OPERANDUM

OPEn-air laboRAtories for Nature baseD solUtions to Manage hydro-meteo risks

Multi Stakeholder engagement strategy

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Short Description
The present deliverable explores and analyses some of the main issues related to the engagement of stakeholders (SH) in developing and implementing Nature-Based Solution and gives a map of the work done in the first year of OPERANDUM. Defining a common strategy for stakeholder engagement that includes tactics, formats, ethical rules and indicators for monitoring, is of paramount importance. The OPERANDUM engagement strategy represents a meaningful and efficient document for capacity building and network development and will guide the implementation of OPERANDUM project.

Dissemination level		
PU	Public	X
CO	Confidential, only for Members of the Consortium, including the EU Commission Services	

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List of Acronyms and Abbreviations

DRR	Disaster Risk Reduction
EU	European Union
GA	Grant Agreement
OALs	Open Air Laboratories
OPLLA	Open Platform
NBS	Nature-Based Solutions
WP	Work Package
SH	Stakeholder
GDPR	General Data Protection Regulation
DPO	Data Protection Officer
NGO	Non-Governmental Organizations
DoA	Description of the Action
PEDRR	Partnership for Environment and Disaster Risk Reduction
UNDP	United Nations Development Programme
SWOT	Strengths, Weaknesses, Opportunities, and Threats

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Executive summary

The present deliverable explores and analyses some of the main issues related to the engagement of stakeholders (SH) in developing and implementing Nature-Based Solution and gives a map of the work done in the first year of OPERANDUM. In order to create and maintain a structured and constant engagement of stakeholders throughout the project, a strategy has been defined that can be used as a methodology and gives the main guidelines on how to involve SH in the co-design, co-implementation, and monitoring phases of NBS. It should be considered as a flexible framework, adaptable through time as per SH needs, requirements and roles change.

Defining a common strategy for stakeholder engagement that includes tactics, formats, ethical rules and indicators for monitoring, is of paramount importance. The OPERANDUM engagement strategy represents a meaningful and efficient document for capacity building and network development and will guide the implementation of OPERANDUM project.

The overall aims of the stakeholder engagement are to increase the diversity of knowledge in design and development of the NBS, improve the social relevance and acceptance of the activities and final results, take care of efficient use of the resources, and throughout the process enhance the learning of the all partners. The process is guided by values, which are inclusivity in regards to stakeholders, credibility, accessibility, respect and sensibility in regards to the process, and accountability and acceptability of the final outputs. It is assumed that these values will lead to greater legitimacy of the process and its outputs as well as trust between the partners. OPERANDUM has designated persons that are in charge of certain engagement processes.

OPERANDUM pursues a co-design and co-develop approach and foresees the set-up of Open Air Laboratories (OALs) in which user-centric method, characterized by the active participation of the stakeholders, is promoted. Due to the complexity of the project a multiple level of engagement is required: starting from the local community, the project aims at involving stakeholders at national and international level to leverage widest possible NBS acceptance to promote its diffusion as a good practice and push business exploitation. The stakeholder engagement strategy is based on the stakeholder mapping which is one of the outputs of WP1. Information and data resulting from stakeholders mapping, have been further processed and analysed in order to identify the main stakeholder target categories of OPERANDUM; for each target category reasons for engagement have been clarified. Having established clear reasons for engagement, an important step in the stakeholder engagement process is represented by the prioritizing of stakeholders. In OPERANDUM a Power-Interest Matrix has been adopted as a useful tool for helping to assess the level of engagement required of different stakeholder groups throughout the project duration. Furthermore, for each stakeholders target category, reasons of interest and expectations have been identified to obtain a greater understanding of stakeholders motivations, interests, needs, and requirements.

The stakeholder engagement is most critical in the Open Air Laboratories. To manage successful co-creation the OPERANDUM is following common guidelines (Task 1.3). Yet, given that all OALs are different geographically and technologically, and located in different kind of institutional, environmental and political contexts, we have identified common opportunities that can be used to strengthen the processes as well as challenges that require specific tactics. The challenges found across the OALs are related to the awareness, attitudes and trust, diversity of goals and interests, financial, legislative, resources (skills or time).

Monitoring during the co-creation process and evaluation at the end of the process are important. They may help to adopt changes and improve the process, but also enhance learning among all partners. We propose some tools and measures to carry out these monitoring activities.

1. Introduction

Science, technology and related expertise have taken an increasingly prominent role in society in the last centuries and shape significantly the way social- environmental policies are implemented. The topic, in the public debate, is still controversial regarding the way science and technology progress and expertise is applied to address societal needs, expectations and demands and it's expected to increase as the scientific progress will proceed. Often this debate is spiced up with scepticism and mistrust towards science and technology, especially if perceived as something complex and unintelligible. National and international institutions - such as the European Union - have recognised this as a critical issue in public policies, detecting what has been sometimes depicted as a "crisis of trust in science" and, more recently, a crisis of data-driven policies design in addressing public issues.

A number of theoretical frameworks and specific fields of research (i.e. STS- Society of Science and Technology studies) have been developed along the years and problematize this issue, discussing from different points of view. Not just hard sciences but also other disciplines are getting more and more involved in what is called Responsible Research and Innovation[1] by using transdisciplinary approach, which takes in consideration the societal point of view. The great challenge is therefore to "tune" different framework and languages that may differ considerably as to how the origin of the problem is diagnosed and how the answer is conceived. Although there is a widespread agreement that any simplistic view of the interface between science and society is to be abandoned and that more inclusive approaches have to be worked out, participation and deliberation in research and innovation is slowly growing, influencing the direction of associated policies locally, nationally and internationally. As a result, there has been an increase in awareness, conceptual frameworks, tools and skills in communicating science, gauging public responses and involving people in science-related policy-making. Given this scenario, why is it important, within a project like OPERANDUM, to discuss, work and focus on stakeholder engagement strategy?

OPERANDUM's foundation is based on co-creation, co-design and active engagement of stakeholders at different levels during the 4-year life of the project and beyond. Most of OPERANDUM partners through different work packages will interact with stakeholders directly (Foundation WPs (WP1, 2 and 3) and Evidence Building (WP 4, 5 and 6)) or indirectly (Consolidation (WP 7) and Outreach and Impact (WP 8 and 9), interactions are described in the Section 3.3. Several OPERANDUM's indicators on monitoring, modelling, socio-economic and policy aspects are directly related to OPERANDUM stakeholders.

Co-creation can be briefly defined as a participatory and inductive approach that aims to stimulate collective creativity in order to jointly develop an idea. Ideally, the co-creative process consists of four phases: 1) the co-analysis of the problem, 2) the co-design of the solution, 3) the co-evaluation and 4) the co-implementation of the idea (Stembert, 2017). Co-creative methods advocate to involve a wide variety

[1] Richard Owen, Phil Macnaghten, Jack Stilgoe; Responsible research and innovation: From science in society to science for society, with society, *Science and Public Policy*, Volume 39, Issue 6, 1 December 2012, Pages 751–760, https://doi.org/10.1093/scipol/scs093

of stakeholders throughout the entire co-creative process. The active inclusion of this wide spectrum of stakeholders is based on the idea that 'everyone is an expert on one issue or another, first and foremost on their own life' (van Westen and van Dijk 2015, p.15).

The aim of bringing different people (stakeholder) together to develop an idea is multifold: the involvement of the target group throughout the co-creative process is expected to increase transparency, support and contribute to build a cultural acceptance of the shared approach and increase the level of responsibility connected with the final outcome of the co-design process. The role of stakeholder is crucial in the process of co-design, co-creation, co-development and their involvement can shape a more conscious and participatory implementation of the NBS at local, national and international level. The participatory process contribute positively in leveraging the widest possible level of NBS acceptance and promote its use as a good practice as shown in previous researches[2]. To do so it's essential to engage different level of stakeholder and realize a multi-dimensional open and flexible platform enabling stakeholders and end users to improve knowledge in NBS to mitigate climate change as well as ways to promote and exploit the improved/preserved environment while increasing business opportunities.

Who are the stakeholders? What is stakeholder engagement?

In OPERANDUM stakeholders are defined as partners that are "any person or group who influences or is influenced by the project" (Durham et al. 2014). This broad, inclusive definition covers anyone, or any group, directly or indirectly affected by a project, as well as those who may have interests in a project and/ or the ability to influence its outcome, either positively or negatively. We define engagement as a mutually beneficial interaction that results in participants feeling valued for their contribution. It means active involvement and participation of stakeholders in some aspect of a project/research. The intensity of the engagement may vary from collaboration to sharing knowledge (see Chapter 4).

This stakeholder engagement strategy is a programmatic document to direct meaningful and efficient stakeholder engagement activities and initiatives in OPERANDUM and for co-designing NBS. The aim of the strategy is to guide and add value to the OPERANDUM operations with the stakeholders by:

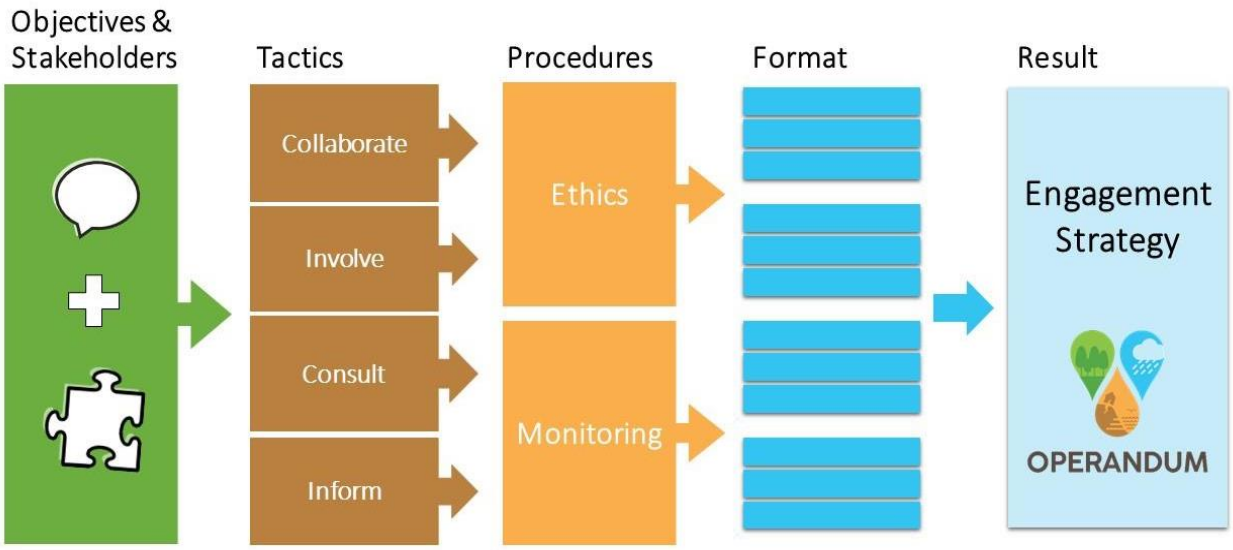
- Enabling efficient, systemic and transparent collaboration with the stakeholders;
- Reassuring stakeholders that their role in the co-design of OALs and NBS more broadly are essential;
- Enhancing opportunities by better understanding about the goals and motivations of each parties';
- Reducing constraints and minimising risks in the co-design of OAL;
- Enabling it to better understand potential contradictions and conflicts and deal with them.

Defining common strategy for stakeholder engagement that includes tactics, formats, ethical rules and indicators for monitoring, is of a paramount importance (see Figure 1). OPERANDUM engagement strategy

[2] Keith M. Reynolds, Social acceptability of natural resource decision-making processes, USDA Forest Service - General Technical Report PNW, 2002, and K. A. Nicholas. 2019. Creating space, aligning motivations, and building trust: a practical framework for stakeholder engagement based on experience in 12 ecosystem services case studies. *Ecology and Society* 24(1):11. https://doi.org/10.5751/ES-10061-240111

will represent a meaningful and efficient document for building capacity and network development and will guide implementation of OPERANDUM project. The final strategy could be used as a guidelines for co-designing and co-developing activities in other projects focusing on NBS. The present deliverable aim to report the work done at OAL, national and international level from OPERANDUM partners regarding the definition and the customization of the engagement strategy that include tactics, formats, ethical rules and indicators for monitoring.

Figure 1 - Stakeholder engagement strategy methodological scheme



2. Scope and Outline

According to what has been declared in the WP8 activities outlined in the DoA regarding the involvement of stakeholder[3], the scope of the deliverable is to report the work done in the first year of OPERANDUM project on identifying SH needs and requirements in order to establish a multi-stakeholder engagement strategy that can be used to guide the stakeholder activities throughout the whole process of implementation and experimentation of NBS in the current project. The stakeholder engagement strategy serves as a document for building capacity and networks for NBS in OPERANDUM, but also more broadly in NBS approaches.

The formalization of requirements from all levels (local, national and international) of primary, secondary and tertiary stakeholders would provide suitable inputs to the co-design, capacity building and dissemination tasks of OPERANDUM. Taking in consideration the heterogeneous composition of the partners and the phases of this project it is crucial to identify some major indications or guidelines to define a common approach that will be used within the project to deal with the stakeholder issues in various phases.

The definition of the SH engagement strategy is the result of combined actions of partners involved in OPERANDUM and it aims to tune the needs of project with the needs of stakeholder assessing engagement tactics and procedure required. During the first year OPERANDUM partners, using virtually and face-to-face meetings, were involved in designing the strategy that should be understood *as a co-creation* process between those who are carrying the project and the different groups of stakeholders linked to it.

The first big crucial challenge was to establish a common approach within a project on how to deal with the stakeholder issues in various phases of the project, in different areas (e.g. OAL) with diversified characteristics and needs without being too general and broad and fail to address issue regarding the engagement of SH.

Based on “trial and error approach” the co-creation process proceeded as followed:

At the beginning the group started with literature review of the principles and good practices of the stakeholder engagement in NBS and began to identify a clear definition of OPERANDUM ambition for engagement in terms of expectation and contribution from SH and what level of engagement to achieve: primary, secondary or tertiary. To do so it was necessary to proceed with mapping the potential stakeholders (D1.1) who could have stake in the projects according to their specific area of influence or interest and try to figure out their specific needs and requirements. All that information, gathered with online surveys and interrogations of OAL members and leaders was reported, organized and integrated in two co-creation workshops in February 2019 (i) in Helsinki (https://www.operandum-

[3] The goal of this task is the acquisition of knowledge and the formalization of requirements from all levels of stakeholders to provide suitable inputs to the co-design, capacity building and dissemination tasks of OPERANDUM. (cfr. OPERANDUM DoA)

project.eu/events/open-air-laboratory-workshop/) and in Paris at UNESCO HQ (https://www.operandum-project.eu/news/1226/). During these workshops researchers, policy makers, hard and soft scientists analysed and discussed crucial issuers, critical aspects and risks related to SH engagement and how to try to overcome them the OPERADUM activities.

The strategy shaping, based on the main inputs of workshops, was based on the following path:

- definition of a "stakeholder"
- definition the core values and targets for stakeholder engagement
- identification the stakeholder groups according to their needs and requirements
- identification of the role of stakeholders, including actors involved and their actions, at OAL, national, EU and global levels.
- provision guidelines, how to engage stakeholders in different at three levels (local, national and global)
- lists guidelines for solving potential problems and conflicts in the co-creation
- introduction of the ethics and risks management in the co-creation
- introduction of methods for the monitoring and evaluating the success of the engagement
- Mapping between the profiles of stakeholders needs and the OPERANDUM solutions, services, or data.

The strategy should consider that each phase of the project has "its own" set of stakeholders that has to be engaged and involved according to the role played in co-design and co- development stage. That means that the same SH should be engaged for different scopes during the whole project and be involved in different role. That continuous change has been defined as the *stakeholder journey* meaning that the SH should be guided through different phases of the project. They would have different level of participation and their involvement needs to be revised according to the aim we want to achieve. Not only the strategy but also the tools and the practices of engagement needs to be remodelled, ranging from more creation and maintenance of relations to modifying and transforming practices

In order to report the whole process of definition of SH engagement strategy the present deliverable is divided into eight sections.

The next section 3 covers an overview of core values and targets for stakeholder engagement based on needs and requirement from the stakeholders (expectation, support, awareness and so on) within the framework of the OAL, considerate as a space of experimentation of co-designed and co-developed NBS.

Section 4 deals with stakeholders' definition and identification. The primary aim is to assess and prioritise stakeholders according to the value and level of involvement in each phase of the project and then develop an understanding of OPERANDUM stakeholders needs and requirements in order to better encounter their expectations and exploit their competences. Moreover, the section will discuss about opportunities and challenges identified by OAL's regarding the SH engagement focusing on specific issue linked to experiences at OAL level. Particular commentary is finally dedicated to tactics and activities to engage stakeholder in co-creating NBS for hydro-meteo risks on OAL level, broadly discussed in the two co-creation workshop held in month 8.

Section 5 evaluates the whole panorama of risk and ethics related to the stakeholder engagement. Starting from an overview of general challenges related to Living Labs, OALs, co-creating approach the paragraph shift towards risks and ethics related to the stakeholder engagement in OPERANDUM and what is the main Risk Management Plan related to face challenges and criticality about stakeholders.

Section 6 focuses on monitoring level of involvement and participation, its purpose and objects and how organising monitoring of stakeholder processes in OPERANDUM. A detailed paragraph is dedicated to qualitative and quantitative indicators for assessing the stakeholder engagement and evaluate their participation in the process.

Section 7 tries to summarize all the main aspects of the deliverable and tries to define the guidelines and/or the main aspects to take into consideration when engaging stakeholders in technological and scientific co-design and co-development processes.

In conclusion, section 8 contains all the references (books, articles, websites) used to support the theoretical framework in this deliverable and in all the publications linked to this topic.

