro-tection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing GDPA Directive 95/46/EC (General Data Protection Regulation) and corresponding country-specific regulations for the Federal Republic of Germany reflecting – BDSG (new) from 2018 for the Technical University of Munich in charge and leading this survey and in line with the Research Ethics Procedures of the Technical University of Munich.

The collected data only serves the above described puropose for this specific research question and is intended for non-commercial use only. Participants of this survey remain anonymous during all stages of the survey no personalized data will be collected. To ensure maintaining privacy at all stages, we kindly ask you NOT to type in anything that could be linked or tracked back. In specific, please DO NOT type in adresses, e-mail addresses or phone numbers. If you wish to receive more information, in case of questions and comments or requests, please directly contact the person in charge of this survey.

WITH PROCEEDING CLICKING THE "NEXT BUTTON", we consider this as accepting the above stated use and handling of the data. In case of disagreement, we would kindly ask not to proceed and ending this survey by closing this browser window or tab.

Thank you very much for your help!

Page 02

Would you let us know your role and link to TRANS-Lighthouses? A101

Please fill in just one option. In case there are several ones, please choose only the role you identify the most.

- ○ Participant of a TRANS-Lighthouses PILOT CASE Living Knowledge Lab
- ○ Work for a TRANS-Lighthouses WP
- ○ Team member facilitating a PILOT CASE
- ○ Participant of TRANS-Lighthouses ASSESSMENT CASE Activity
- ○ Other Role in TRANS-Lighthouses
- ○ Partner of TRANS-Lighthouses (e.g. Associated Partner, Sibling Project)
- ○ Other – if you like, you can specify ...

- ○ Prefer not to say

Page 03

How familiar are you with the concept of Nature Based Solutions? A007

- ○ No knowledge at all
- ○ Little knowledge
- ○ Some knowledge
- ○ Quite good knowledge
- ○ Very good knowledge

- ○ I prefer not to say

Page 04

What type of NBS are you most interested in? A006

You can select several options

- ☐ NBS in urban areas
- ☐ NBS in rural areas
- ☐ NBS in built-up areas (e.g. solutions in city quarters)
- ☐ NBS on buildings (e.g. green roofs)
- ☐ NBS linked to or with forests
- ☐ NBS linked to agriculture and farmland
- ☐ NBS linked to rivers and inland waterbodies
- ☐ NBS linked to wetlands
- ☐ NBS in coastal areas
- ☐ NBS in marine ecosystems
- ☐ Others, please explain

- ☐ None of them
- ☐ Cannot answer

For co-creating more inclusive Nature Based Solutions, how important are the following topics for you? Please rate on a 1-5 Scale. One star – not important at all to five stars – extremely important	
Jobs and job creation	☆ ☆ ☆ ☆ ☆
Degrowth	☆ ☆ ☆ ☆ ☆
Plural Economy	☆ ☆ ☆ ☆ ☆
Solidarity Economy	☆ ☆ ☆ ☆ ☆
Alternative Economy	☆ ☆ ☆ ☆ ☆
Human Nature Relations	☆ ☆ ☆ ☆ ☆
Traditional Knowledge	☆ ☆ ☆ ☆ ☆
Cultural Aspects	☆ ☆ ☆ ☆ ☆
Societal impacts	☆ ☆ ☆ ☆ ☆
Upscaling	☆ ☆ ☆ ☆ ☆
Just transition	☆ ☆ ☆ ☆ ☆
Social inclusion	☆ ☆ ☆ ☆ ☆
Racism	☆ ☆ ☆ ☆ ☆
Immigrants	☆ ☆ ☆ ☆ ☆
Gentrification	☆ ☆ ☆ ☆ ☆
Children/Youth	☆ ☆ ☆ ☆ ☆
Adolescents	☆ ☆ ☆ ☆ ☆
Gender aspects	☆ ☆ ☆ ☆ ☆
Women/Girls	☆ ☆ ☆ ☆ ☆
Elderly	☆ ☆ ☆ ☆ ☆
Handicapped/Disabled	☆ ☆ ☆ ☆ ☆
Ethnic aspects	☆ ☆ ☆ ☆ ☆
Indigenous people	☆ ☆ ☆ ☆ ☆
Vulnerable groups	☆ ☆ ☆ ☆ ☆
Religious aspects	☆ ☆ ☆ ☆ ☆
Human rights	☆ ☆ ☆ ☆ ☆
Conflicts and their management	☆ ☆ ☆ ☆ ☆
Methods and tools for inclusion	☆ ☆ ☆ ☆ ☆
Participatory methods	☆ ☆ ☆ ☆ ☆
Governance aspects	☆ ☆ ☆ ☆ ☆
Democracy aspects	☆ ☆ ☆ ☆ ☆

For co-creating more inclusive Nature Based Solutions, how do you rank the relevance of the following different topics? Please arrange the cards in a descending order according to your perceived relevance.

