Ref. Ares(2024)1587300 - 29/02/2024

NATALIE

Accelerating and mainstreaming transformative NATure-bAsed solutions to enhance resiLIEence to climate change for diverse bio-geographical European regions

D5.1 Initial roadmap for the implementation and monitoring of actions at the Case Studies

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February 2024

Funded by the European Union

Project funded by
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Confederation
Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

UK Research and Innovation

Disclaimer

This document arises from the European project "Accelerating and mainstreaming transformative NATure-bAsed solutions to enhance resilience to climate change for diverse bio-geographical European regions (NATALIE)", which has received funding from the European Union, under the Grant Agreement N° 101112859.

Intellectual Property Rights

Project Consortium

EXECUTIVE SUMMARY

This document presents the initial planning, coordination and monitoring activities for the case study activities in NATALIE, which took place during the first six months of the project (M1-M6), as well as the actions planned for the next months, related to the Accelerating and mainstreaming transformative Nature Based Solutions (NBS) to enhance resilience to climate change for diverse bio-geographical European regions at the eight Case Studies (CSs) of the project. It also includes an initial roadmap for the implementation of NATALIE activities at the CS, as well as an initial monitoring plan.

This version (V1) shows the status of Deliverable 5.1 on this specific date of submission (M6). Later in the project, newer (updated) versions of this document will be submitted (M12/M24/M42/M60).

It is practically a living document, continually updated, reporting (a) an updating description of each CS; (b) the stakeholder engagement activities (meetings, actions, etc) within the CSs that are contributing to particular Work Packages (WP2, WP6, WP7); (c) the organisation of preparatory actions for the implementation of stakeholder participation and modelling activities (WP3, WP4) and (d) the organisation of a monitoring mechanism and plan for all these activities, for potential amendment actions (e.g. for delayed work, lack of communication with stakeholders, lack of data, pandemic related issues, unforeseen emergencies etc.), which need to be reported to WP1 (management).

During the first six months of the project, within Task 5.1, NATALIE managed to establish a regular communication mechanism among the CSs and key partners from the other WPs with weekly meetings, thus ensuring a smooth coordination to enable the active participation of all the CSs partners in project activities and in key technical decisions (e.g. the climate projection scenarios selected to be applied across the CSs), as well as the compilation of the long list of stakeholders for all the CSs, with guidance and instructions from WP2.

In the next few months, emphasis will be given on the organisation of the first stakeholder meeting, the initiation of citizen science engagement activities, and the preparation in the CS for implementation of the NBS. Beyond this stage, detailed plans (tailor-made) for each CS will be developed and included in the next version of this deliverable.

The document includes also three Appendices presenting a detailed survey of the CS on their data, monitoring and modelling needs (Annex 1 and 2) and containing the minutes of all the meetings that took place in this period within Task 5.1 (Annex 3).

This Deliverable, in its final version (M6) aims to provide detailed information and experience-based knowledge from the (diverse) case studies, which is expected to contribute to regional decisions and EU policies for the implementation of actions leading to enhanced resilience to climate change at regional level.

RELATED DELIVERABLES AND WORK PACKAGES' CONNECTION

This roadmap is indeed strongly related to all the other WPs of NATALIE, as the case studies are at the heart of the project:

- The work carried out was based on the **inputs from** WP2 (T2.1, T2.3), WP3 and WP4 (survey – see annex 1) and WP6 (Tasks 6.1, 6.2, 6.3)
- The results presented in this deliverable **will feed** WP2 (T2.1, D2.1), WP 3 (D3.1), WP4 (D4.1, D4.4), WP6 (D6.1) and WP7 (D7.1).

DOCUMENT INFORMATION

Grant Agreement N°	101112859
Project Acronym	NATALIE
Project full name	Accelerating and mainstreaming transformative NATure-bAsed solutions to enhance resilience to climate change for diverse bio-geographical European regions
Start of the project	1 September 2023
Duration	60 months
Deliverable	**D5.1: Initial Roadmap and monitoring plan for the activities and actions at the Case Studies**
Work Package	**WP5: Case studies: Coordination, Implementation, Testing, Monitoring and Validation activities**
Task	Task 5.1: Development of a roadmap for the implementation, testing and monitoring of actions in all the CSs
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Quality check	Sonia SIAUVE (Oieau)
Due Date	29/02/2024
Delivery Date	29/02/2024
Explanation of the delay (if any)	N/A
Citation	Van den Broeke J., Vamvakeridou-Lyroudia L. (2024): *Initial Roadmap and monitoring plan for the activities and actions at the Case Studies,* Deliverable D5.1, Public, Horizon Europe NATALIE Project, Grant agreement N° 101112859
Dissemination Level	Public