3. Core Values and targets for stakeholder engagement

3.1 Aims of Stakeholder Engagement in OPERANDUM

Multi-stakeholder approach and co-creation are rapidly growing fields in environmental management as well as in many other sectors in society and business, and literature points out a number of reasons for engaging stakeholders in the research and development actions. The main cross-cutting aims for stakeholder engagement relevant for OPERANDUM can be summarized as follows:

- **Diversity of knowledge**. Many NBS are complex requiring context specific solutions that can be scaled up and out. Various types of knowledge ranging from scientific expertise to local knowledge based on everyday experiences may lead to a greater range of options that can be explored, challenges can be addressed and unintended consequences and risks identified and mitigated. Engagement with different experts may also improve access to additional information or resources, and support the analysis of the situation or data, improve the relevance, efficiency, cost-effectiveness or utility (impact) of the outcomes to users and beneficiaries.

- **Social relevance**. Research engaging stakeholders is often more likely to be socially relevant, when the stakeholders are able to participate in the problem framing and designing possible solutions. Engagement of the stakeholders may also help to design dissemination that better targets stakeholders' needs, improve decision making and policies as well as business opportunities.

- **Social acceptance**. Working with the stakeholders from the start of the process also increases the likelihood that the stakeholders feel greater ownership to the planning and implementation of the NBS , and also more readily adopt and accept the outcome. Engagement is also expected to increase trust among the stakeholders, which in turn may help mediating conflicts.

- **Learning**. Working together may include changes in the preconceived ideas about the nature of problems and their solutions and deepening of knowledge and understanding of other perspectives and circumstances enhancing learning at individual and social level. The engagement may also establish new links and networks between the stakeholders, sectors, science and society, which may lead to generation of new knowledge, research ideas and innovations after the project.

- **Efficient use of resources**. Although the participatory processes themselves may take time and financial resources (compared to a top-down and expert driven planning and implementation) in the long term the solutions may be more lasting, having wider social impact and therefore being also more cost-efficient.

3.2. Values of the Stakeholder Engagement enhancing legitimacy and trust

It is also important to identify values that guide the stakeholder engagement. The values contribute to the overall legitimacy of the activities with the stakeholders including, balanced representation; quality of the processes governance and effectiveness and accountability of the results (Schmidt 2013). Another important ingredient of stakeholder engagement is trust. Trust is foundational for partnership continuation and especially for learning and innovation. It builds up slowly and incrementally through repeated interactions, but can break down rapidly when betrayed. Trust is in particular important in cases when the context is not familiar for all players and formal institutions are weak (Nahi 2018). Based on the literature (see e.g. Pohl & Hirsch-Hadron 2008; Durham 2014; Moser 2016; Mielke 2015; Nahi 2018) we have identified the following principles/values for the Stakeholder Engagement.

Inclusivity. Whenever stakeholders are to be engaged in a project, an initial challenge lies in the question of who to engage with, where to draw the boundary between relevant and not relevant, and therefore in judging who should be listened to (Vos, 2003). Focusing only on those previously known and active stakeholders increases the chance of missing hidden, remote or less obvious stakeholders (Reed, 2008). It has been argued that knowledge exchange and trans-disciplinary is more effective when researchers are considered as stakeholders themselves, rather than as outsiders or holders of certain powers or knowledge (Mitton et al. 2007). Engagement should be based on careful mapping of all potential stakeholders and creating partnership as early as possible. Exclusion of those with opposing views should be avoided; the view that others have of the process is also important. Some continuity of those involved in stakeholder engagement exercises is also considered important to ensure that knowledge and skills are built upon.

How the outputs are achieved?

Credibility. Credibility is the perceived quality and validity of the stakeholder engagement process. To create credibility, a stakeholder engagement process should have clear objectives and a plan, which is communicated to the stakeholders. Most appropriate practices and methods should be used, and those should be implemented by people who are most competent to work with those methods. External facilitators may increase the credibility.

Accessibility. Continuous communication adopting understandable language for different stakeholder groups is a precondition for accessibility. It is important to pay attention to the timing of the engagement: on one hand it is important to engage the stakeholders as early as possible, but also to take into account their resources and avoid unnecessary contacts to prevent stakeholder fatigue and to enhance the feeling of relevance. It is also important to be adaptable to changing circumstances. At times it might be necessary to tailor the engagement processes and activities to enable the participation of specific stakeholder groups that are often overlooked or who face additional barriers to participation for example due to lack of resources (time, funding) or technology.

Respect and sensibility for stakeholders diversity and human rights. In a multi-stakeholder process stakeholders may have variety of cultural backgrounds. It is important to be mindful of their social and

cultural environment, including the cultural norms. In addition, the existing power dynamics need to be considered as well as the values of human rights and gender equality, underpinning the commitment of "no one left behind" and "do no harm". The welfare, anonymity and confidentiality of individual informants and stakeholders, in particular in the case of vulnerable or ethically sensitive groups (i.e. children and cultural minorities) should be accounted for.

What is the acceptability of the NBS implemented?

Acceptability and accountability: Acceptability and accountability refers to the engagement process, but also its outputs and outcomes, in this case NBS – how closely they relate to stakeholders and researchers needs, and how responsive the process was to changing needs. As for the outcomes, stakeholders need to feel satisfied that their interests have been taken into account appropriately/sufficiently in the design of the NBS .

3.3. How the stakeholders are involved in the OPERANDUM?

The strategic vision on how to engage stakeholders in OPERANDUM's co-design, co-creation and co-development process was adopted at the stage of project development. The schema on Fig. 2 represents OPERANDUM's framework for stakeholders' engagement. It states the main actors responsible for relations/engagement with stakeholders in the project. The framework is embedded in the overall management structure of the project in a way that creates synergies and maximizes OPERANDUM's impact. The framework comprises three levels, corresponding to the stakeholders' geographical coverage (section 4.1).

Figure 2: Graphical representation of frame for stakeholder engagement

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Engagement of primary, secondary and tertiary stakeholders at EU and international level (see chapter 4 for detailed classification) is under the coordination of UNESCO. Together with all OPERANDUM partners as well as with Advisory Board members, UNESCO undertakes activities with a wide range of stakeholders, identified during the Global mapping (D.1.1). Relations with OAL local and national level stakeholders are developed and maintained within the life of the project by national OPERANDUM partners, i.e. respective representatives of OPERANDUM OAL Board. Moreover, to ensure the most appropriate co-creation approach at local level, each OAL team is supported by a social scientist. Here below are stated the partner institutions, responsible for OALs:

- Australia - USC
- Austria – OEAW
- China (Hong-Kong) - UHK
- China (mainland) - CAR
- Finland – LUKE
- Germany – HZG
- Greece – PSTE
- Ireland – UCD
- Italy - UNIBO
- UK – GCU

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Actions at all geographical and engagement levels are implemented in close cooperation with, and often under guidance of WP leaders. At all stages of the project, there is a variety of needs and requirements by the different WPs addressed to OPERANDUM's stakeholders, in particular at OAL local and national levels. To avoid overlapping work and overloading stakeholders and OAL representatives with many separate requests, in October 2018 Task 8.1 core team (LUKE, UNIBO, PNO and UNESCO) have designed a short survey addressed to the WP leaders about the level of engagement, practical actions and the timing of the planned actions with the main OPERANDUM stakeholders.

The overview of the survey is presented in the Table 1, where stakeholders groups (by geographical and engagement levels) are crossed with needs of different WPs. The survey confirmed that all OPERANDUM WPs are/will be actively working with stakeholders during all stage of the project. Foundation WPs (WP1, 2 and 3) and Evidence Building WPs (WP 4,5 and 6) mainly deal with OAL local and national primary and secondary stakeholders, while actions in Consolidation WP 7 and Outreach and Impact WP 8 and 9 cover primary, secondary and tertiary stakeholders at all geographical OPERANDUM levels. The results of this survey will help OPERANDUM to coordinate the actions related to the stakeholders.

Table 1: Results of the survey on needs of WPs

OPERANDUM work packages		Geographical scope								
		OAL local level			OAL national level			EU and international level		
		Engagement level								
		Primary	Secondary	Tertiary	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Foundation	WP1	yes			yes			yes		
	WP2	yes								
	WP3	yes	yes		yes					
Evidence Building	WP4	yes	yes		yes	yes				
	WP5	yes	yes		yes	yes				
	WP6	yes	yes	yes	yes	yes	yes			
Consolidation	WP7	yes	yes	yes	yes	yes	yes	yes	yes	yes
Outreach and impact	WP8	yes			yes	yes	yes	yes	yes	yes
	WP9	yes	yes	yes	yes	yes	yes	yes	yes	yes
Coordination	WP10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

4. Stakeholder Engagement

4.1 Stakeholder definition and identification

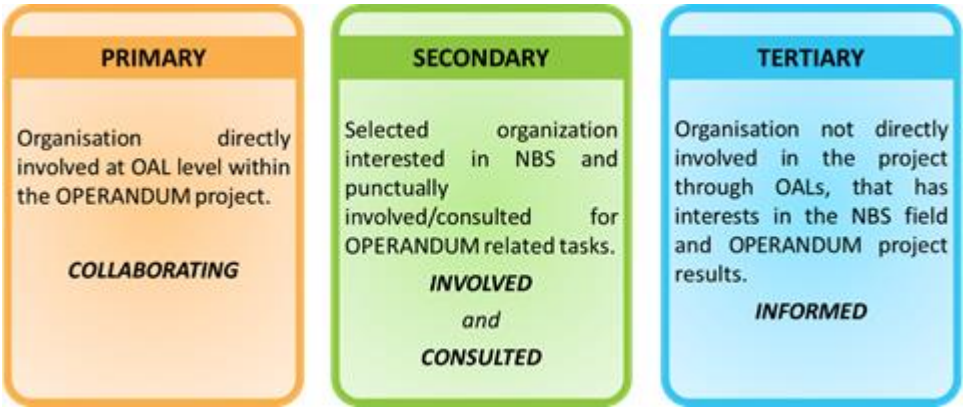
In OPERANDUM stakeholders are defined as any person or group who influences or is influenced by the project (Durham et al. 2014). An extensive mapping of OPERANDUM stakeholders has been performed within the activities of WP1 and reported in the *Deliverable 1.1 - Mapping, characterization and critical evaluation of existing NBS* (D 1.1). D 1.1 also contains general definitions, analysis and statistics of stakeholders identified in the first year of the project. Due to the complexity of the project and the multiple level of engagement, in OPERADUM stakeholders are classified according to two main criteria:

- *Geographical coverage:* depending on the extension of the area of influence of their activity, stakeholders can be distinguished in local, national, and global (Figure 3).

Figure 3: Stakeholders' definition according to their geographical coverage (own source).

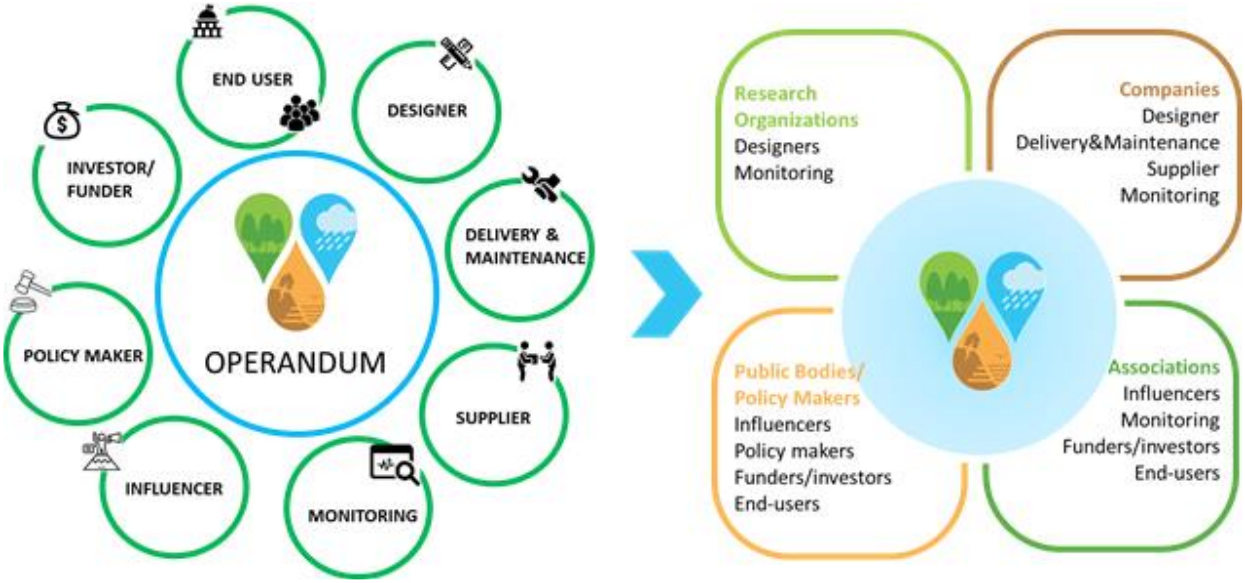
- *Level of engagement* in the project: stakeholders are defined as primary, secondary, and tertiary according to the definitions in Figure 4

Figure 4: Classification of stakeholders based on the level of engagement (own source).



In D 1.1 the main groups of stakeholders, relevant for the implementation of NBS, have also been identified and represented in the OPERANDUM value chain (Figure 5a). Starting from the OPERANDUM value chain, stakeholders have been further grouped in 4 target categories, as reported in Figure 5b and for each target category, reasons for engagement have been identified and reported in Table 3.

Figure 5: OPERANDUM value chain (a) and identification of stakeholders' target categories (b) (own source).



(a) (b)

Table 2: Identification of stakeholders' target categories and reasons for engagement

Target Category	Reasons for engagement: what could they provide to OPERANDUM?
Knowledge-based Organizations/Research Organization: Universities and research organisations engaged in research and development and training of individuals and/or organisations	Research organizations are fundamental for developing synergies, exchanging of knowledge, information and results, for increasing the network and promoting the dissemination of results. They can provide large expertise in OPERANDUM related topics, collaboration in training activities, research and development, further knowledge on existing strategies, techniques and management for the implementation of NBS. They can also provide scientific and local knowledge from the region, local contacts, experimental data on the area of interest. They can collaborate in developing technical standards and guidelines, in co-designing NBS and new technologies, in testing, and in defining new monitoring approaches.
Companies: Privately owned profit-orientated business and industrial groups	Companies are the driving force behind socio-economic development. They can collaborate in co-designing NBS, training for NBS co-deployment, testing solution, developing guidelines for NBS management, testing the solutions and technologies. They can deliver useful information and increase awareness. They can provide professional expertise, regulatory information related to environment, publicity, potential extraordinary maintenance of monitoring stations. They may allow to use their land for developing NBS and contribute in the planning thus facilitating the executive phase. They also have local knowledge of the area. In some case, they are crucial for implementing the NBS since they will deploy the NBS, which is their specific business.
Associations of categories, organizations, interest group	Associations and organizations can optimise joint effort towards cooperation, dissemination and exploitation in specific areas of interest related to NBS. They foster participation, experience and leadership towards the necessary actions and promote the participatory approach to development planning. Furthermore, they can collaborate in operationalising NBS and provide support to data collection activities, provide publicity, economic funds, dissemination of results and creation of awareness, publicity, collaboration in operationalisation of NBS, local contacts, local knowledge, assistance in organising monitoring, participating in monitoring, networking.

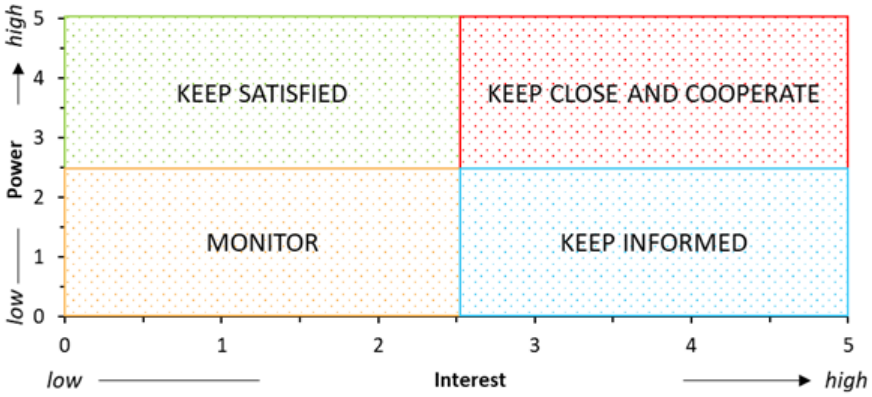
Public Bodies/Policy makers: National and local government; organizations which possess membership of more than one country. Public and semi-public entities that have interest in OPERANDUM related topics.	Public bodies and policy makers are fundamental for the discussion on the development of national and EU environmental strategies related to NBS and the discussion on standards/certifications and regulations to be considered in the development of NBS. They mediate between private and public interests and coordinate different stakeholders at different levels. They can develop and enforce rules, laws and regulations. They can provide data of the area of interest, permits, authorizations, and institutional support to deploy and test NBS. They can further provide access to infrastructure, financial support, experience in execution of public works, experience in ecosystem defence and biodiversity protection, and regulatory information related to environment. They can collaborate in co-design, implementation, and testing phases. They can perform monitoring and maintenance activities and report on the NBS efficacy. In some case, they can be the owner and manager of area and therefore they are crucial for implementing the NBS.