Please rank: In comparison to the other topics, #1 is the most important topic, the last one is of less relevance.

Jobs and job creation	Degrowth	Plural Economy	1
	Solidarity Economy	Alternative Economy	2
			3
Human Nature Relations	Traditional Knowledge	Cultural Aspects	4
		Societal impacts	5
			6
Upscaling	Just transition	Social inclusion	7
Racism	Immigrants	Gentrification	8
Children/Youth	Adolescents	Gender aspects	9
Women/Girls	Elderly	Handicapped/ Disabled	10
Ethnic aspects	Indigenous people	Vulnerable groups	11
Religious aspects	Human rights	Conflicts and their management	12
Methods and tools for inclusion	Participatory methods	Governance aspects	13
		Democracy aspects	14
			15
			16
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			31

Page 07

A129

If you could ask someone from an Assessment case in TRANS-Lighthouses that already has made experiences or gone through a process of co-creating Nature-Based Solutions, what would be your questions to a case representative or what would you like to learn from such a case?

Open-ended question – please type in your questions

Page 08

A128

What would be a question or what would you like to learn from a Pilot case in TRANS-Lighthouses that are at the beginning of a process to co-create Nature-Based Solutions?

Open-ended question – please type in your questions

Page 09

A130

What would be topics on co-creating inclusive Nature-Based Solutions, that you would like to learn from more scientific literature and case studies from data banks?

Open-ended question – please type in your questions

Page 10

A131

From your perspective, what would be very interesting issues around co-creating more inclusive Nature-Based Solutions that should be investigated by research?

Open-ended question – please type in your questions

Page 11

May we ask for your age? A126

If you like to indicate, please choose the according age group, otherwise klick "prefer not to say"

- ○ Below 18 years
- ○ 18-24 years
- ○ 25-34 years
- ○ 35-44 years
- ○ 45-54 years
- ○ 55-64 years
- ○ 65-74 years
- ○ 75-84 years
- ○ 85 years and older

- ○ Prefer not to say

May we ask for your gender? A127

If you like to indicate, please klick one of the provided options, if you prefer not to say, you can choose for the "preder not to say" option

- ○ Female
- ○ Male
- ○ I self-describe myself as

- ○ Prefer not to say

Page 12

In which geographical region do you live?

Please choose only one option – please speak for the region you live in or that you would like to highlight as your main working area

- ○ Western Europe (FR, Benelux, UK, Ireland)
- ○ Southern Europe (PT, ES, IT)
- ○ Central Europe
- ○ Southeastern Europe (e.g. Balkans, Greece, Cyprus)
- ○ Eastern Europe
- ○ Northern Europe
- ○ North Africa
- ○ Subsahara Africa
- ○ North America
- ○ South America
- ○ Asia
- ○ Oceania

- ○ Prefer not to say

Is there anything else you would let us like to know?

Thank you for completing this questionnaire!

Your answers were transmitted, you may close the browser window or tab now.

Appendix 2: Roadmap Draft Template

[Please copy the template and try to fill in the material from your Assessment Case]:

[Name of the Assessment Case, Partner]

1. Description of the territory, its actors and challenges

Similar to the Pilot Case Roadmap, the Assessment Cases start with a section to describe what the case intends to work on and/or where Assessment Case can provide epistemologies and lessons learned that are of value for other Pilot or Assessment Cases as well as for different TRL conceptual Work Packages (WPs) and related tasks.