4.2 Assess and prioritise the stakeholders

Having established clear reasons for engagement, the next step in the stakeholder engagement process is to assess and prioritise stakeholders. To this aim, OPERANDUM has adopted the Power-Interest Matrix (Figure 6). This is a powerful tool that allows to prioritise the stakeholders by means of Power and Interest of stakeholders, and it helps to define the level of engagement required (by OPERANDUM) for different stakeholder groups (Ginige et al., 2018). According to the level of interest and power, stakeholder can be included in one of the four resulting boxes. Each box represents a type of engagement, as presented in Figure 6:

- Stakeholders with high power and high interest (in OAL, NBS, and/or OPERANDUM) are heavily invested in the project and therefore they must be fully engaged.
- Stakeholders with high power but low interest must be kept satisfied. They can derail the project over seemingly minor issues.
- Stakeholders with low power but high interest must be kept informed since they can become influential by forming alliance with other more powerful stakeholders.
- Stakeholders with low power and low interest must be monitored, in case they become more powerful and affect the project in the future.

Figure 6: Example of stakeholders' power-interest matrix



It has to be highlighted that for the successful implementation of the project, there is no need to engage all the stakeholder groups at the same time and at the same level. Furthermore, the same stakeholder or stakeholder group can have different impact at different stages of the project implementation. As a result, the stakeholder matrix is not definitive but it will vary throughout the project duration, since the power and influence of stakeholders will also change.

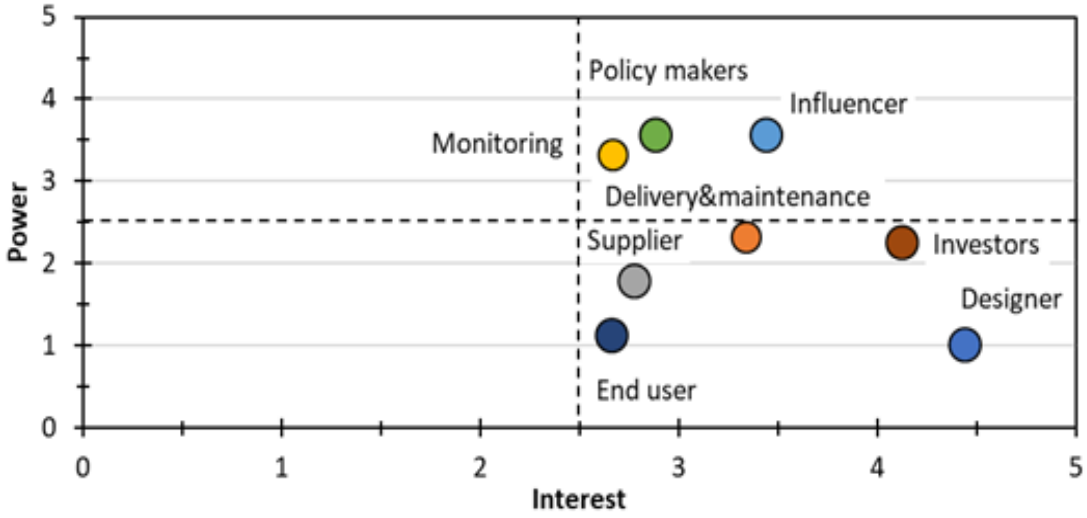
Power vs interest analysis was conducted in relation to each identified stakeholder group in OPERANDUM value chain. Partners have been asked to rate from 0 (low) to 5 (high) the level of interest of the stakeholders' group in the project and their level of power (i.e., whether they can positively or negatively contribute and influence the project).

This analysis was conducted at two different levels:

- OAL level: each OAL leader has been asked to rate the power and the interest of the SH groups considering primary and secondary stakeholders identified so far and referring to the implementation of the NBS in the specific OAL. The power-interest matrix of each OAL is reported in ANNEX 2. The differences among the matrices reflect the difference among the European OAL. In fact, while the deployment, social acceptance, community awareness and market exploitation of NBS is generally supported by authorities in some countries, in other countries NBS exploitation is at an earlier stage. Furthermore, the technology readiness level of the NBS to be implemented is different among OALs. However, some general considerations can be done. Almost all OALs consider *monitoring and influencers* as key stakeholders groups to keep close and collaborate. *Policy makers* are considered of great importance as well, although in two of the 7 OALs their interest is estimated as low and therefore they are identified as a group to monitor. The evaluation of e*nd users, designers, delivery and maintenance, and investors* varies among OALs, mostly because their power has been estimated at different levels. For this reason, they are mainly classified as a group either to keep close or to inform. The highest variability is associated to the group of *suppliers*.

- Global level: partners have been asked to rate the power and the interest of the SH groups considering the overall specific objectives of OPERANDUM. Stakeholder groups were plotted in relation to their power and interest in the project considering the average results of the survey conducted among OPERANDUM consortium (Figure 7). Partners associated the highest level of both power and interest to *policy makers, influencers and monitoring* and therefore the collaboration with these stakeholders groups can be considered a priority. Minor level of power but high level of interest was associated to the stakeholder groups of D*elivery and maintenance, investors, designers, suppliers and end users* that resulted classified as groups to continuously inform during the project.

Figure 7: Plotting stakeholder power against interest



Detailed results of the above illustrated analysis (per each OAL) are included in ANNEX 2 of the present document.

OPERANDUM partners have been also asked to rate from 0 (low) to 5 (high) the importance to engage each stakeholder group in order to fulfil the SOs:

- SO1 Integrate knowledge about NBS efficacy against hydro-meteorological risks
- SO2 Strengthen technology innovation in the area of NBS
- SO3 Improvement of acceptance of NBS based implementation
- SO4 Enhancement of market demand and increase of competitiveness of NBS
- SO5 Strengthening the adoption of NBS in national policies for DRR land planning, EIP Water

Figure 8 shows results of the voting. It can be seen that all stakeholder groups identified in the OPERANDUM value chain are considered of great importance to achieve one or more SOs. The engagement of designers, delivery and maintenance, and suppliers was considered more important for achieving SO1 and SO2,

whereas the engagement of remaining stakeholder groups, especially influencers, policy makers, and investors , were evaluated necessary to fulfil SO3, SO4 and SO5.

Figure 8: Correlation between OPERANDUM stakeholder groups and specific objectives

	Designer	Delivery&Maintenance	Supplier	Monitoring	Influencer	Policy maker	Investor Funder	End user
SO1	+++	++	++	+++	++	++	++	+
SO2	+++	++	+++	+	+	++	++	+
SO3	++	+	+	++	++	+++	++	++
SO4	++	+	++	++	+++	++	+++	++
SO5	+	+	+	++	+++	+++	++	++

+++ average vote > 4
++ 2.5 <average vote< 4
+ average vote < 2.5

4.3 Developing an understanding of OPERANDUM stakeholders: needs and requirements

The analysis of needs and requirements of the stakeholders is a fundamental step in the stakeholder engagement strategy since it allows to attune the engagement strategy to each stakeholder category. Stakeholders' needs and requirements were assessed through OAL leaders, although in some cases the establishment of the OAL was still in an early phase and contact had not been established with all stakeholders yet. In other cases OAL representatives already organized informative meetings with stakeholders, and therefore they were able to summarize in a preliminary way, their needs and requirements (ANNEX 3). This approach was preferred to the direct submission of survey to stakeholders to reduce unnecessary burden on them and to avoid 'stakeholder fatigue' that is they begin to feel overloaded with engagement activities, which negatively affects willingness to participate and lessens the quality of their input.

In order to assess needs and requirements of the stakeholders the following questions have been considered.

- Why are stakeholders interested in OPERANDUM? What motivates them?
- What outcomes do stakeholders expect as a result of the project? What direct benefit do they expect to get from the project?

The inputs were processed and clustered according to the four stakeholder target categories previously identified. As a result, the main needs and requirements for each target category, can be summarized as follows:

KNOWLEDGE-BASED ORGANIZATIONS' NEEDS AND REQUIREMENTS:

Knowledge-based organizations are interested in exchanges of scientific knowledge and development and application of new scientific knowledge on NBS, climate change, hydro meteorological risks, including monitoring and modelling, and water conservation in the changing environmental conditions. In the case of already existing collaborations, their interest is that the collaboration continues.

Knowledge-based organizations expect from OPERANDUM new scientific knowledge on environment in terms of updated data and novel indicators for NBS performance and environmental management. They would like to obtain new knowledge on socio-economic issues and participatory methods consisting in the establishment of novel approaches for stakeholders engagement and citizens participation. Finally, scientific publications, broaden networks, follow-up research grants are also expected.

COMPANIES' NEEDS AND REQUIREMENTS:

Companies are interested in developing and exchanging of knowledge that will lead to the increase of their business opportunities. Within OPERANDUM, they can have the possibility either to test their technologies in a new market segment generated by NBS, or to develop/improve new technologies. Furthermore, results of OPERANDUM can lead to new collaborations and synergies with different authorities and companies.

Companies expect from OPERANDUM evidence data, new standards for deployment and operationalization of NBS, new knowledge of the state of the art, good practices and measures to adopt that may enhance the state of the area, new knowledge of climate change and its impacts in the region, guidelines for future implementations, contacts with possible future clients.

ASSOCIATIONS AND ORGANIZATIONS' NEEDS AND REQUIREMENTS:

Associations and organizations are interested in reducing geo-hazards likelihood, thus enhancing the quality of the territory and landscape, and favouring its preservation and conservation. This leads to an improvement of agriculture, forestry and fishery management and an increase of local livelihoods. Furthermore, they are interested in the development of interdisciplinary frameworks other than science based frameworks, focused on public awareness and citizen participation that investigate the conservation of biodiversity, adaptation to climate change, and environmentally friendly policies.

Associations and organizations expect from OPERANDUM evidence-based data on the efficacy of the adopted NBS and of the citizen participation approaches on the protection of the area from hydro-meteorological risk. Furthermore, they would like to obtain new agricultural, fishery and forestry management practices for the area.

POLICY MAKERS AND PUBLIC BODIES' NEEDS AND REQUIREMENTS:

OPERANDUM is considered as an opportunity to develop better policies and management intervention plans based upon rigorous scientific knowledge of hydro-meteorological hazards, their risk assessment and the NBS efficacy in mitigating their effects. Policy makers and public bodies are interested in performance-based evidences of the efficacy of sustainable novel approaches against hydro meteorological risks and of their co-benefits for social and political purposes. Furthermore, they are interested in exchanges and production of new knowledge to improve the management of DRR, enhance the defence of the ecosystem and biodiversity and meteorological models. The main goal is to reduce the hazard threat, thus enhancing the overall quality of their territory.

According to policy makers and public bodies, OPERANDUM should develop innovative solutions and guidelines to support environmental policies and management strategies. Furthermore, new data to use in DRR, guidelines for integrating NBS and proper Water Use strategies, enhancement of public awareness on environmental issues, multiple co-benefits of NBS implementation, guidelines on replication of NBS and on SH engagement are expected. Public bodies and policy makers want to gain experience in construction of NBS, enhance defence of the territory, integrate environmental management intervention interventions, and improve business opportunities in the territory.

4.4 Communication strategy for stakeholder engagement

Communication is an important part of engaging stakeholder and there are several parameters to consider when designing and implementing a communication strategy for this purpose. Effective communication for engagement starts with knowing which stakeholders are involved in the project and its activities, their potential reasons for engagement and their needs and requirements, both in general as well as in OPERANDUM. This depends on the type of stakeholder group, its geographical coverage and the level of engagement in the project and if this is direct or indirect (chapter 4.1).

Even though communication with all stakeholder is important, different stakeholder groups have different interest and power in OPERANDUM (chapter 4.2). It is therefore important to not only consider how stakeholders can benefit from being engaged in the project and its activities (chapter 4.3), but also what they can bring to the project (Table 5).

The main goal of stakeholder engagement in OPERANDUM is to ensure active contribution or participation (industries), adoption (NGO's) or support (governments) on different levels and in different phases of the project. A tool that facilitates this is called a stakeholder journey. Adapted from the customer journey used in business to sell a product or service to a customer, a stakeholder journey aims to engage the stakeholder group by first creating awareness, then showing the benefits of contributing and finally provide ways to actively participate in, adopt, support, stimulate or purchase a certain product or service.

A stakeholder journey facilitates the project partners in engaging stakeholder target groups as shown in figure 5b, both at project and OAL level, according to the specific objectives of OPERANDUM. The OPERANDUM stakeholder journey tool (Figure 9) consists of the following steps:

Step 1: Stakeholder characteristics
Determine where the stakeholder group is positioned on the awareness spectrum now and where you want to get it during the project.

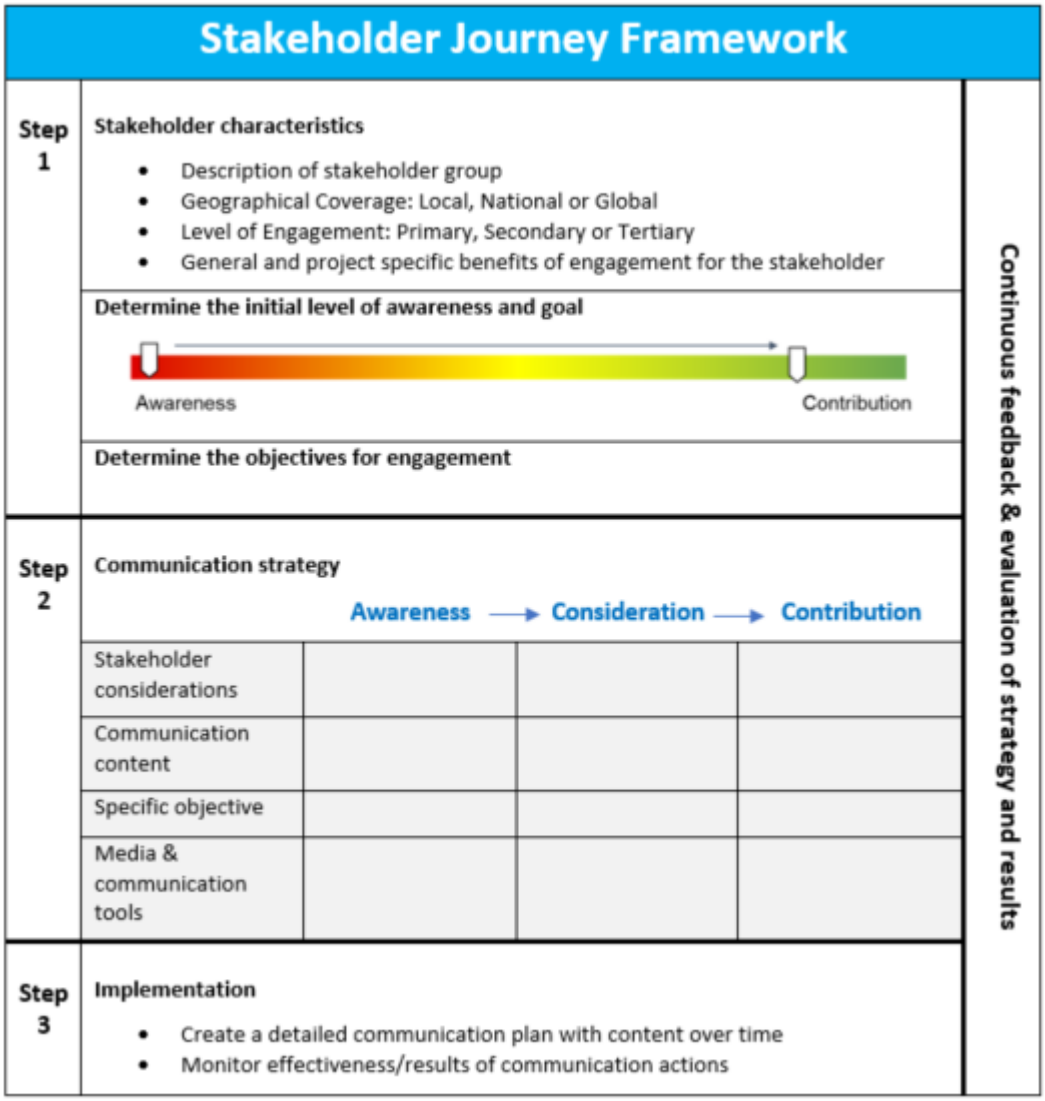
- Determine the main stakeholder group characteristics
- Determine the initial level of awareness and goal
- Determine the objectives for engagement

Step 2: Communication strategy
Determine the strategy for reaching your objectives. As the stakeholder's interests/considerations depend on the characteristics defined in step 1, as well as per phase (from awareness – consideration - contribution), it is important to realize that the messaging, its objective and the media and tools differ over time.

- Determine the stakeholder considerations
- Determine the communication content/message
- Determine the specific objective of the message
- Choose the media and communication tool

Step 3: Implementation
Make a detailed planning for communication activities based on the strategy in step 2, including timing. Also, it is important to receive feedback from the stakeholder group about the effectiveness of the messaging.
In addition, continuous feedback and evaluation of the strategy and its results is needed as different parameters can change during the course of the project, or initial assumptions made might not be valid anymore.

Figure 9: OPERANDUM stakeholder journey framework



4.5. Opportunities and challenges at the OAL level

As the main aim of the OPERANDUM project is to provide NBS for Hydro-Meteo risks, the work with local level stakeholders in OALs is critical. The large diversity of local stakeholders participating in the co-creation process brings special opportunities and challenges to the stakeholder engagement.

All the OALs are different in many respects: they vary in size, phase of stakeholder engagement (some OAL are based on previous project in a same topic or region), experience in stakeholder processes and use of engagement methods. The NBS themselves also differ in terms of technology used, social, environmental, political and regulative arrangements. Nevertheless, each site of experimentation represents a space of opportunities especially if we think about the heterogeneous panorama we are facing. Through the first

year of activity we had the chance to structure a "map" of the strength and opportunities of OAL based on a context analysis made by OAL leaders and members. This map has been used as a base to identify the crucial point on which the strategy of involving and engaging the SH should be shaped. The following table (table 1) shows the main strengths and opportunities linked to each OAL resulting from a SWOT analysis presented by OAL leaders in the Paris workshop, held in February 2019.

SWOT analysis or SWOT matrix is a strategic planning technique used to help a person or organization identify Strengths, Weaknesses, Opportunities, and Threats related to project planning (*www.mindtools.com)*. It is intended to specify the objectives of a project and identify the internal and external factors that are favourable and unfavourable to achieving those objectives. Users of a SWOT analysis often ask and answer questions to generate meaningful information for each category to make the tool useful and identify their competitive advantage. SWOT has been described as the tried-and-true tool of strategic analysis (Dess, 2018).

Table 3: Strengths and opportunities in OAL

OAL	Strength	Opportunities
OAL Italy	Three sites with different SH Two partners are also SH A patent process already started	- Po delta is an MAB site - Emilia Romagna industrial network is very active and ready to accept NBS and ready to be connected with OAL-Italy and OPERANDUM representing good opportunities to spread the OPERANDUM message
OAL Greece	Existence of important thermal-springs in the basin, much visited place Unique landscape with easy access for all kind of activities Protected areas, "forces" nature solutions SH are mostly civil parties Key persons have a positive stance on involvement process	- Water Directive - Flood risk management plan in force ❾ Promote NSB

OAL Ireland	- Co-development Sustainable Urban Drainage System as NBS - Local and national SH are extremely supportive as flood is an extreme important issue - Part of the Dublin initiative, so great interest and support form the industry SH - Local community is also already engaged.	- Increase permeability of surfaces - Promoting climate awareness among local community - Monitoring flood risks - Planning green infrastructure by promoting biodiversity - Efficacy will be assessed
OAL Finland	- Motivated SH - Good confidential relationships with SH - Partly established monitoring systems	- Good set of potential NBS - Good set of potential modelling tools
OAL UK	- Strong community interest, well organized. → Easy to consult the local community - Positive disposition towards NBS - Community goodwill created by long prior collaboration with (partner) researchers. - Green tourism, drives the need for green solutions - Community know that the implementation work, so there is a great trust.	- Established collaboration with knowledgeable eco-engineers (Naturlea), thanks to OPERANDUM - Institutional buy-in (although somewhat limited) - Scenic importance of the site (tourism/musea track) - Mixed/hybrid NBS
OAL Austria	Well-established monitoring plan - Expertise and equipment available and to expand	- Stabilize the slope - Develop set of compatible-measures (mixed/hybrid)

	- Well-established contact with some SH - Natural and social sciences expertise available in OAL team	- Gain more in-depth knowledge on all the underlying causes of landslide - Exchange knowledge and expertise with SH - Increase awareness of NBS
OAL Germany	- A lot of institutional experience with SH processes - Large SH network - High motivation of employees - Communication competences	- Individualization of the SH dialogue - Involvement at eye level - Joint problem framing
SWOT China Mainland	- Engagement of local official professional bureaus and research institute by collecting data, information, and policies. - Direct and extensive communication with local farmers - NBS closely comply with the local needs. Farmers really have the interest to increase productivity while coping with risks due to climate change.	- OAL NBS provided communication chance for different SH - OAL NBS can help to trade off the benefits difference between the different SH - OAL NBS provide professional training and capacity building. - Co-design is a new concept for them (OPERANDUM could help in this)

In order to conduct inclusive co-creation process, the OALs follow common guidelines for co-creating NBS (Task 1.3.). Yet, many of the OALs have identified some challenges, weaknesses and threats, related to the stakeholder engagement (see the SWOT analysis at ANNEX 3). These were clustered according to recurrent characteristics and similarities (see Table 4). This analysis helped to identify tactics and shape methods on how these challenges in particular can be addressed and the risks mitigated. These tactics should be considered more reactive than preventive.

Table 4 :Challenges about SH engagement and tactics

Topic of the challenge	Description	OALs concerned	Tactics/Methods that can be used to tackle the challenge
Diverse and conflicting interests/needs between the stakeholders.	Introducing new constructions and/or plants may change land-use and landscape, increase or decrease the value of land or the ecosystem services.	Finland, Greece, Italy	Role play Citizen science Field trips
Awareness, attitudes	Lack of awareness about benefits of NBS; Unrealistic expectations of the results of the project (time and impact); Doubts/mistrust about the efficiency of NBS Lack of awareness of/competence in the co-creation Alienation of the nature	China, Greece	Providing information of the solution and potential co-benefits (consider use of external experts); Examples from successful projects; citizen science (involvement e.g. in monitoring environment); nudging; field trips
Trust	Previous negative experiences in environmental projects or environmental conservation (Nature 2000) as well as lack of awareness may cause mistrust	China, Finland,	Open and continuous communication with and between the stakeholders; involving local leaders as mediators
Commitment	Stakeholder fatigue, a lot of projects	All	Getting to know the stakeholders, their organisation and

			way of working; understanding their needs and motives; being responsive; create an executive board which can facilitate the contact; frequent communication and midterm results; create activities (also recreational related to project benefits); show the "big picture"
Legislation, regulations	Current legislation (e.g. biosphere areas), other restrictions in the land use may be hamper the stakeholder participation/co-design of NBS or slower the process, also the GDPR	Germany, Italy	
Physical environment	Stakeholders are not able to participate due to harsh environmental conditions or aged of the populations	UK, Greece	Start with low pilots; there might be non-locals interested in participation (associations, volunteers)
Financial aspects	NBS may become expensive	Austria, Greece, Finland,	Start with small successful pilots; external funding (business and municipalities, crowd-sourcing,
Lack of resources (time) or expertise	NBS methods may be new to the project partners.	Germany, China	Use of external facilitator or

in OPERANDUM to deal with stakeholder processes			examples and experiences of other project; Operandum guidelines for the co-design;

As reported in table 4, in order to address challenges related to engagement of SH in OPERANDUM, the team in charge of shaping a strategy provided? some tactics that could be used by scientists at OAL level to promote and facilitate the involvement of groups of interests, public institutions, citizens and so on. Some of the tactics were discussed and applied during the Helsinki and Paris workshop and presented as useful tools to deal with SH engagement especially in the field of science and technology. In the specific case, complexity related to engage SH is embedded with the complexity of vehiculate technical issue and make them "accessible" and understandable to a wide range of public and different actors. The following examples could tackle this specific matter and provide tools for the OAL members and partners of OPERANDUM (more tools and tactics would be deeply described in the guideline due in task 1.3)

a. Nudging: Nudge is a concept in behavioural science, political theory and behavioural economics[4]. It proposes positive reinforcement and indirect suggestions as ways to influence the behaviour and decision making of groups or individuals. Nudging contrasts with other ways to achieve compliance, such as education, legislation or enforcement. Nudging may be combined with traditional regulatory approaches but works independently of the rational consequences of:

(a)forbidding or adding any rationally relevant choice options;

(b)changing incentives, whether regarded in terms of time, trouble, social sanctions, economics, etc.; or

(c)the provision of factual information and rational argumentation

b. Citizen science Engaging citizens or other stakeholders in the research. Intensity and benefits may vary from crowdsourcing to extreme participation (see the Figure 3)[5].Citizen science could bring some potential benefits:

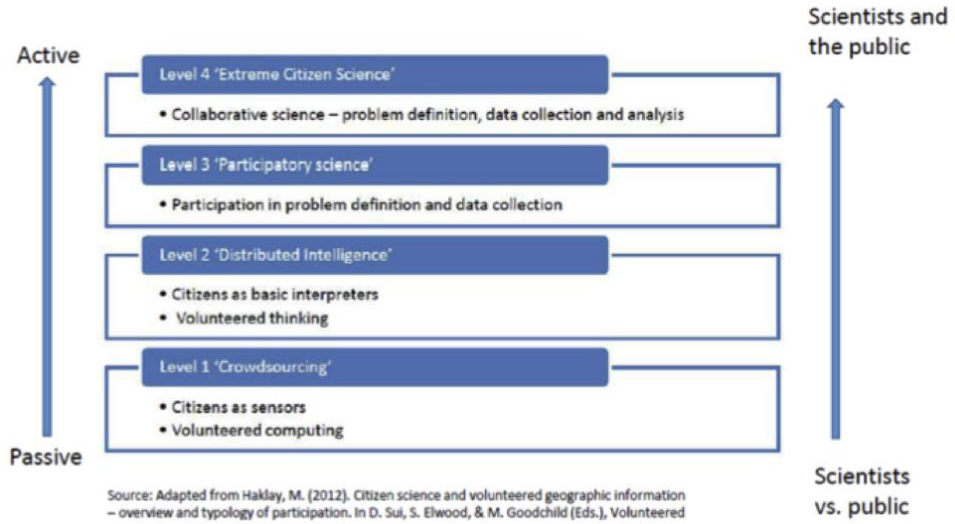
- Awareness, knowledge or understanding
- Engagement of interest
- Attitude towards a scientific topic

[4] Thaler, R.H, & Sunstein, C.R., 2008. Nudge: Improving Decisions about Health, Wealth, and Happiness. New Haven, CT: Yale University Press.

[5] Buytaert, W. 2014. Citizen science in hydrology and water resources: opportunities for knowledge generation, ecosystem service management, and sustainable development.

- Skills related to a scientific endeavour

Figure 10: Adapted from Haklay, M. (2012). Citizen science and volunteered geographic information – overview and typology of participation.



c. Role play: actor constellation. An actor constellation is a role-play, in which all scientific and societal actors involved in a project are represented and positioned around the central research question[6]. Why should it be applied? Project team members may hold implicit assumptions on the other actors' relevance for, and their potential contributions to the project. The actor constellation method helps making these assumptions explicit. When? Early in the project; ideally during problem framing when a team is forming. Benefits: Usually the outcome of an actor constellation is a different, revised constellation of the actors. New actors may come in; some may come closer to each other, become less relevant or disappear. As a consequence, the project team and organisation can be re-defined (Consider having an experienced facilitator!)

d. Dilemmas cafe[7]. (this specific tool was also simulated with OAL members and leader during the Paris workshop on SH engagement) Dilemmas cafe involves people coming together to discuss several dilemmas experienced by participants. A dilemma is a choice between alternative courses of action, when it is not clear which is the right one to choose. A dilemmas cafe may be organised on any topic. x number of people present a dilemma from their own experiences. Participants choose a dilemma to work on, and join a table with a presenter of their choosen dilemma, and a reporter/facilitator. The reporters tease out, discuss and record the issues. Feedback in a plenary discussion. Potential benefits of using this specific tactics:

[6] Gissi & Garramone, 2018. Learning on ecosystem services co-production in decision-making fromrole-playing simulation. Ecosystem Services 34, 228–253.
[7] Durham University: Centre for Social Justice and Community Action: Dilemmas cafés: A guide for facilitators.

- raise participants' awareness of co-creation challenges;
- encourage collaborative dialogue, including critical listening and questioning:
- stimulate learning through hearing about different ways of seeing and understanding issues;
- explore a variety of recommendations for action.

4.5.1. Engagement actions for stakeholders on OAL regional, European and international level

The non-local, meaning OAL national, regional, European or international stakeholders of OPERANDUM were included during the extensive mapping exercise reported in the Deliverable 1.1. It has been concluded that these stakeholder groups cover all three levels of engagement; however, many are secondary (stakeholders that will be involved and consulted), and most are tertiary stakeholders (stakeholders who will be informed). The vast majority of the secondary and tertiary stakeholders are influencers, policy makers, and investors, which were, as indicated before, evaluated necessary to fulfil SO3, SO4 and SO5 (as reported in ANNEX 3) .

Engaging with regional, EU and international stakeholders, for most of which the level of engagement varies significantly from the local stakeholders, requires a different approach. In the table below, an overview has been provided of foreseen engagement actions within OPERANDUM with these non-local stakeholders.

Table 5 - Foreseen engagement actions within OPERANDUM with "non-local" stakeholders on secondary and tertiary level

SH group	Needs & Interests	Planned actions
Public Bodies & Policy makers Secondary National/ Regional	Be consulted and involved in (implementation and mainstreaming of NBS and use OPERANDUM to learn about (the effectiveness and	**WP8 – Task 8.2.1**: Guidelines and policy briefings will be presented at high-level events organized by OPERANDUM (UNESCO), possible as side-events and high-level conferences and forums.
		WP8 – Task 8.3.1 Knowledge exchange within OPERANDUM OALs: Lectures and 1-day workshops will be organized at each OAL in order to ensure that knowledge is exchanged within the project and with external partners including communities, experts, policy-makers and academia.

	cost-benefits of) green solutions.	**WP8 – Task 8.3.2. NBS training and OAL demonstrations to national and EU authorities:** At each OAL a series of trainings and demonstrations to EU representatives and national authorities will be organized, i.e. river basins organisations, civil protection representatives, site managers of UNESCO designated sites etc. Each week training will consist of theoretical part, lead by OPERANDUM experts to define NBS solutions, and practical demonstration part, led by OAL local partners
Public Bodies & Policy makers Tertiary National/ Regional	Be informed (implementation and mainstreaming of NBS and use OPERANDUM to learn about (the effectiveness and cost-benefits of) green solutions.	**WP8 – Task 8.2.2** high-level outreach: presenting outcomes of OPERANDUM at high-level event by OPERANDUM stakeholders.
		WP8 – Task 8.3 on capacity building on NBS at national level within OALs.
		WP8 – Task 8.3.1 Knowledge exchange within OPERANDUM OALs: A number of summer schools (at least 2) will be organized to allow students to participate in the establishment of OALs. The potential participants of summer schools will be students, early career scientists, and also practitioners from public authorities and companies.
		WP7/WP8 – Task 8.4.3 Knowledge sharing through OPERANDUM platform: A series of webinars on various NBS, facilitated by OPERANDUM experts will be set.
Public Bodies & Policy makers Secondary European/ international	Be consulted and involved in of NBS and use OPERANDUM to learn about green solutions.	**WP8 – Task 8.2.1**: Guidelines and policy briefings will be presented at high-level events organized by OPERANDUM (UNESCO), possible as side-events and high-level conferences and forums.
		WP8 – Task 8.3.1 Knowledge exchange within OPERANDUM OALs: Lectures and 1-day workshops will be organized at each OAL in order to ensure that knowledge is exchanged within the project and with external partners including communities, experts, policy-makers and academia.

		WP8 – Task 8.4. Capacity building on NBS under the climate change context at EU and global level.
		WP8 – Task 8.4.1 High-level regional workshops: Two regional workshops on NBS for decision makers and regional authorities will be carried out at least in two outside EU regions. The training will be recorded and made available on OPERANDUM Platform.
		WP8 – Task 8.4.2 Building capacities of scientists and practitioners: share the best practices and collect feedback regarding the applicability of OPERANDUM solutions outside EU.
Public Bodies & Policy makers Tertiary European/ international	Be informed of NBS and use OPERANDUM to learn about green solutions.	**WP8 – Task 8.2** On fostering NBS on European and international level: main international organisations and national high level authorities will be reached through PEDRR partnership and Advisory Board representatives
		WP8 – Task 8.2.2 high-level outreach: presenting outcomes of OPERANDUM at high-level event by OPERANDUM stakeholders.
		WP8 – Task 8.3 on capacity building on NBS at national level within OALs.
		WP8 – Task 8.3.1 Knowledge exchange within OPERANDUM OALs: A number of summer schools (at least 2) will be organized to allow students to participate in the establishment of OALs. The potential participants of summer schools will be students, early career scientists, and also practitioners from public authorities and companies.
		WP8 – Task 8.4.3 Knowledge sharing through OPERANDUM platform: A series of webinars on various NBS, facilitated by OPERANDUM experts will be set.
Knowledge-based	Be consulted and involved in of NBS and use	**WP8 – Task 8.3.1** Knowledge exchange within OPERANDUM OALs: Lectures and 1-day workshops will be organized at each OAL in order to ensure that knowledge is exchanged within the

Organisations Secondary National/ Regional	OPERANDUM to learn about green solutions.	project and with external partners including communities, experts, policy-makers and academia.
		WP8 – Task 8.3.2. NBS training and OAL demonstrations to national and EU authorities: At each OAL a series of trainings and demonstrations to EU representatives and national authorities will be organized, i.e. river basins organisations, civil protection representatives, site managers of UNESCO designated sites etc. Each week training will consist of theoretical part, lead by OPERANDUM experts to define NBS solutions, and practical demonstration part, led by OAL local partners
Knowledge-based Organisations Tertiary National/ Regional	Be informed of NBS and use OPERANDUM to learn about green solutions.	**WP8 – Task 8.2.2** high-level outreach: presenting outcomes of OPERANDUM at high-level event by OPERANDUM stakeholders.
		WP8 – Task 8.3 on capacity building on NBS at national level within OALs.
		WP8 – Task 8.3.1 Knowledge exchange within OPERANDUM OALs: A number of summer schools (at least 2) will be organized to allow students to participate in the establishment of OALs. The potential participants of summer schools will be students, early career scientists, and also practitioners from public authorities and companies.
		WP7/WP8 – Task 8.4.3 Knowledge sharing through OPERANDUM platform: A series of webinars on various NBS, facilitated by OPERANDUM experts will be set.
Knowledge-based Organisations Secondary European/ international	Be consulted and involved in of NBS and use OPERANDUM to learn about green solutions.	**WP8 – Task 8.3.1** Knowledge exchange within OPERANDUM OALs: Lectures and 1-day workshops will be organized at each OAL in order to ensure that knowledge is exchanged within the project and with external partners including communities, experts, policy-makers and academia.
		WP8 – Task 8.4. Capacity building on NBS under the climate change context at EU and global level.