The Assessment Case roadmaps are picking up and following the Pilot Case roadmap structure in many points to create synergies, links and connections to identify connections between the cases, to share lessons learned and to develop individual work plans for the Assessment Cases. The template intends to bundle the existing knowledge of the partners on their territory and gives insight on the Assessment Cases, their goals and on what topics, challenges and dilemmas cases want to work on during TRL. Also, it will determine and elaborate about epistemologies and lessons learned that could be shared with other Pilot and Assessment Cases as well as to link with the conceptual WPs. The idea of this document is to extract insights and identify relevant topics worth for investigation and analyses. The template is intended to be elaborated in an iterative way. First, Assessment Case Representatives fill in the information about their case following the structure to create a draft. In the next step, the individual cases will receive feedback from the different pilot and assessment cases as well as the Work Packages. For the case representatives, try to remember the links and connections that we made during the 3rd day of the consortium meeting as a first hint but also try to outreach and have a look at all cases. Consider what you could offer to other Cases and WPs. What might be of interest or for persons representing other cases and WPs? There might be a lot of interesting aspects in the Assessment Cases when having a closer look. Based on this feedback loop, Assessment Case owners are invited to revise their roadmap accordingly.

Description of the territory

Territorial description

Macro: rural/forest/urban/coastal lighthouse

Instructions for this paragraph	
Main description of the paragraph	Give a description of the physical characteristics of the municipality, district or organizational unit (you can use EU NUTS definitions to explain) in which the Assessment Case is situated and orientate it in space. The physical characteristics concern for example its: geography, infrastructure, land use, density and urban form, landscape, facilities…
Must have data in this paragraph	It is important to highlight those factors that contribute to your municipality being a rural, forest, urban or coastal municipality and those macro factors that are of interest for the pilot case.
Length	200-400 words
Material for support	Maps, pictures, figures, tables, statistical data, GIS-data, policy documents, studies, urban development plans *To simplify, if available online, after a very brief description in the template, you can provide the links to such documents. In this case, make sure, the link to the document is working and linked materials will be available and updated until the end of the TRL lifetime*
Link to other Assessment or Pilot Cases, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations. Materials collected for the Consortium Meeting in Rome and the documentations can be found in Basecamp link: https://3.basecamp.com/5699989/buckets/34865148/vaults/6747165090*
Contact in case of questions or aid	Gerd Lupp
Comments from conceptual WPs	Comments after Roadmap is shared with WPs to link, to be filled in by WPs and task leaders
Comments from other Pilot Cases	Comments after Roadmap is shared with Pilot Cases to links, to be filled by Pilot Case owners
Comments from other Assessment Cases	Comments after Roadmap is shared with other Assessment Cases to find links to be filled by other Pilot Case owners

OPTIONAL - Micro: This section might be relevant for site representatives with both a Pilot and Assessment case and planning to work with in different places or neighbourhoods. It might be also useful to have both the macro and micro level for Assessment Cases, that plan to pick a specific site for their work. For these described situations, it will be useful to have a description of both the macro (region/city) and the micro scale such as the neighbourhood or location/place of the Assessment Case.

Instructions for this paragraph	
Main description of the paragraph	This section is especially relevant for cases with both a pilot and an assessment case or breaking down to one example within the territory to have a closer look: Give a description of the physical characteristics of the neighbourhood in which the assessment case is situated and orient it in space. The physical characteristics concern for example its: geography, infrastructure, land use, density and urban form, landscape, facilities…
Must have data in this paragraph	Try to highlight those factors that contribute to the unique character of the neighbourhood or case(s) and those factors that are of interest for either working in the case or that could be helpful for linking up with other assessment or pilot cases (e.g. to draw links by similarities in the territory). When filling out this section, try to think about the presentations you had at several stages and what you learned about the dilemmas of other assessment and pilot cases and what would be useful to know trying to broker and exchange knowledge.
Length	800-1000 words
Material for support	Maps, pictures, figures, tables, statistical data, GIS-data, policy documents, studies, urban development plans
Contact in case of questions	Gerd Lupp

Link to other Assessment or Pilot Case, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations*
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Socio-economic description

Macro: rural/forest/urban/coastal lighthouse

Instructions for this paragraph	
Main description of the paragraph	Give a description of the social and economic characteristics of the municipality or district in which the assessment case is situated. The socio-economic characteristics concern for example its: population demographics, income and employment, education, health, cultural and recreational facilities, crime and safety. Which aspects were most relevant to have co-creation processes and creating your assessment case?
Must have data in this paragraph	Try to highlight those factors that contributed to your case. Those macro factors that are of interest for working on the assessment case or drawing lessons learned for other Pilot or Assessment Cases or to connect with respective WPs and working groups/Task Forces dealing with socio-economic aspects.
Length	200-400 words
Material for support	Maps, pictures, figures, tables, statistical data; consider also links to respective documents to simplify the work when compiling the material. Please make sure that the link to the document is working and linked materials will be available and updated until the end of the TRL lifetime
Operationalisation of WP? Synergy with conceptual WP?	No
Contact in case of questions	Gerd Lupp
Link to other Assessment or Pilot Case, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations*
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Optional - Micro: This section might be relevant for cases planning to work on a specific place, e.g. having an assessment case and a pilot case in the same territory or when you like to go into more details when picking a specific site for further investigations