		WP8 – Task 8.4.1 High-level regional workshops: Two regional workshops on NBS for decision makers and regional authorities will be carried out at least in two outside EU regions. The training will be recorded and made available on OPERANDUM Platform.
		WP8 – Task 8.4.2 Building capacities of scientists and practitioners: share the best practices and collect feedback regarding the applicability of OPERANDUM solutions outside EU.
Knowledge-based Organisations Tertiary European/international	Be informed of NBS and use OPERANDUM to learn about green solutions.	**WP8 – Task 8.2** on fostering NBS on European and international level: main international organisations and national high level authorities will be reached through PEDRR partnership and Advisory Board representatives
		WP8 – Task 8.2.2 high-level outreach: presenting outcomes of OPERANDUM at high-level event by OPERANDUM stakeholders.
		WP8 – Task 8.3 on capacity building on NBS at national level within OALs.
		WP8 – Task 8.3.1 Knowledge exchange within OPERANDUM OALs: A number of summer schools (at least 2) will be organized to allow students to participate in the establishment of OALs. The potential participants of summer schools will be students, early career scientists, and also practitioners from public authorities and companies.
		WP8 – Task 8.4.3 Knowledge sharing through OPERANDUM platform: A series of webinars on various NBS, facilitated by OPERANDUM experts will be set.
Companies Secondary National/	Be consulted and involved in (implementation and	**WP8 – Task 8.2.1**: Guidelines and policy briefings will be presented at high-level events organized by OPERANDUM (UNESCO), possible as side-events and high-level conferences and forums.

Regional	mainstreaming of NBS and use OPERANDUM to learn about (the effectiveness and cost-benefits of) green solutions.	**WP8 – Task 8.3.1** Knowledge exchange within OPERANDUM OALs: Lectures and 1-day workshops will be organized at each OAL in order to ensure that knowledge is exchanged within the project and with external partners including communities, experts, policy-makers and academia.
		WP8 – Task 8.3.2. NBS training and OAL demonstrations to national and EU authorities: At each OAL a series of trainings and demonstrations to EU representatives and national authorities will be organized, i.e. river basins organisations, civil protection representatives, site managers of UNESCO designated sites etc. Each week training will consist of theoretical part, lead by OPERANDUM experts to define NBS solutions, and practical demonstration part, led by OAL local partners
Companies Tertiary National/ Regional	Be informed (implementation and mainstreaming of NBS and use OPERANDUM to learn about (the effectiveness and cost-benefits of) green solutions.	**WP8 – Task 8.2.2** high-level outreach: presenting outcomes of OPERANDUM at high-level event by OPERANDUM stakeholders.
		WP7/WP8 – Task 8.4.3 Knowledge sharing through OPERANDUM platform: A series of webinars on various NBS, facilitated by OPERANDUM experts will be set.
Companies Secondary European/ international	Be consulted and involved in of NBS and use OPERANDUM to learn about green solutions.	**WP8 – Task 8.3.1** Knowledge exchange within OPERANDUM OALs: Lectures and 1-day workshops will be organized at each OAL in order to ensure that knowledge is exchanged within the project and with external partners including communities, experts, policy-makers and academia.
Companies	Be informed of NBS and use	**WP8 – Task 8.2.2** high-level outreach: presenting outcomes of OPERANDUM at high-level event by OPERANDUM stakeholders.

Tertiary European/ international	OPERANDUM to learn about green solutions.	**WP8 – Task 8.3.1** Knowledge exchange within OPERANDUM OALs: A number of summer schools (at least 2) will be organized to allow students to participate in the establishment of OALs. The potential participants of summer schools will be students, early career scientists, and also practitioners from public authorities and companies.
		WP8 – Task 8.4.3 Knowledge sharing through OPERANDUM platform: A series of webinars on various NBS, facilitated by OPERANDUM experts will be set.
Associations Secondary National/ Regional	Be consulted and involved in (implementation and mainstreaming of NBS and use OPERANDUM to learn about (the effectiveness and cost-benefits of) green solutions.	**WP8 – Task 8.3.1** Knowledge exchange within OPERANDUM OALs: Lectures and 1-day workshops will be organized at each OAL in order to ensure that knowledge is exchanged within the project and with external partners including communities, experts, policy-makers and academia.
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Associations Tertiary National/ Regional	Be informed (implementation and mainstreaming of NBS and use OPERANDUM to learn about (the effectiveness and	**WP8 – Task 8.2.2** high-level outreach: presenting outcomes of OPERANDUM at high-level event by OPERANDUM stakeholders.
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	cost-benefits of) green solutions.	**WP7/WP8 – Task 8.4.3** Knowledge sharing through OPERANDUM platform: A series of webinars on various NBS, facilitated by OPERANDUM experts will be set.
Associations Secondary European/ international	Be consulted and involved in of NBS and use OPERANDUM to learn about green solutions.	**WP8 – Task 8.2.1**: Guidelines and policy briefings will be presented at high-level events organized by OPERANDUM (UNESCO), possible as side-events and high-level conferences and forums.
		WP8 – Task 8.3.1 Knowledge exchange within OPERANDUM OALs: Lectures and 1-day workshops will be organized at each OAL in order to ensure that knowledge is exchanged within the project and with external partners including communities, experts, policy-makers and academia.
		WP8 – Task 8.4.2 Building capacities of scientists and practitioners: share the best practices and collect feedback regarding the applicability of OPERANDUM solutions outside EU.
Associations Tertiary European/ international	Be informed of NBS and use OPERANDUM to learn about green solutions.	**WP8 – Task 8.2** On fostering NBS on European and international level: main international organisations and national high level authorities will be reached through PEDRR partnership and Advisory Board representatives
		WP8 – Task 8.2.2 high-level outreach: presenting outcomes of OPERANDUM at high-level event by OPERANDUM stakeholders.
		WP8 – Task 8.3 on capacity building on NBS at national level within OALs.
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		WP8 – Task 8.4.3 Knowledge sharing through OPERANDUM platform: A series of webinars on various NBS, facilitated by OPERANDUM experts will be set.

5. Ethics and risk management related to the stakeholder engagement

In a co-creation process all participants are assumed to be equal. Yet, stakeholders may differ in their expertise in the topic, resources for participation, role (e.g. administrative vs. civil society) interest and stake in the process, but also because of their cultural background. It can also be the case that certain stakeholders are used to take a certain role in a process, although they would be given some other roles in this particular process . It should also be acknowledged that the researchers may also have their aims in the process and that sometimes their roles are blurred(observers, facilitators and change agents) (Wittmayer and Schäpke 2014). This should be clarified to participants and assess how the different roles may affect to the process.

Given these variety of backgrounds and the overall idea of equal participation, (special attention to) power dynamics need to be addressed (Banks et al. 2012). In the beginning careful mapping and analysis of the stakeholders, their needs and expectations are important as well as clarification of their rights and responsibilities. During the collaboration, special attention should be paid in particular to those, who are in the most marginal position. Their participation should be supported, when possible, if restricted by physical, economic, social or cultural reasons. The project will produce variety of results and outputs, such as publications, tools and tool-kits throughout the project. In the beginning of the project it is important to discuss the possible outputs of the project, as well as any IPR issues that may emerge and to agree on the fair and equal ownership of the data and results between the stakeholders and researchers.

5.1 The risks and ethics related to the stakeholder engagement in OPERANDUM: data management issue

One of the main ethical issue arising from stakeholder engagement activities in OPERANDUM relates to the protection of stakeholders' personal data. This issue is subject to the Regulation (EU) 2016/679[8] on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation - GDPR).

'Personal data' means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person [art. 4 - EU General Data Protection Regulation (GDPR)].

The collection and processing of stakeholders' personal data in OPERANDUM may take place at different levels:

- project activities at OAL sites

[8] EU General Data Protection Regulation (GDPR) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016R0679

- project events
- stakeholders interviews and follow-up
- stakeholders interaction with the project website and social media accounts

As a general rule, OPERANDUM partners shall evaluate the research needs at the basis of every collection of personal data. If a set of personal data is not fundamental to carry on the research, then it should not be collected in the first place (*data minimisation* concept).

In terms of data minimisation, collecting/handling anonymous stakeholders data is the best practice, which can be derogated to meet follow-up actions and/or share information within the OPERANDUM Consortium. However, handling of personal data should be subjected to pseudonymisation to minimize risks related to exposure or misuse of personal data.

'Pseudonymisation' means the processing of personal data in such a manner that the personal data can no longer be attributed to a specific data subject without the use of additional information, provided that such additional information is kept separately and is subject to technical and organisational measures to ensure that the personal data are not attributed to an identified or identifiable natural person.

Every collection of stakeholders personal data is regulated by OPERANDUM procedures listed in Deliverable 11.1 "POPD-NEC-Requirement No. 4". The D11.1 requires OPERANDUM beneficiary institutions performing personal data collection to provide natural persons with an Information Form on the Protection of Personal Data. The Information Form is designed to update stakeholders on:

- Nature of the collected data;
- Purposes and methods of processing;
- Parties involved in processing (data controller, data protection officer, categories of recipients);
- Legal basis for the processing;
- Data retention period;
- Rights of data subjects;
- *[Only if needed]* notification of transfer of personal data to an international organisation, including its identification and the documentation of suitable safeguards.

Every OPERANDUM partner involved in stakeholder engagement is required to draft its own Information Form, which should be compliant with GDPR and applicable national laws. OPERANDUM partners should collect feedback from their Legal Offices and/or Data Protection Officers (DPOs) to draft the Information Form.

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5.2 Risk Management Plan related to stakeholders

The Risk Management Plan of OPERANDUM, as defined in D10.1, outlines a systematic process to identify, assess, manage, monitor and report on risks on all aspects of Project implementation (e.g. Project's scope, budget, schedule and performance). The risk is defined, in its broadest sense, as the combination of the probability of an event negatively impacting on any Project activity and its consequences. The Plan defines criteria to identify risks and evaluate their impact on the Project, develops and implements strategies to prevent and mitigate the risks, and sets up a communication procedure to track, review and report on risk evolution to re-define strategies and priorities, and improve management process. To this end, WP Leaders and OAL Leaders are requested to submit to the Risk Manager bi-monthly risk reports, where, if a risk is present or envisaged, it is described, outlining its severity, consequences, and time scales, and suggesting mitigation actions.

The stakeholder engagement is a key activity of our project and has to be carefully monitored as a possible source of risks. To preventively mitigate this type of risk, in the proposal preparation phase, in most OALs local authorities were included as project partners or provided endorsement letters, to ensure a link of the Project with relevant stakeholders since the early activities, especially when co-design and co-development of NBS is concerned. In the first nine months of OPERANDUM, risks related to stakeholder engagement were identified, and will be summarized below.

The main type of risk, already envisaged in the proposal preparation phase, is that stakeholders are not interested in NBS deployment. Reasons for this could be the lack (or limited) evidence of NBS efficacy, especially if compared to well established grey solutions: there are also cases where past activities on NBS in the OAL were not successful. This could be mitigated by starting with hybrid solution that take in to account the previous and successful experiences with grey solutions. Moreover, in some cases, the deployment of NBS could apparently impact negatively on some local activity, especially of economic nature. A further risk regarding stakeholders engagement, is the so called "stakeholders fatigue": most OALs are in regions of high value (naturalistic, economic, touristic, cultural), and very often local stakeholders are already involved in several consultancy activities within local and regional projects, and at the moment do not perceive the added value of OPERANDUM. To mitigate this type of risk, the communication with key players in the OAL has to be strengthened, together with awareness raising activities, aiming to highlight the innovative nature of OPERANDUM, and to clarify that "NBS demonstration" is one of the main goals of the whole Project.

As stated before during the Paris workshop OAL leader were asked to identify the main risks in the SH engagement related to their site of experimentation and implementation. With the support of social scientists, they provide a detailed map of the main issue related to the SH engagement activity using a SWOT analysis (see ANNEX 3).

By underlining the strengths, weaknesses, opportunities, and threats the OAL may encounter in engaging and involving SH for the co-design process, OAL leaders contribute to enhancing the knowledge about the

OAL and help in shaping an updated map of the possible risks related to the engagement of SH. This updated map could be considered as a picture that overlaps with the “risk map” of the technical part in each OAL and which identifies any effect that can impact the progress of the project.

Overall, even though each OAL has different characteristics and diverse circumstances, which could facilitate or hinder the engagement of stakeholders on all levels, it’s possible to cluster three main issues that recur in all the OAL as follow:

Every OAL is very different, and thus different opportunities and threats regarding geographical and logistic location need to be addressed. It’s important to follow common guidelines but rules should be adapted to local circumstances. In this scenario the communication between the OAL leader and members and the social scientist is crucial and could prevent some issues such as the “SH fatigue” by moderating the input send to SH, modulating level of information and involvement according to a defined step by step process.

As we analyse the schemes we can notice a strong dichotomy: on one side we have civil society who have a more sceptical attitude to NBS (old and traditional approach to environment and natural infrastructure? Different benefit? Lack of general trust towards ?) and on the other side research institute and private sector are very interested in NBS implementation. The latter are proved to be an important SH to spread the message of NBS among public institutions and civil society to increase social acceptance and citizen support to NBS. Moreover it’s essential to focus on the SH willing to work with the project or highly interested/affected by it and let them to spread the word about NBS and motivate other SH in a “snowball” effect.

Since results of NBS are not immediately visible (it might take a very long time before NBS show their effectiveness and prove to be adequate to address some hydro-meteorological risk), the OPERANDUM partners should try to convince SH in other ways using different involvement and inform tactics, like inviting SH to events regarding NBS in general, in order to increase the cultural acceptance of NBS which then will spread to more reluctant stakeholder.

6. Monitoring of the SH engagement and participatory process

6.1 Purpose and objectives of the monitoring

Advice on basic requirements for meaningful monitoring of participatory processes is plentiful (e.g. Abbot & Guijt 1998, Brunner 2004, Estrella & Gaventa 1998, Krick et al. 2005, Mahanty et al. 2007, McAllister 1999, Pasteur & Blauert 2000). In principle, the monitoring system should follow generic standards such as utility the information needs of users), feasibility (realistic and prudent) and accuracy (reveal and convey technically adequate information about the features that determine worth or merit of the program(s) being evaluated) (MED 2004).

In principle the monitoring aims to provide information about the processes throughout the project in order to provide understanding of their contribution to the final outcome, but also to adjust the processes during the lifetime of the project if needed. Another objective for monitoring is learning, which is an aspect and outcome in co-creation. Monitoring is a way to see, what are crucial points for learning in the topic, and how the learning could be enhanced. Monitoring will also reveal the unintended consequences to accommodate changes and enhance learning in the long term. Finally, the monitoring can also be seen as means to foster collaboration with the partners, create transparency and trust.

Overall, monitoring should not be seen as a separate part of the process, but rather as a continuous and integral element of the stakeholder engagement and communication, in order to keep the stakeholders informed and updated, but also to have their views and feedback throughout the process. Participation of stakeholders in the engagement process may also enhance ownership and responsibility for the process of engagement, facilitating further discussions that can improve the final project impact and build social networks .

Following these aims the monitoring may focus on the process, outputs or outcomes. Moreover, monitoring can and should occur at different time-steps. Monitoring of the engagement process itself can be initiated over the short term. The effectiveness of the engagement process can be monitored, and the process can be adjusted for improvement. Monitoring of outputs can be initiated at the end of the engagement process itself, as a tool for evaluation of the process completed. Monitoring of outcomes of the engagement process requires longer time lines as well as evaluation of a wider set of drivers and conditions. Longer time lines and increased complexity also mean increased funding requirements. However, this type of monitoring does allow to track the actual effectiveness of the engagement process as an agent of change.

Several principles of ‘good practice’ have been proposed by the UNDP Guidebook nd, p. 3):

- Both qualitative as well as quantitative methods must be included in the evaluation in order for the outcome of the projects to be fully understood.

- Evaluating participation demands that the entire process be evaluated, over a period of time. The approach needs to be dynamic as opposed to static (and easily adjustable to different circumstances, changing needs, diversity among SH and so on); conventional ex post facto evaluations, performed as limited snap-shots, will therefore not be adequate.

- Evaluating a process of participation is impossible without relevant and continual monitoring. Indeed, monitoring is of central importance to the whole exercise and the only means by which the qualitative descriptions can be obtained is to explain the process which has occurred.

- The people involved in the project have a part to play in the entire evaluation process. It is not a question of an external evaluator solely determining the project outcome; the evaluation needs to be participatory, with people themselves – both organisational staff and stakeholders – having a voice.

- The selection of indicators is seen as a critical issue, ensuring that indicators selected are not over-complex, do not demand enormous amounts of staff time and are related to the objectives of the project.

How to conduct the monitoring in practise? As the contexts in particular in the case of the OALs vary, the methods for the monitoring could be tailored to fit with the number and character of the stakeholders and finding best means to collect the data. Also the frequency of the monitoring could be set according to overall frame of the process. Each of the OAL should plan the monitoring and create formats for it (such as surveys with structured and open-ended questions, lists of attendance) and find the most appropriate ways to organise the data collection as a part of the meeting.

6.2 Organizing monitoring of stakeholder processes in OPERANDUM

As we defined in the previous section, monitoring should be shaped according to the overall framework of the process. In OPERANDUM given the multifaceted activity of involvement and engagement of SH, that has to be modulated across co-design and co-implementation phases, monitoring process represent a crucial task for partners. First of all, monitoring addresses the need to manage a complex communication flow within and among OAL, thanks to the continuous update of the state of the art in term of stakeholder involvement and consulting and the main success or failure gained in every step of the process.

In fact, monitoring the stakeholder engagement helps to notice “who is missing” or who is not following with the OAL development and to adjust the engagement strategy, to check if every stage of the engagement strategy is working and where it needs to be adjusted according to the stakeholder response and contribution. In other terms monitoring makes the stakeholder map alive and interactive and permits to intervene promptly in case of criticality.