Instructions for this paragraph	
Main description of the paragraph	Give a description of the social and economic characteristics of the specific neighbourhood or location in which the assessment case is situated and where it is relevant for the case. The socio-economic characteristics concern for example its: (diverse) population demographics, income and employment, education, health, cultural and recreational facilities, crime and safety and community engagement.
Must have data in this paragraph	It is important to highlight those factors that contribute to the unique character of the neighbourhood or district and those factors that are of interest for working with the assessment case or to draw lessons learned for other cases or WPs. For example, what are or were community-based actors working in the field of equality, characteristics of the persons, especially in terms of gender, cultural background, migration, socio-economic status and other vulnerabilities.
Length	800-1000 words
Material for support	Maps, pictures, figures, tables, statistical data

Link to other Assessment or Pilot Case, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations*
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Lessons from the participatory culture

Together with the exploration of the physical and socio-economic characteristics of the territory, knowledge on the participatory culture and previous NBS projects with (or without) a strong participatory dimension within the territory is of interest to support your work in the Assessment Case. Besides own topics to elaborate and work on, sharing experiences made and epistemologies contribute to linking, teaming up and following with other Assessment and Pilot Cases and conceptual WPs to inspire and support other cases and their work, draw lessons learned and help to better understand how inclusive, "more than green" NBS could be created.

As one step, a (retrospective) mapping of participatory projects/trajectories, as well as an evaluation of their methodologies and results will generate a better understanding of the local participatory culture. This provides valuable data for the more conceptual tasks in WP3 and WP4 surrounding the evaluation of the Assessment Case. Thinking about the participatory culture with limits and opportunities, besides success stories, it is worth reflecting on a variety of activities in this section to identify what worked and what didn't work as well as failures or shortcomings to learn from.

Opportunities and barriers for participatory governance

Instructions for this paragraph	
Main description of the paragraph	This paragraph gives an overview on the accumulated experiences and conclusions. Based on what was or could be learned about the Assessment Case on the territory and their participatory (or non-participatory) structures, opportunities and barriers for the participatory culture surrounding the implementation of NBS can be identified. This paragraph is intended to describe the main experiences and knowledge of the partners on the barriers and opportunities for participatory governance and co-creation in their territories. This paragraph serves as an evaluation of the local participatory culture and local governance challenges that will help to draw lessons learned and share experiences. In this paragraph, the lessons learned from the assessment case in terms of participatory governance and culture will be outlined. This paragraph serves as a starting point for the evaluation of the local participatory culture and local governance challenges in the assessment case. It is of interest what contributed to the emergence and mobilisation of the LKL. For less mature cases, try to elaborate here on the participatory exercises/activities for mapping that you conduct to mobilise stakeholders.
Must have data in this paragraph	For the assessment case, its goals and actions need to be described as well as its participatory activities. Co-governance structures and socio-cultural, political and local obstacles and opportunities for participatory governance can be analysed by reflecting the frameworks of T4.1 and T4.2: see Work Document 2 - Mapping of Local Participatory Culture: Methods and Indicators (basecamp.com) In this paragraph, the partners reflect on what stories and epistemologies can be useful and interesting for the further development of the pilot and the LKL and what lessons could be learned (both in terms of success, challenges, and analysing what did not work). For less mature cases, reflect on specific aspects that you want to work on.
Length	500-1500 words
Material for support	websites, stakeholder spidergrams, images, charts…

Contact in case of questions	
Operationalisation of WP? Synergy with conceptual WP?	Task 3.3 - T3.3 concerns deep research process over assessment and pilot cases that will be applied to reach a comprehensive evaluation on NBS design and implementation.
Contact in case of questions	CES Team Isabel Ferreira, Andreia Barbas, Lucia Fernandez, Beatriz Caitana (T3.3 coordinator), Gerd Lupp (WP leader)

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Definition of the Assessment Case goals

[Based on the territorial reconnaissance and the analysis of the participatory culture, the ecological and socio-economical challenges can be identified around which the Assessment Case and the NBS that were created. Depending on the maturity of the Assessment Case, the goals are twofold:

- What are the aims of the Assessment Case to work on advancing working on ecological and socio-economical challenges around NBS?
- How has the Assessment Case worked on these ecological and socio-economical challenges and what lessons could be drawn?

Collecting information and knowledge as well expertise, this section defines the goals for working in and with the Assessment Cases.

Instructions for this paragraph	
Main description of the paragraph	In this paragraph partners can shortly introduce their Assessment Cases. You can build upon the information provided in the posters made for the first consortium meeting updating and changing the information where needed.
Must have data in this paragraph	Only a very short introduction of the assessment cases is needed. In the following paragraphs we expand on the ecological application of the NBS and the social dimension and the ecological are further elaborated. In a later section, the stakeholder dimension is reflected.
Length	100-200 words
Material for support	Maps, pictures, illustrations, figures
Contact in case of questions	

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Ecological challenges

Ecological goals and description of the NBS

Instructions for this paragraph	
Main description of the paragraph	This paragraph describes the ecological problem faced by the territory or neighbourhood of the assessment case. It describes the risks in light of climate change and the resilience of the territory. The paragraph further describes the goals of the assessment case in light of addressing this problem and its choice of NBS.
Must have data in this paragraph	The paragraph should contain a description of the ecological problem and its technical complexity and barriers in the territory (what, why, how) and how the Assessment Case addressed or will address the ecological problem. The ecological side of the NBS of the Assessment Case (what, why, how it works/how it did not work) should be clearly explained and motivated why (or why not) the specific NBS were decided to be the preferable solution. In contrast to D6.1 (part 2.2), where the ecological challenges are explained in a general way and connected to a lighthouse typology, we invite the Assessment Cases to write down the ecological problem and the NBS in more detail and, when you have a more mature case, how NBS addressed the problem, what worked well and what remained unclear or unsolved.
Length	500-700 words
Material for support	Maps, pictures, illustrations, figures, tables, examples
Operationalisation of WP? Synergy with conceptual WP?	Task 2.1 and deliverable 2.2 - T2.1 and D2.2 provide an Internal Conceptual Framework on NBS and describe the different dimensions (nature, social, economic) of NBS: T2.1 (basecamp.com)

Contact in case of questions	
Link to other Assessment or Pilot Case, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations*
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Local values and attitudes towards the ecological challenges

Instructions for this paragraph	
Main description of the paragraph	This paragraph describes the relationship and the position of the community of the assessment case towards the ecological challenges and for more mature Assessment Cases, how the perspectives and attitudes have changed over time when co-creating NBS.
Must have data in this paragraph	Local social interaction and behavioural aspects: attitudes, habits, behaviour, resistances and core values from the community towards NBS and the ecological context or climate change. Are there any barriers or dispositions, lack of solidarity, etc. that render the implementation of NBS difficult? Try to put a focus in this section on socio-cultural experiences and knowledge, considering diversity of knowledge mobilised within NBS implementation. What worked well and could inspire others? What did not work so well and what are remaining questions or topics to work on? What could TRL contribute to your Assessment Case?
Length	400-500 words
Material for support	Pictures, illustrations, figures, tables,
Operationalisation of WP? Synergy with conceptual WP?	Task 3.4 - T3.4 generates a deeper knowledge about behavioural aspects from the co-creation process, and spawn understanding of attitudes, habits, behaviour, resistances and core values from the community to the NBS involved. Task 3.5 - In T3.5 differences and similarities of perceptions, representations and practices between the different categories of stakeholders (inhabitants, government agents, members of associations, networks, citizens etc.) and the plurality of contexts (urban, rural, coastal, forestry) are registered.
Contact in case of questions	
Comments from other WP leaders	

Link to other Assessment or Pilot Case, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations*
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Socio-economic challenges

The following paragraphs describe the socio-economic challenges in the territory or neighbourhood of the Assessment Case. What lessons learned could be drawn in terms of social inclusion and in long lasting social cohesion in the local community especially in terms of leaving no one behind? Describe how marginalised knowledge and socio-economic needs of marginalised groups were (or, for Assessment Cases more to the beginning, will be) identified and addressed, as well as certain absences that emerged and how it was and/or will be addressed to include them. What could be lessons learned?