For these reasons, some experimentations in monitoring have been tested lending some specific reporting tools, provided by the social scientists, within the OAL Italy. The tool belong mostly to “qualitative instrument” and it is supposed to integrate a whole setting of monitoring tools used by hard scientists. Social science uses some interactive tools to keep track of developments occurred in the area of

interest/research such diaries, field notes, observation notebooks in which the researchers report every single development of their activity. The proposal was to tailor these tools to OAL needs and keep track/monitoring progresses on engagement of stakeholder and authorization processes. OAL members were asked to file a so called “logbook” using a using a working platform Evernote[9] to share the notes. Each note is structured in two parts: page 1 to define the state of the art since the logbook has been introduced after some SH have already been involved, consulted and activated. Therefore, this part was dedicated to what has been done in terms of technical and operative steps (permission, authorizations etc.)/ which stakeholder have been already contacted and engaged/ weaknesses and critical situations/ next steps expected. Page 2, in the other hand, is a “on-going” part that has to be filled each time a SH is contacted, consulted or activated in any manner. The logbook outline appears as follow:

PAGE 2 - Logbook form

•Date

•Person/institution/business contacted (name, surname and role)

•Has this person/institution/business already been contacted or involved? For what reason?

•Object

•Short summary of the communication

•If any, weaknesses and critical aspect

Even if the logbook represents an internal tool it appears to help OAL members in keep track of development and criticality. It makes OAL members responsible of data gathering and for report to OAL leader and social scientists any helpful information to use for practical activities and to improve, as it goes, the current strategy and tactics in SH engagement.

However we are fully aware that the logbook shall be considered as a starting point for the monitoring of activities of SH engagement throughout OPERANDUM (co-design phase, co-implementation phase and so on) and some other steps need to be taken and implemented. Moreover it’s crucial to start identifying indicators that can actually measure the effectiveness of the engagement and how the project is factually producing transformations and changes that will impact SH area of interest at local, national and global level. The following section is dedicated to provide some sets of indicators that will try to measure the Stakeholder engagement strategy built through the first year of OPERANDUM.

[9] **Evernote** is application software designed for note taking, organizing, task lists, and archiving. The app allows users to create notes, which can be formatted text, web pages or web page excerpts, photographs, voice memos, or handwritten "ink" notes. Notes can also have file attachments. They can be sorted into notebooks, tagged, annotated, edited, given comments, searched, and exported.

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6.3 Topics and indicators for assessing the stakeholder engagement

Indicators are means to monitor the stakeholder engagement activities and their quality in respect to the set goals, and communicate about the stakeholder engagement. In an ideal case, the goals for the collaboration and topics for monitoring and possible indicators, either quantitative or qualitative, should be decided and selected together with the stakeholders in the beginning of the project.

Below we provide some topics and indicators that can be used for monitoring.

6.3.1. Monitoring the co-creation and stakeholder engagement

I Involvement in project activities

Questions for the project members and secondary/tertiary stakeholders:

- List/number of the project level meetings and other events.
- List/number of people involved in different project activities according to different stakeholder groups defined earlier.
- List/number of project outcomes (tangible), any new constructions, monitoring stations etc.
- List/number of the activities that the stakeholders have undertaken during the process.
- List/number of new networks, connections emerged during the process.

Questions for the project members and primary/secondary/tertiary stakeholders: (rate from 1 to 5 where 1 is "strongly disagree" and 5 is " strongly agree")

- All the relevant stakeholders were engaged in the project (rate 1-5)
- Communication was sufficient between the project partners and the stakeholders (rate 1-5)
- The project plan was jointly designed and approved (rate 1 -5).
- Do you have any other remarks about the involvement. (blank space)

II Learning

Questions for the primary stakeholders involved (rate from 1 to 5 where 1 is "strongly disagree" and 5 is " strongly agree")

- New knowledge/increased awareness about the NBS (rate 1-5)

Technological aspects (rate 1-5)

Economic aspects (rate 1-5)

Social aspects (rate 1-5)

Other, please describe

- New knowledge/increased awareness about the hydro-meteo risks in the area (rate 1-5)

  What type of knowledge, please describe?

- New knowledge about the other stakeholders, their interests and motivations regarding the NBS (rate 1-5)

  Please describe

- New knowledge about the co-creation methods (rate 1-5)

  Please describe.

- Any other topic?

Questions for the project members:

- New knowledge/increased awareness about the NBS (rate 1-5 *where 1 is "strongly disagree" and 5 is " strongly agree"*)
  - Please describe
- New knowledge/increased awareness about the hydro-meteo risks in the area? (rate 1-5)
- Please describe
- New knowledge about the other stakeholders, their interests and motivations regarding the NBS (rate 1-5)
- Please describe
- New knowledge about the co-creation?
- What (activity/element/method in the process) have you found important considering the learning of the topic (hydro-meteo risks/NBS/stakeholders)?
- What (activity/element/method in the process) have you found important considering the engagement and collaboration?

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- Any other topic you would like to mention regarding the learning or engagement?

III Other aspects (related to the transparency, equal participation, trust) for both stakeholders and the project members.

- I feel the process has been transparent, i.e. all the relevant information has been available and decision making has been open.

- I feel all the relevant stakeholders have been heard and they have been able to express their views and opinions.

- I feel that the process has been dominated by some of the stakeholders.
  - If possible, name who?
- I have got to know new people/organisation with whom I can collaborate also in the future.
- The process fulfilled my expectations.
  - Please describe why and how you would improve the process.
- Based on this experience so far I could participate in another similar type of process
  - Please describe why?
- I am happy with the result of the process (NBS selected etc.)?
  - Please describe why?
- I am not happy with the result of the process (NBS selected etc.)
  - Please describe why?

7. Conclusions

The deliverable intents to explore and analyse some of the main issue related to the engagement of stakeholder in develop and implement NBS and give a map of the work done in the first year of OPERANDUM. In order to create a structured and constant engagement of stakeholders through the whole project a strategy should be defined and used as methodology that gives the main guidelines on how to involve SH into co-design, co-implementation and monitoring phases. It should be seen as a very flexible framework, adaptable through time as SH needs, requirements and role change.

The overall aims of the engagement is to increase the diversity of knowledge in design and development of the NBS, improve the social relevance and acceptance of the activities and final results, take care of efficient use of the resources and throughout the process enhance the learning of the all partners. The process is guided by values that are inclusivity in regards to stakeholders, credibility, accessibility, respect and sensibility in regards to the process and accountability and acceptability of the final outputs. It is assumed that these will lead to greater legitimacy of the process and its outputs as well as trust between the partners. OPERANDUM has designated persons that are in charge of certain engagement processes.

The proposed strategy in this deliverable has been shaped according to the general goal and challenges of OPERANDUM: starting with a map of the SH, their needs and requirements have been defined in order to clarify the best tools to let them participate at the project. The focus was not only on *what* we expect from the stakeholders (e.g. information and knowledge, resources, technical support, willingness for collaboration), but also *how* the collaboration should be like (means of collaboration including issues like participation, inclusiveness, communication, trust). Moreover, this participation should be monitored in order to verify the quality and the effectiveness of the engagement and how it can actually implicate a change in the perception, acceptance, knowledge and support of NBS.

The stakeholder engagement is most critical in the OAL. To manage successful co-creation the OPERANDUM is following common guidelines (Task 1.3.). Yet, given that all OAL are different geographically and technological, and located in different kind of institutional, environmental and political contexts, we have identified common opportunities that can be used to strengthen the processes as well as challenges that require specific tactics.

The challenges found across the OAL are related to the awareness, attitudes and trust, diversity of goals and interests, financial , legislative, resources (skills or time). It can be assumed that there is a good number of stakeholders that fulfill the criteria of a stakeholder, at least if we take the broadest possible definition for the stakeholder as “anyone who is affected by the OAL” (e.g. local residents in the area). Yet, this does not mean that all the people in the area have a stake in building the OAL. Therefore we need to be aware of our own goals and objectives for the project and to find the stakeholders who can contribute to the aims and goals of the OPERANDUM.

The involvement of stakeholders should be promoted in every step of the project and it's essential to maintain current communication or collaboration practices according to the needs of each phase. For this reason interactions (communication and involvement) with SH should be modulated and adapted to meet stakeholder expectations and concerns. The partners must pay attention at these interactions and, in case, change some processes and practices in response to stakeholder feedback. Monitoring during and evaluation in the end of the process are important. They may help to adopt changes and improve the process, but also enhance learning among all partners.

OPERANDUM represent a precious chance not only to experiment NBS but also to trial the ways in which science field projects could be co-designed and co-implemented. The role of the strategy, integrated with some tools (here reported as a result of a synergical work among project partners), is to guide researcher through a methodical approach in which SH become more and more active actors of the process.

Now that the strategy, tactics and activities have been defined, partners would have a toolkit to move forward in the project, making the SH involvement and contribution more and more concrete and stable. In this scenario, the collaboration among partners remain significant and must be reinforced within and among OALs in order to succeed in the goal of fostering NBS at global and EU level, facilitate the process of capacity building on NBS at national and international level and, more important, to enhance capacities to replicate the solution in different social and cultural contexts as expected in the next years of OPERANDUM.

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ANNEX 1: Definitions

Definition of NBS by IUCN and the European Commission: IUCN defines **nature-based solutions (NBS)** as: '… actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g., climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits' (p. xii) (Cohen-Shacham et al. 2016).The European Commission understands: '… **nature-based solutions** to societal challenges as solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions' (European Commission 2016)

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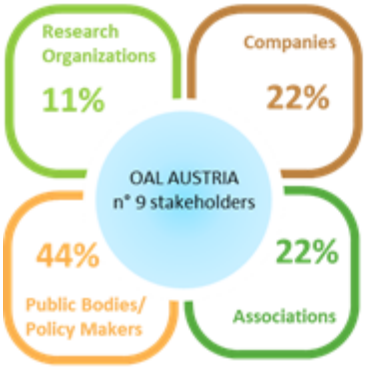
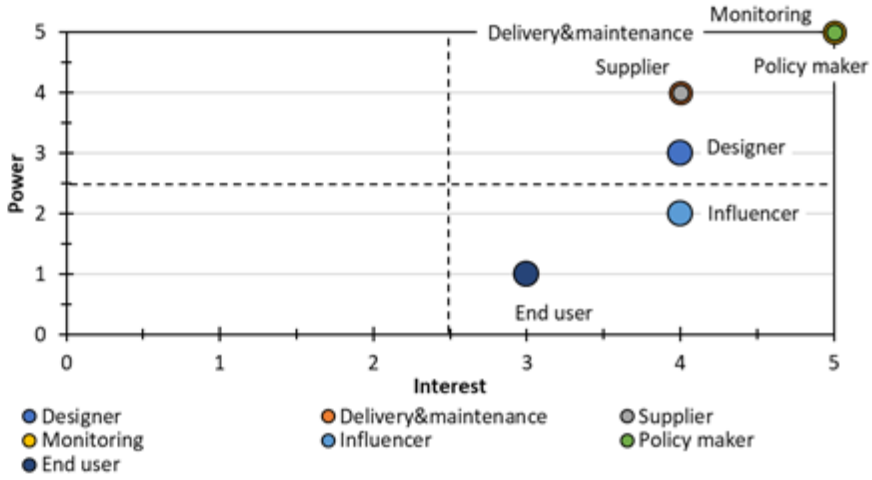
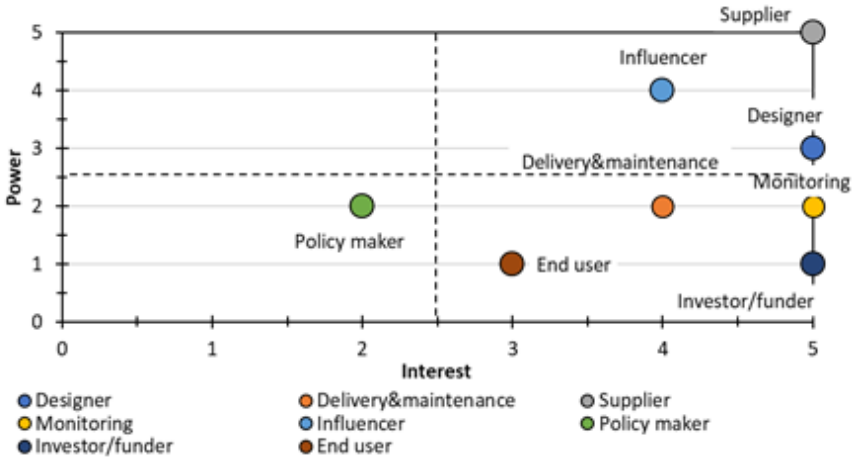
ANNEX 2: Power-Interest matrix at OAL level

OAL Austria is located in the lower Watten Valley in Tyrol (western Austria). The site is characterized by a continuously moving deep-seated landslide, which directly and indirectly endangers human and economic well-being. Houses and infrastructure situated on the active part of the landslide are directly affected by the continuous displacements while settlements located below the landslide are potentially threatened by secondary processes such as debris flows.

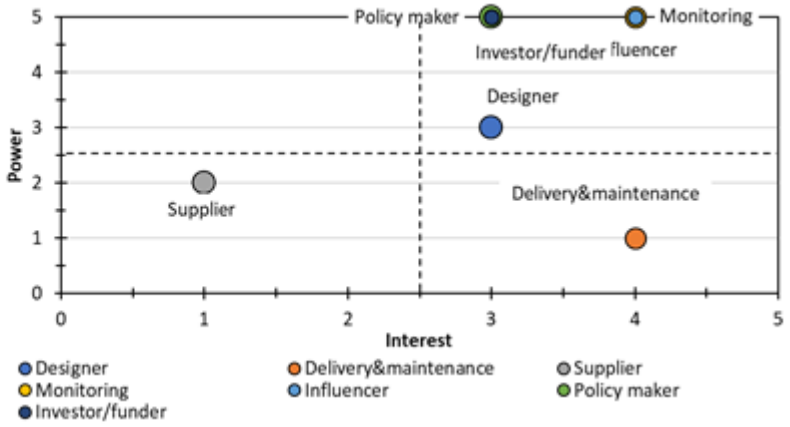




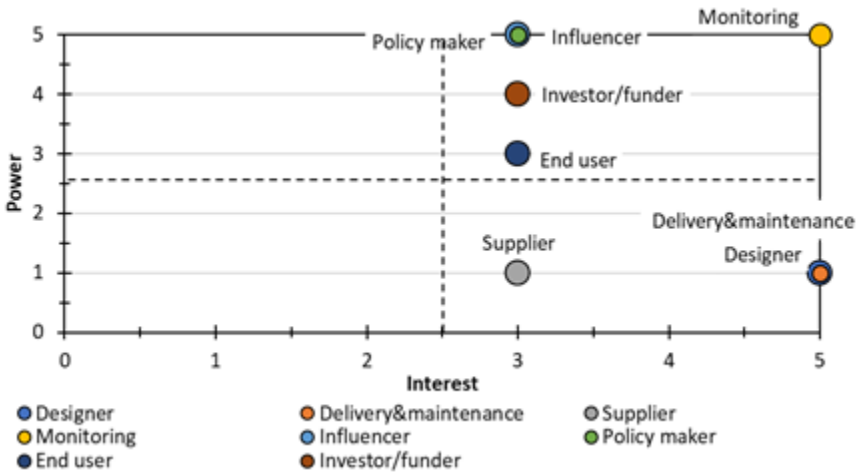
OAL Finland is located in the Lake Puruvesi catchment in Finland. The main land-use is forestry, with minor areas in agriculture, peat harvesting and urban land-use. Activities related to these land-uses and infrequently occurring high runoff peaks due to heavy rain or snowmelt impose eutrophication and sediment load risks.



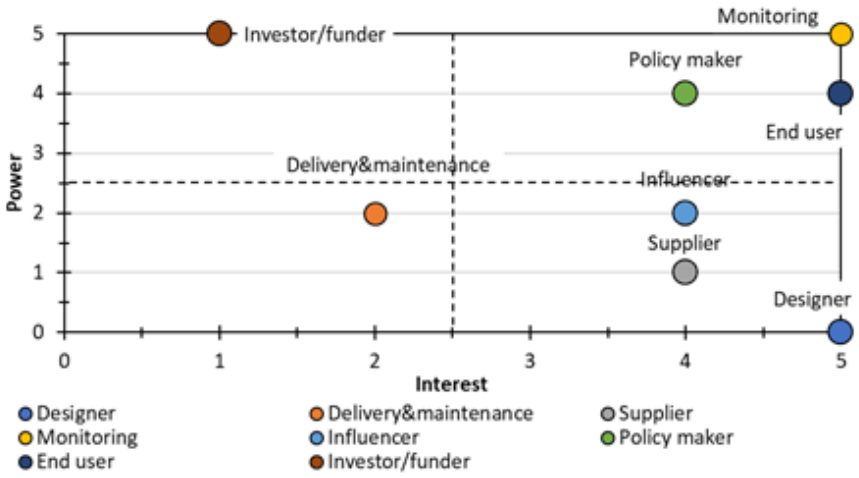
OAL Germany is in Elbe river basin, including a combination of sites with various land uses representing drivers of change such as urbanization and intensive agriculture. All the sites focus on the hazards of flooding. The site for observing reduced impact of flooding on a natural floodplain providing numerous important ecosystem services is provided by UNESCO biosphere reserve „Flusslandschaft Elbe- MV“.



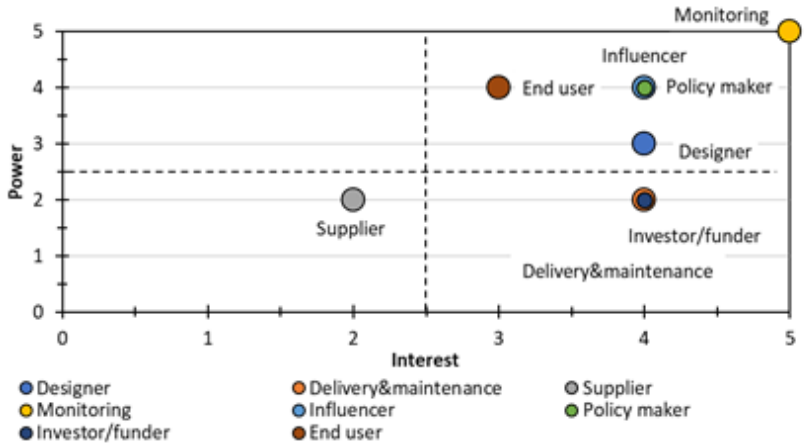
OAL Greece is in Sperchios river basin. The main purpose of this OAL is to study, implement and evaluate a number of pilot Natural Water Retention Measures (NWRMs), with the primary function of enhancing and restoring the retention capacity of natural and manmade soil and aquatic ecosystems.



OAL UK is in Catterline Bay. Severe coastal erosion episodes have occurred in the past coincident with spring tides. The erosion of the slopes' toe is leading to the downward movement of the slope forming materials, too. The early successional plant communities (i.e. herbs and grasses) are influenced by recreation causing risk of landslides and coastal erosion.



OAL IRELAND is located in Dodder River that is one of the principal rivers in Dublin. The aim of the Dublin OAL is to study, implement and evaluate a number of pilot Sustainable Urban Drainage Systems (SUDS) as NBS for the flooding with quick response to extreme precipitation through the application of the concept of constructed wetlands, with the establishment of riparian buffer areas, testing buffer zones with several vegetated areas, testing several bio-engineering solutions and promote practices to reduce water usage.



OAL ITALY is in the lower end of the Po valley, where the land use coverage is heterogeneous with agricultural land, river catchments and basins, wetlands, urban area and coastline. The area is prone to several risks: flooding, droughts, salt intrusion at estuaries, storm surge and consequent coastal erosion. It includes three focus areas where three different interventions are planned: the Panaro river, Po di Goro area and on the coastline.

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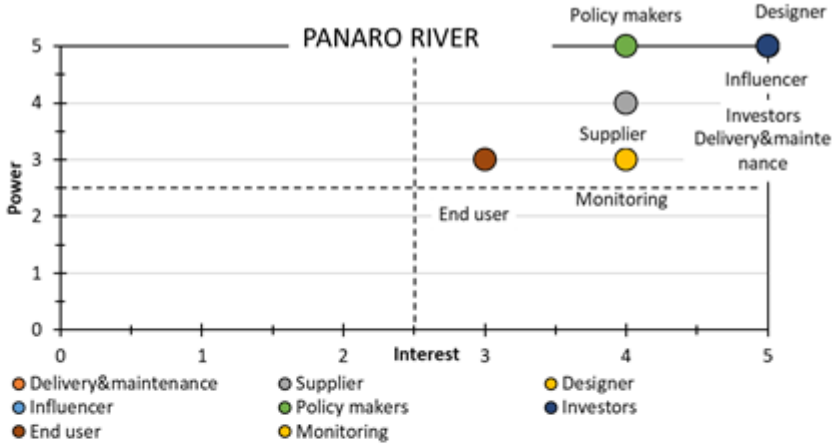
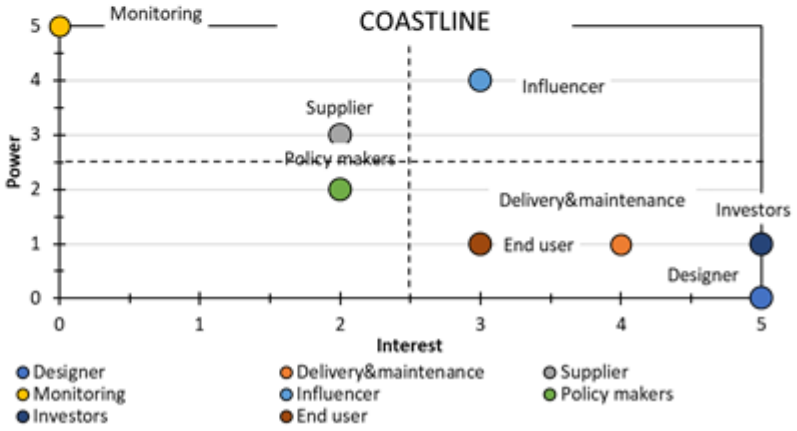
Research Organizations
8%
Companies
31%
OAL ITALY
n° 13 stakeholders
6%
Public Bodies/ Policy Makers
0%
Associations


PANARO RIVER
Policy makers
Designer
Influencer
Investors
Supplier
Delivery&maintenance
End user
Monitoring
Power
Interest
Delivery&maintenance
Supplier
Designer
Influencer
Policy makers
Investors
End user
Monitoring


COASTLINE
Monitoring
Influencer
Supplier
Policy makers
Delivery&maintenance
Investors
End user
Designer
Power
Interest
Designer
Delivery&maintenance
Supplier
Monitoring
Influencer
Policy makers
Investors
End user

ANNEX 3: Stakeholders needs and requirements - survey

Stakeholder Level of engagement Geographical Coverage	**Why are they interest in OPERANDUM? What motivates them?**	**What outcomes do they expect as a result of the project? What direct benefit do they expect to get from the project?**	**What could they provide to OPERANDUM?**	**Are there any potential conflicts in the collaboration with OPERANDUM?**
Knowledge-based Organizations				
Multidisciplinary research and education centre *Secondary SH National*	Interested in NBS or understanding of triggers of land slide activity.	better understanding of land slide activities and/or NBS effectiveness.	knowledge/expertise and support in monitoring activities (including instruments).	n/a
University with long involvement in studies related to the area of interest *Secondary SH National*	exchanges of scientific knowledge. Development of new Bioengineering curriculum	scientific collaboration, new data on NBS and environmental management	collaboration in technologies, testing, data on the area of interest, networking.	no
Research project Implementing and monitoring water protection activities, research,	interested in research in climate change and nutrient loading including monitoring and modelling, and water conservation in	they expect new scientific knowledge on environment, and socio-	scientific and local knowledge from the region, local contacts, publicity	no

participation in modelling *Primary SH* *National*	the changing environmental conditions	economic issues and participatory methods		
Construction Service of University *Primary SH* *Local*	Build the monitoring station	n/a	Provide technology and materials	No
Companies				
Technical consultants with experience in soil bioenginneering *Secondary SH* *National*	Interested in NBS or understanding of triggers of land slide activity.	better understanding of land slide activities and/or NBS effectiveness.	knowledge/expertise and support in monitoring activities (including instruments).	n/a
Local portal for information *secondary* *Local*	OPERANDUM is a big Research project with lots of partners involved and could be "big news", interest in climate change mitigation.	four years and more, of news concerning the project and its outcomes	publicity	perhaps there should be a separate premium for them to get them more involved
Local newspaper *primary* *Local*	interested in activities around the area of interest, supporting local viability, local environmental policy	they expect increase in local activities and local viability, they get material for their newspaper	publicity, delivery of information, increasing awareness	there is always a possibility of misunderstanding in communication, which may be harmful either to the project or collaboration with the local people

Multinational interested in supporting sensors deployment *secondary* *Worldwide*	collect data from sensors for analytics	high density network of sensors	collaboration in testing solutions and technologies	no
Landowners-managers *secondary* *Local*	Interested in forest management, but also the state of area and fishery	new knowledge of the state of the area, and knowledge of practices and measures that may enhance the state of the area, new knowledge of climate change and its impacts in the region	they may allow to use their land for NBS , and contribute in the planning, they also have local knowledge of the area.	most of them are collaborative, there may arise tensions with those who are afraid of economic losses due to the NBS
Manager of the hotel next to the area of interest *secondary* *Local*	Proximity to the OAL	Host in situ meetings	Potential extraordinary maintenance of monitoring stations	Yes, they may accidentally harm the monitoring devices
Environmental engineering company expert in NBS *primary* *National*	exchange of knowledge, improve its business, publicity, experiment its NBS in different context, improve technology,	experiment its NBS in different context, improve technology, improve its business	collaboration in co-design, implementation end monitoring, provide regulatory information related	There could be potential conflict between the company and OPERANDUM partner expert in design, but the involvement of an Environmental engineering

	collaborate with different Authority and Companies		to environment, collaboration in testing solution, publicity, provide their experience in these works, facilitate the executive phase	Companies has been agreed with the partner itself at the beginning of the Project.
Public Bodies/Policy makers				
Water Management Directorate *primary* *Local*	DRR with other then Grey solutions, dissemination of NBS co benefits for social and political purposes	New data to use in DRR, guidelines for integrating NBS and proper Water Use strategies.	collaboration in licencing, implementation, monitoring	the only possible conflict would be the timing of licencing.
Management Body subject to the supervision of the Ministry of Environment, Energy and Climate Change *secondary* *Local*	exchanges and production of knowledge, improvement of environmental management DRR.	enhancement of public awareness on environmental issues, multiple co-benefits of NBS implementation, guidelines on replication of NBS and on SH engagement.	Data for the area of interest, network, publicity.	since the environmental management up to now, is not done through broadly accepted channels, there might be some kind of defensiveness in the beginning and there might be needed to properly inform them about the scope and the specific objectives of OPERANDUM.

Regional Administration *primary* *Local*	interested in improving the state of the environment in general and of the specific area, and support the local livelihoods and viability	effective measures to decrease the nutrient loading; evidence-based data of these changes in the environment and climate, social-economic impacts of the area	monitoring data, assisting in organising monitoring, local contacts	no we cannot foresee any conflicts now
Regional Administration primary Local	interested in improving the state of the environment in general and of the specific area, and support the local livelihoods and viability	effective measures to decrease the nutrient loading; evidence-based data of these changes in the environment and climate, social-economic impacts of the area.	monitoring data, assisting in organising monitoring, local contacts	no we cannot foresee any conflicts now
Management body of forests and protected areas *primary* *National*	interested in sustainable forest management in general and of the specific area, and support the recreation	new forest management practices	knowledge and practices related to participatory forest planning methods	no we cannot foresee any conflicts now

Forest centre *primary* *Local*	interested in sustainable forest management and planning in general	effective measures to decrease the nutrient loading; evidence-based data of these changes in the environment, social-economic impacts of the area of interest	knowledge of local forest planning and management, design of measures for managing nutrient loading from forests	no we cannot foresee any conflicts now
Section of the Local Authority in charge of the ports *secondary* *Local*	Performance evidence from sustainable novel approaches against coastal erosion - citizens participation	Evidence, innovation, and guidelines to support environmental policies and management strategies	Data, permits and institutional support to deploy and test offshore NBS	n/a
Section of the Local Authority in charge of the transportation infrastructure *secondary* *Local*	performance evidence from sustainable novel approaches against landslides and erosion - citizens participation	Evidence, innovation, and guidelines to support environmental policies and management strategies	Data, permits and institutional support to deploy and test NBS	n/a
Section of the Local Authority in charge	performance evidence from sustainable novel approaches against	Evidence, innovation, and guidelines to	Data, permits and institutional support	n/a

of the flooding policy *secondary* *Local*	flooding - citizens participation	support environmental policies and management strategies	to deploy and test NBS	
Section of the Local Authority in charge of the coastal infrastructure secondary Local	Performance evidence from sustainable novel approaches against coastal erosion - citizens participation	Evidence, innovation, and guidelines to support environmental policies and management strategies	Data, permits and institutional support to deploy and test offshore NBS	n/a
Regulator of environmental matters *secondary* *National*	Performance evidence from sustainable novel approaches against hydro-meteorological hazards - citizens participation	Evidence, innovation, and guidelines to support environmental policies and management strategies	Data, permits and institutional support to deploy and test NBS	n/a
Branch of local municipality dealing with tech companies *primary* *National*	create new business	create new SMEs	publicity	no
Association of local authorities *primary*	create new business	create new SMEs	publicity	no

National				
State body responsible for flood risk secondary National	reduce flood risk	reduced flood risk using NBS	access to data	no
State body responsible for meteo secondary National	improve meteorological models	better models	access to data	no
Biosphere Reserve Administration *primary* *Local*	their interest is that we continue with existing projects and the development of management plans	update of regional user-tailored data about climate change for the region	knowledge on existing strategies and techniques and management for implementing NBS	Operandum profits highly from participation of the Biosphere Reserve. On the contrary, it is unclear how much the Biosphere Reserve may profit from the outcome of OPERANDUM. An overload of requests could still lead to a fatigue of the stakeholder. Potential conflict: lack of financial resources
Regional body - Land Security Agency and Civil Protection Agency *primary* *Local*	Enhance the knowledge of hydrometeorological hazards, their risk assessment and the NBS efficacy in mitigating their effects	Hazard threat reduction and new environmental data	Perform monitoring and maintenance activities. Report the NBS efficacy. Provide technologies	No

		gain experience in construction of NBS, enhance defence of the territory, integrate its interventions	collaboration in co-design, implementation end monitoring, testing solution, provide their experience in coastal defence and in execution of public works,	
Management Board for Parks and Biodiversity *secondary* *Local*	exchange of knowledge, enhance the defence of the ecosystem of the park, interest in natural based solution, the works could be included in management interventions of the park	enhance environment, defence and integrate management intervention of the park	collaboration in co-design, provide regulatory information related to environment, collaboration in testing solution, publicity, provide their experience in ecosystem defence, facilitate the executive phase, contribution to maintenance	no
Local municipality - Territory and Economic Development Department *secondary* *Local*	Reduce the hazard threat exchange of knowledge, enhance the quality of their territory, experiment a new defence structure, tourism,	Hazard threat reduction gain experience in construction of NBS, enhance defence of the territory,	Grant authorizations to perform research activities provide regulatory information, provide their experience in coastal defence and in execution of public	Yes, they provide the authorizations to implement NBS and monitoring stations inside the OAL

		improve its business	works, facilitate the executive phase, publicity, contribution to maintenance	
Authority for cultural and landscape heritage conservation policy *secondary* *Local*	protection and enhancement of the landscape	protection and enhancement of the landscape	provide regulatory information related to landscape,	no
Local municipality *primary* *Local*	Reduce the hazard threat	Hazard threat reduction	Grant authorizations to perform research activities	No
Police Department for biodiversity and parks protection *secondary* *Local*	exchange of knowledge, enhance the defence of the park end of biodiversity, interest in natural based solution, the works could be included in management interventions of the park	protection of biodiversity	collaboration in co-design, implementation end monitoring, provide regulatory information related to environment, collaboration in testing solution, publicity, provide their experience in biodiversity protection, facilitate the executive phase, contribution to maintenance	no

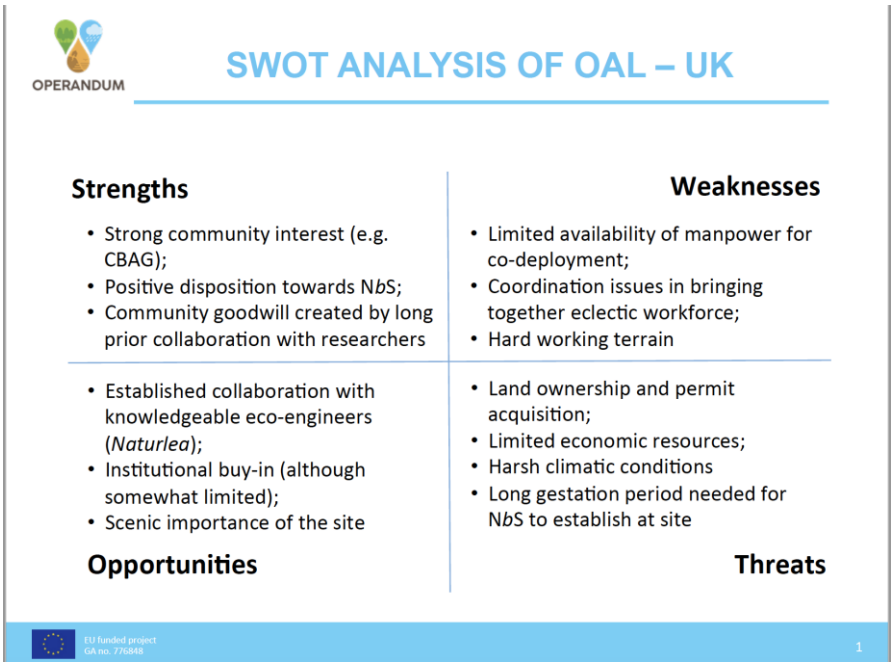
Inter-regional agency responsible for flood protection and flood damage reduction *primary* *National*	Enhance the knowledge of hydrometeorological hazards, their risk assessment and the NBS efficacy in mitigating their effects Improving river banks protection and applicability and benefits potential of the proposed NBS	Hazard threat reduction and new environmental data Analysis of the potential of implementation of deep-root herbaceous plants on river banks for reducing erosion; pros and cons of the proposed solution; guidelines for future implementations.	Perform monitoring and maintenance activities. Report the NBS efficacy. Provide technologies They are crucial for implementing the NBS (they are the owner and manager of the river bank); close collaboration on choice of study site and co-design for the practical deployment of the NBS and its future maintenance.	No
Provincial body *primary* *Local*	Reduce the hazard threat Exchange of knowledge; close collaboration with AIPO on road infrastructures and their use during flood events	Hazard threat reduction Perhaps more information on behaviour of the tested NBS for other applications beside river banks.	Grant authorizations to perform research activities May be consulted for suggestions and help for the practical development of the deployment, since they are expert of civil engineering works in the area.	No