Identification of marginalised knowledges and of needs of marginalised groups

Instructions for this paragraph	
Main description of the paragraph	This paragraph reflects on marginalised groups and knowledge that are underrepresented in today's society. The information from this paragraph links strongly on the socio-economic territorial description in the previous chapters. The socio-economic needs of marginalised groups are identified and described and there what was/is the motivation of why and how the Assessment Cases (depending on their maturity) addressed or will work on these needs.
Must have data in this paragraph	Identification of socio-economic problems and social networks in the area. Identification of areas of exclusion, abandonment, vulnerabilities (e.g. poverty, racism, integration, happiness, etc.) for certain groups. Reflect on networking actions to understand their social challenges. The specificities of the social groups are to be registered (e.g. age, gender, race and ethnicity, functional diversity, socio-economic status, culture, religions, local history and existing relationships). Were all groups included, who/ what was missing? Were there attempts to overcome them? What worked well, what did not work?
Length	500-800 words
Material for support	Pictures, illustrations, figures, tables, notes on meetings with associations, interviews, policy documents…
Operationalisation of WP? Synergy with conceptual WP?	Task 2.1 - T2.1 will focus on re-thinking NBS through the lens of action research, participatory processes and inclusive communities: T2.1 (basecamp.com). This task will focus on extending the understanding of what is NBS by relying on sociology of absences (Santos, 2001) and asking what is not there and who is not there? WP3: Following the principle that NBS are beneficial for all stakeholders and inclusiveness, for more mature cases, describe strategies how it was done to involve and engage especially vulnerable groups such as women, youth, indigenous populations and those hit the hardest by the COVID-19 pandemic in the co-creation of NBS as well as on under-researched groups. Did the strategies work and what lessons could be learned?
Contact in case of questions	

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Identification of presences and absences

Instructions for this paragraph	
Main description of the paragraph	This paragraph describes what was absent and who still is absent in the territory of the Assessment Case. This paragraph also describes what is present, upon which an equality is sustained or introduced. The paragraphs describe how the Assessment Case and the NBS addressed the absence or presence and how it was tried (or will be attempted) to overcome them. These absences can be economical in nature or societal. This paragraph needs to specifically address the social and economic dimension of the NBS. Try to look at your Assessment Case, if there is something that could provide more information about the economic dimension of NBS, how to be inclusive and how it contributed towards a solidarity economy.
Must have data in this paragraph	
Length	500-700 words
Material for support	Pictures, illustrations, figures, tables

Link to other Assessment or Pilot Case, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations*
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2. Lessons learned on diverse knowledges for co-creation approaches

[For TRL ,case-specific learnings from the Assessment Case and the mapping of the participatory culture can provide information for both conceptual WPs and to create a pool of lessons learned for Pilot Cases. With this work, it is possible to create relationships with potential partners for cross-fertilization and inspiration, upscaling, replication and dissemination of good practice examples.]

Creating relationships with partners

Networking and exploratory activities in territory

Instructions for this paragraph	
Main description of the paragraph	This paragraph allows the partners to reflect on their activities and development of co-creation processes.
Must have data in this paragraph	What lessons learned could be drawn from the assessment cases? What formats such as field visits, working with "Hands-on" cases, events from/through/together with local communities and organisations were moving co-creation of NBS the most? How was learning achieved from and between different groups of stakeholders? What about challenges? How did it contribute to gaining more connection with the territory and working together? What remained open or did not work so well?
Length	300-500 words
Material for support	Summary of materials from documentations and insights, interviews and testimonials
Contact in case of questions	

Link to other Assessment or Pilot Case, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations*
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Bringing members and stakeholders in Co-Creation Processes

[A key challenge is to bring the local community and the relevant stakeholders of the territory and with knowledge to co-creation processes. This section wants to reflect on how this was done for more mature Assessment Cases. How participants were selected and co-creation processes were assembled? What lessons learned could be drawn for others? For less mature Assessment Cases where it is planned to work on NBS, consider and reflect how you intend to bring participants to the table to successfully create co-creation processes following the philosophy of the TRANS-Lighthouses project.

Instructions for this paragraph	
Main description of the paragraph	This paragraph reflects if and how a stakeholder mapping was done and what characteristics were chosen. What was the role and relationships with each other? What barriers were observed and how did this influence the processes? What knowledge was brought together and represented, what was missing? What could be lessons learned for others? In case your assessment case will work on co-creating NBS, please write about the plans for your processes.
Must have data in this paragraph	This paragraph includes basic information on the stakeholders (types, locations, tasks, statutory goals…). In this paragraph it is important to understand and describe the interests of the stakeholders, diverging interests and how they started collaboration. How was a diversity of knowledge represented by stakeholders? Were perspectives missing and why? How were citizens included in co-creation processes of the assessment cases? Directly or by representation through an intermediary actor? Who represents nature? If your case is less advanced, describe your case accordingly.
Length	1500-2000 words
Material for support	Pictures, illustrations, figures, tables, websites…
Contact in case of questions	

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Inclusion of marginalised knowledges

Instructions for this paragraph	
Main description of the paragraph	Looking at the paragraphs which describe the social challenges in the territory and the importance of inclusion of marginalised groups for the TRANS-Lighthouses project, this paragraph describes how knowledge of marginalised communities or groups were represented and included. What worked well, what didn´t?
Must have data in this paragraph	The paragraph should describe who or what marginalised group is represented, what knowledge was represented (direct representation or representation by an intermediary stakeholders or actor). If the representation is by an intermediary (e.g. associative and community-based actors working with these groups), try to describe the goals and nature of the intermediary and its connection with the marginalised group or community. In this paragraph the experience and difficulties could be explained in more detail as well. The paragraph can describe how relationships are maintained within the social network to generate understanding of social issues of vulnerable and underrepresented groups (e.g. go to meetings and local events of local associations or communities).
Length	300-400 words
Material for support	Pictures, illustrations, figures, tables, websites…

Link to other Assessment or Pilot Case, Link to conceptual WPs from Case Owner perspective	*Consider the questions raised during the Consortium Meeting Workshop discussions on Day 1 and Day 3 and what was attached to the posters and written on the posters and the network of wool you created – see Workshop documentations*
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Inclusion of youth

Instructions for this paragraph	
Main description of the paragraph	One of the identified lack of knowledge is co-creation of NBS with adolescents and youth. Some Assessment Cases might form a relationship with the youth and adolescents or have lessons learned from engaging young persons and, if you have good examples, targeting at specific groups such as girls, children with handicaps (physical, sensory or mental)
Must have data in this paragraph	It is important to register the characteristics of youth actors (age, education, socio-economic status) and their institution by which they were contacted (e.g. school, sports, movement, organisations), what contacting and networking activities have been conducted or if assessment cases plan to work with them, in which form young people are engaged and what form of projects/engagement they are involved. For more mature Assessment Cases, what could be lessons learned to be shared?
Length	300-400 words
Material for support	Pictures, illustrations, figures, tables
Contact in case of questions	

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Relationship with and view of nature (human-nature relationship)

Instructions for this paragraph	
Main description of the paragraph	This paragraph includes a registration of perceptions and practices (cultural, political) surrounding NBS and nature and describes the relationship of the (categories of) stakeholders towards nature. How is nature understood and what is nature, and how do the perceptions and practices of the stakeholders relate to their understanding? Please reflect on how and through what representation of stakeholders or directly, nature could be seen - or should be seen - as an actor in the co-creation processes? What lessons learned could be drawn when looking at more mature Assessment Cases? Which questions remain open?
Must have data in this paragraph	You could reflect on: categories of stakeholders (inhabitants, government agents, members of associations, networks, citizens), their perceptions and practices (cultural, political), characteristics of the context by reflecting GIS data, policy documents, studies, planning documents…) and the definition and perspectives of ecological challenges. What knowledge was or is lacking? How was knowledge generated and provided (by whom, how?)
Length	500-600 words
Material for support	Possible (based on conceptual tasks description): PPGIS (public participation geographic information system), participatory map-it exercises. A partially common framework for qualitative and quantitative surveys in evaluation/pilot cases (e.g. a common section of interview guide, a shared questionnaire template enabling data comparisons across stakeholders/countries/types of NBS)
Operationalisation of WP? Synergy with conceptual WP?	Task 2.2 - By collaborating with the pilot cases across the lighthouses, T2.2 will collect qualitative and quantitative data about different types of ecological interconnectedness of people with their environments, in order to create an overview of human-nature relationship in diverse contexts. @ Task – consider if there might be interesting things from the Assessment Cases as well. Task 3.5 - In T3.5 differences and similarities of perceptions, representations and practices between the different categories of stakeholders (inhabitants, government agents, members of associations, networks, citizens etc.) and the plurality of contexts (urban, rural, coastal, forestry) are registered. The aim is to describe and map what counts as nature and what is valued in different territories and groups. Task 4.1 - T4.1 creates a framework with governance archetypes that will sustain the process of situating the systems of governance from the assessment and pilot cases.
Contact in case of questions	