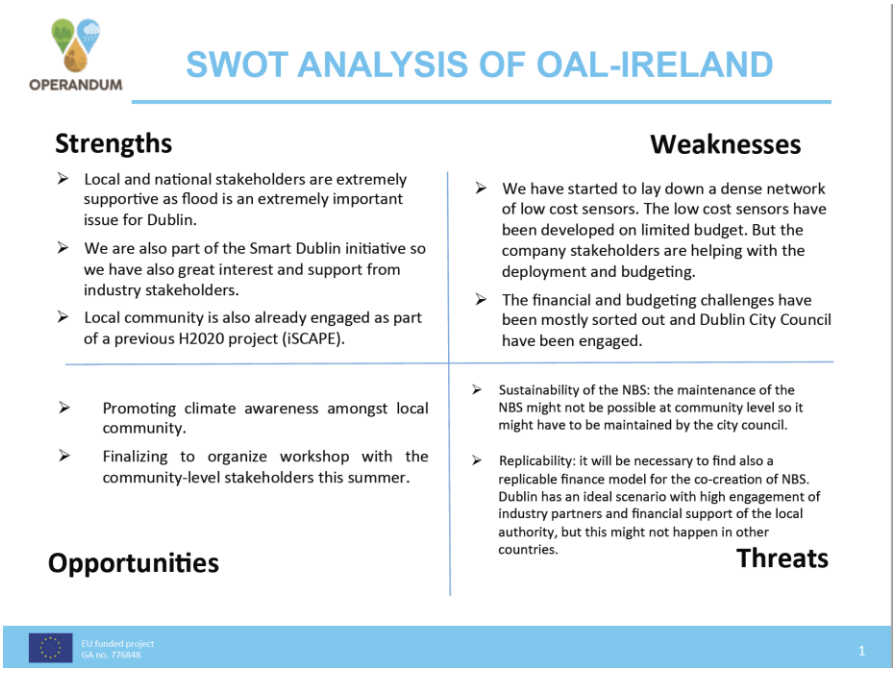
			May help in publicity and engagement of other stakeholders	
Associations and Organizations				
Association of Primary Education Teachers *secondary* *Local*	development of interdisciplinarity in frameworks other than science, conservation of biodiversity, adaptation to climate change, public awareness, environmentally friendly policies.	DRR, enhancement of public awareness on environmental issues, multiple co-benefits of NBS implementation, guidelines on replication of NBS and on SH engagement.	creation of awareness, dissemination of the whole context of the project through the schools network.	no
Advising role for shaping environmental policy and interventions primary Local	create new business/improve their business, new engineering knowledge/practices, funding opportunities.	DRR, enhancement of public awareness on environmental issues, multiple co-benefits of NBS implementation, guidelines on replication of NBS and on SH engagement and	collaboration in technologies, data on the area of interest, networking, shaping and proposing new policies, possible standardisation of NBS guides	no

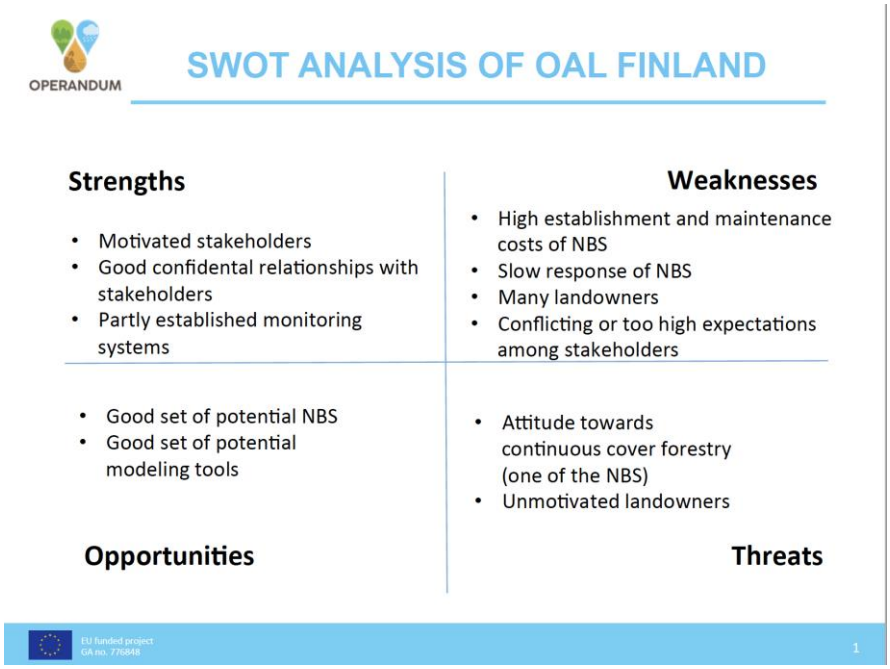
		engineering approaches to NBS		
Fishery association *primary* *Local*	interested in improving the state of the lake in general and in particular for fishery	effective measures to decrease the nutrient loading	local contacts, local knowledge, participating in the monitoring	no we cannot foresee any conflicts now
Union of Agricultural Producers and Forest Owners *primary* *Local*	Interested in agriculture and forest management, environment and landowners' rights	new scientific knowledge of sustainable forest management practices	knowledge of local agriculture forestry and land owners, contacts for local forest and land owners	not probable
Local hunting clubs *primary* *Local*	interested in hunting and game management in the region	activities of OPERANDUM that may be beneficial for the hunting	they may assist in building or management of wetlands etc, but also assist in monitoring	not probable, but in case the OPERANDUM activities are harmful for hunting or game management, conflicts may arise
Association for forest management *secondary* *Association* *Local*	Interested in forest management and forestry	new scientific knowledge of sustainable forest management practices	knowledge of local forestry, forest management, planning and forest owners	no we cannot foresee any conflicts now
Community group representing local residents affected by hydro-meteo risk	Reduce geo-hazards likelihood, Enhance the quality of the territory/landscape,	Improved protection of the area from	Collaboration in operationalising NbS, support to data	n/a

primary *Local*	preservation, conservation, aesthetic value	hydrometeorological risks	collection activities, publicity	
Charitable organisation *secondary* *National*	Performance evidence from sustainable novel approaches against hydro-meteorological hazards - citizens participation	Evidence about vegetation use in NBS - publicity	Plant materials for the deployment of NBS	n/a
Charitable organisation *secondary* *Local*	citizens participation	evidence on citizens participation approaches - publicity	Economic funds	n/a
Association of users of the area *secondary* *Local*	Generation and application of scientific knowledge on NBS	Evidence data - novel indicators for NBS performance	dissemination of results - collaboration in operationalisation of NBS	n/a

ANNEX 4: SWOT analysis about OAL






OPERANDUM
SWOT ANALYSIS OF OAL FINLAND
Strengths
Motivated stakeholders
Good confidental relationships with stakeholders
Partly established monitoring systems
Weaknesses
High establishment and maintenance costs of NBS
Slow response of NBS
Many landowners
Conflicting or too high expectations among stakeholders
Good set of potential NBS
Good set of potential modeling tools
Opportunities
Attitude towards continuous cover forestry (one of the NBS)
Unmotivated landowners
Threats
EU funded project GA no. 776848
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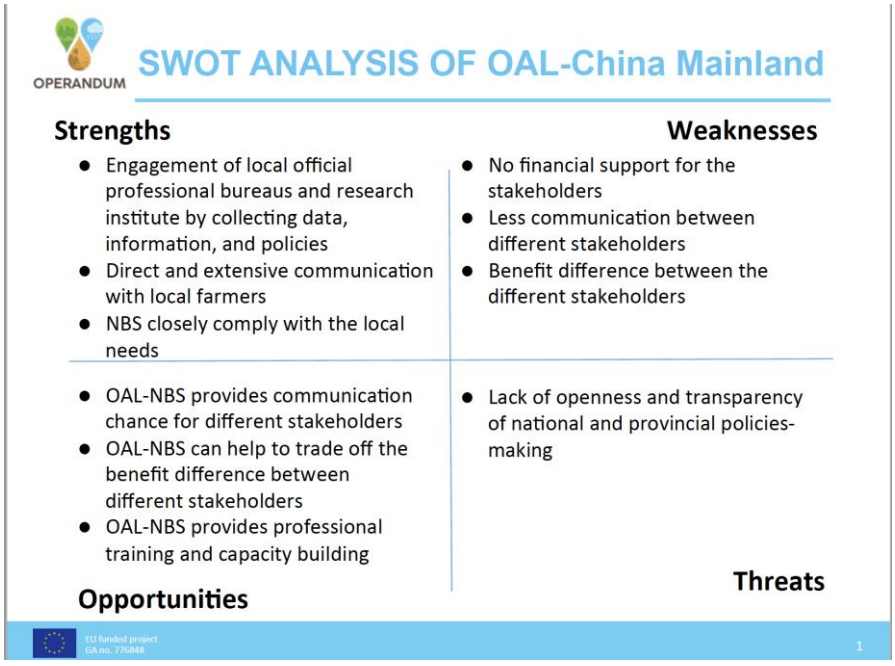
OPERANDUM
SWOT ANALYSIS OF OAL-China Mainland
Strengths
Engagement of local official professional bureaus and research institute by collecting data, information, and policies
Direct and extensive communication with local farmers
NBS closely comply with the local needs
Weaknesses
No financial support for the stakeholders
Less communication between different stakeholders
Benefit difference between the different stakeholders
OAL-NBS provides communication chance for different stakeholders
OAL-NBS can help to trade off the benefit difference between different stakeholders
OAL-NBS provides professional training and capacity building
Opportunities
Lack of openness and transparency of national and provincial policies-making
Threats
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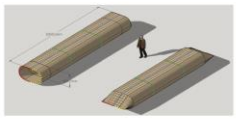
OPERANDUM

SWOT ANALYSIS OF OAL - Italy

Strengths

- Three sites with **different** stakeholders
- Two **partners** are also stakeholders
- A **patent** process has already started

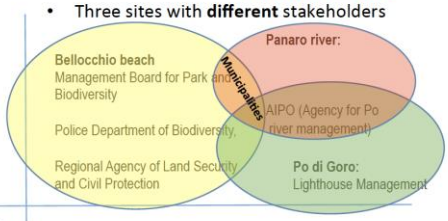


- Bellocchio beach and Po di Goro are within the biosphere reserve **MaB UNESCO**
- Emilia Romagna **industrial network** is very active and ready to be connected with OAL-Italy and OPERANDUM

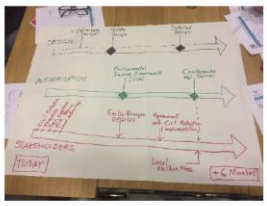
Opportunities

Weaknesses

- Three sites with **different** stakeholders



- Authorities **permissions sequence**
- **Timing**



Threats

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OPERANDUM

SWOT ANALYSIS OF OAL- Greece

Strengths

- The existence of important thermal-springs in many sites of the basin
- The uniqueness of Platanodasos's landscape and the easy access for all kind of activities
- The existence of many environmentally protected areas (Natura)
- Our local stakeholders are mostly entities of civil society (strong voice)
- The majority of the local stakeholders are closely attached to their place of residence
- The identified Key Persons are of positive stance on the involvement process

Weaknesses

- Managing "strong" stakeholders conflict of interests
- The local stakeholders are somewhat unwilling to adopt NBS solutions due to Cost and insufficiency
- The majority of local stakeholders are reluctant to adopt innovative and environmentally friendly solution, due to their age
- The local stakeholders are moderately aware of the complete Hydro/meteo risks that Spercheios valley is facing
- They have a narrow picture of the co benefits an NBS intervention can provide

- Most of the stakeholders believe that climate change will influence the risks in Spercheios valley
- They have noticed many changes in the river since the beginning of their relation with it
- There are many protected areas in the basin (Natura), fact that is very important, because the legislation can restrict the environmental pressures in these regions.
- EU Framework Directive (2000/60/EC). This Directive provides new legislation and opportunities for the sustainable management of water resources.
- Implementation of Flood risk management plans according to Directive 2007/60/EC
- The existence of thermal springs, unique landscape and the Platanodasos itself which are significant factors for touristic development and financial regeneration

Opportunities

- The stakeholders do not acknowledge the full potential benefits of the four levels of engagement (mostly interested to be informed)
- They are quite reserved against research projects and the use of their scientific results in their everyday life
- The improper water management, which is a complex problem
- The area is in actual risk by natural hazards
- The climate changes in correlation with the overexploitation of the surface and groundwater resources.
- Platanodasos is threatened from the spread of the catastrophic disease, "metachromatic ulcer of platanus"

Threats

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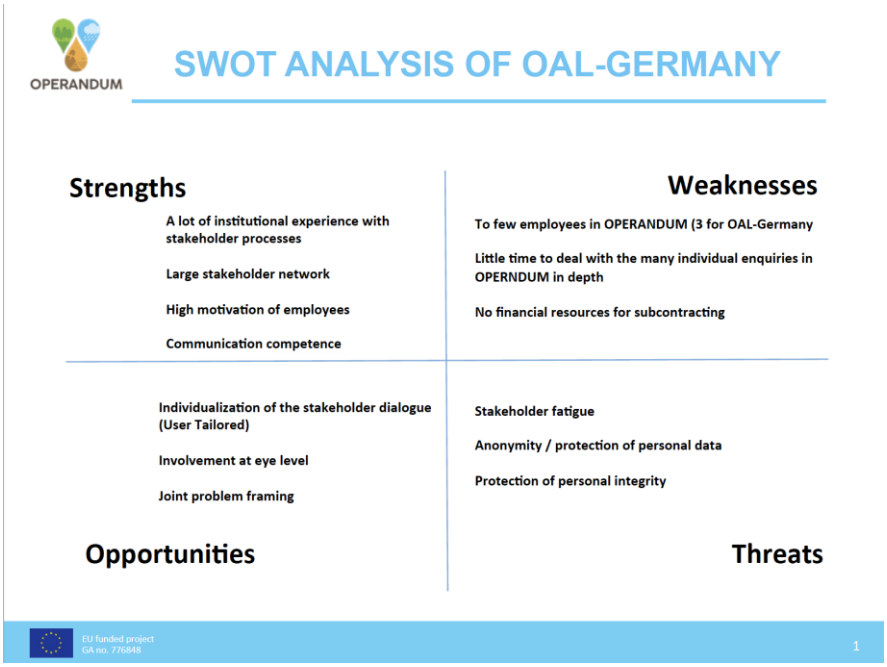
OPERANDUM
SWOT ANALYSIS OF OAL-GERMANY
Strengths
A lot of institutional experience with stakeholder processes
Large stakeholder network
High motivation of employees
Communication competence
Weaknesses
To few employees in OPERANDUM (3 for OAL-Germany
Little time to deal with the many individual enquiries in OPERNDUM in depth
No financial resources for subcontracting
Individualization of the stakeholder dialogue (User Tailored)
Involvement at eye level
Joint problem framing
Stakeholder fatigue
Anonymity / protection of personal data
Protection of personal integrity
Opportunities
Threats
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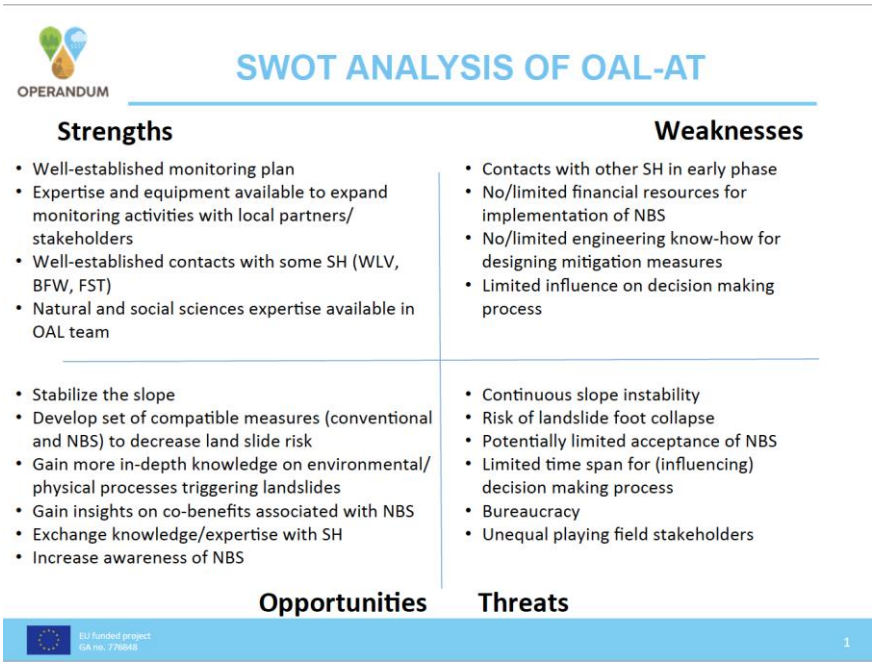
OPERANDUM
SWOT ANALYSIS OF OAL-AT
Strengths
Well-established monitoring plan
Expertise and equipment available to expand monitoring activities with local partners/ stakeholders
Well-established contacts with some SH (WLV, BFW, FST)
Natural and social sciences expertise available in OAL team
Weaknesses
Contacts with other SH in early phase
No/limited financial resources for implementation of NBS
No/limited engineering know-how for designing mitigation measures
Limited influence on decision making process
Stabilize the slope
Develop set of compatible measures (conventional and NBS) to decrease land slide risk
Gain more in-depth knowledge on environmental/ physical processes triggering landslides
Gain insights on co-benefits associated with NBS
Exchange knowledge/expertise with SH
Increase awareness of NBS
Continuous slope instability
Risk of landslide foot collapse
Potentially limited acceptance of NBS
Limited time span for (influencing) decision making process
Bureaucracy
Unequal playing field stakeholders
Opportunities
Threats
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