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Strategy, Work Plan and Actions with Time Line for the Assessment Cases

After having collected the diverse information of the Assessment Case, reflecting on stakeholders and how they were/or intended to be represented in co-creating NBS, in this section, the idea is to develop a workplan with actions and strategies to work in the Assessment cases. Here, try to reflect on what was in the poster descriptions and updates as well as what you presented in Rome and questions you received both in the discussions and on the posters. To structure this elaboration, the following part is organised in three sections:

The first section asks to formulate key questions to work on and set goals for what you want to achieve with the assessment case. The second section intends to reflect about members/stakeholders if you want to set up a more intense LKL process in the Assessment Case. Finally, the third section steps towards an operationalization by reflecting on activities and tools that could provide epistemologies and lessons learned or if you plan to establish a LKL or NBS co-creation approach.

Section 1: Reflecting on the Scope of the Assessment Case

1.1 Key questions on dilemmas and work in the case
Please describe here the key questions and dilemmas goals that you want to work on in the assessment cases. Do you plan to set up and engage stakeholders in a LKL? If yes – explain the setup and engagement in the LKL as well as how you plan to map and engage to leave no one behind
Write here…

1.2 Key topics to work on and steps taken
Please describe here, if already identified key topics to reach the goals of the assessment case. If you plan to set up or use a LKL for the work in your assessment case, please describe in more detail your steps and type of activities
Write here…

1.3 Key steps and operationalization
Please outline and sketch a work plan and timeline for your work in the assessment case, steps that you want to take and what you want to achieve with a rough timeline
Write here…

1.4 Intended Outcome or Goals of the Work in the Assessment Case
Please describe the intended outcomes (results) that you would like to achieve in your assessment case.
Write here…

Section 2: Stakeholder Engagement

2.1 Intended engagement of stakeholders
Please reflect here who you systematically want to engage and strategies how to involve everyone in an inclusive way in your processes. Check your stakeholder lists if they are complete and discuss it briefly so persons not familiar with the case could understand and follow your thoughts.
Write here…

2.2 Engagement beyond the usual suspects
Reflect here on your strategies to engage and include all stakeholders, especially if you intend to set up a LKL. Please describe your strategies to engage beyond the usual suspects and bring underrepresented and vulnerable groups to your processes (e.g. young persons, elderly, disabled, with migration background…)
Write here…

2.3 Creating added value for non-TRL funded participants in case activities
Please reflect here how the persons and volunteers engaging in your processes are receiving added value for their time dedicated to work in the LKLs or processes you intend to work on in your assessment case. Consider all aspects such as incentives, non-material benefits but valuing their contribution (e.g. inviting for a meal during or after a workshop) or other elements to show respect and value for the persons contributing and dedicating their time and knowledge to TRL.
Write here…

Section 3: Tools and type of Activities

3.1 Tools and Approaches
Linked to the surveys before and tables for the Pilot Cases, reflect here which tools you choose for your case
Write here…

3.2 Formalization of Activities and LKLs
Please reflect here on envisaged meeting formats and frequencies and work formats (e.g. forming a working group; create workshop series; webinars; field trips; excursions; public events; capacity building)
Write here…

3.3 Cross Fertilisation Activities suitable beyond own case
Please describe here activities that might be suitable or of special interest for fellow pilot or assessment cases, for specific TRL-work package tasks or Task Forces. Consider also formats bringing together different cases and sharing knowledges and experiences made. This could be films, slideshows etc. and consider also on formats to bring different actors/stakeholders together e.g. through a webinar etc.
Write here…

Further remarks related to the Assessment Case

Further information / remarks
Describe here any further information or remarks you'd like to add to the description of your Living Lab strategy.
Write here…

Supplementary Materials

Scopus AI Outcomes and Custom AI Tool Material

https://zenodo.org/communities/trans-lighthouses/