REVISION HISTORY

Version	Date	Who	What
V0.1	13/02/2024	Joep van den Broeke (KWR)	First draft
V0.2	21/02/2024	Lydia Vamvakeridou-Lyroudia (KWR)	Internal review
V0.3	27/02/2024	Sonia Siauve (Oieau)	Quality check
VF	29/02/2024	Joep van den Broeke (KWR)	Final edit

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LIST OF ACRONYMS

ASR	Aquifer Storage Recovery
CA	Consortium Agreement
CS	Case Study (1 CS = 1 DS + 1FL if any)
DS	Demonstration Site
EBA	Ecosystem Based Adaptation
EC	European Commission
FL	Follower Site
GA	Grant Agreement
IPCC	Intergovernmental Panel on Climate Change
M	Project Month, with September 2023 constituting month 1 (M1)
MAR	Managed Aquifer Recharge
NBCCAS	nature-based climate change adaptation solutions
NBS	Nature Based Solutions
SH	Stakeholder(s)
SEA	Sources en Actions
SUDS	Sustainable Urban Drainage System
WP	Work Package
WWTPs	Wastewater treatment plants

1 INTRODUCTION

1.1 Scope of this deliverable

NATALIE addresses the risks posed by climate change and its impacts and proposes to advance the concepts of "ecosystem-based adaptation" (EBA) in Europe combined with climate resilient development pathways, as the means for impact driven Nature Based Solutions (NBS), to accelerate and mainstreaming the adoption of NBS for resilience to climate change, which is also the cornerstone identified in the recent IPCC AR6 WGII Report. NATALIE will deliver innovative and practical innovations in co-creation of solutions and stakeholder engagement, modelling, testing, monitoring and validation mechanisms that will support regions and municipalities to develop adaptation actions bringing along valuable knowledge and experience as actionable knowledge for adaptation and impact-driven NBS.

In NATALIE, the work on development and implementation of the transformative NBS Booster Pack is organised around 25 solutions that will be developed through the concerted WP activities and demonstrated at the scale of the 8 (CSs). The implementation, testing, monitoring and validation of the NBS in these CSs, as well as the overall coordination of the CSs, is organised in Work Package (WP) 5. A number of activities and actions need to take place, implemented specifically for each CS, but also horizontally across them. The objectives of NATALIE WP5 are:

(i) to develop a roadmap of actions for all the CS,
(ii) to coordinate the activities and actions in all the CS and the interactions with the other WPs,
(iii) to guide and monitor the implementation of the aforementioned actions, i.e., testing and monitoring actions, installations of sensoring equipment, data collection, stakeholder engagement etc.
(iv) to assess the impact of NBS (including technical, social, economic and cultural aspects),
(v) to develop and coordinate the validation procedures (by the stakeholders) for the NBS implemented in all the CSs,
(vi) to provide evidence-based knowledge, lessons learned and recommendations at EU level (horizontally from all the CSs).

WP5 is structured in three Tasks, encompassing all the above objectives. Task 5.1 develops a **roadmap to foster, guide and monitor the collaboration and coordination of activities for each CS, mapping all necessary activities and timelines for implementation**. Furthermore, through task 5.1, the implementation of the activities related to all the WPs that are linked to the CSs are coordinated.

The initial roadmap and monitoring framework for the above goals has been developed in the first six months of the project, taking into account the particularities of each CS and the needs and objectives of each WP. These are reflected and detailed in this deliverable (D5.1). It is very early in the project to have a realistic full roadmap and timeline of activities till the end of the project. Consequently D5.1, referring to activities of task 5.1, is considered as a **living document**, which is placed online in the common folder of the project, updated every week, updated continually throughout the project, to take account of the project development, achievements and emerging issues related to the CS.

This version submitted on 29 February 2024 (M6) shows the status of D5.1 on this specific date of submission. Later in the project, newer (updated) versions of this document will be submitted as D5.2 /D5.3/D5.5/D5.6 in M12/M24/M42/M60 respectively. Thus, this first version of the deliverable focuses mostly on the **actions and plans for the first months of the project, up to M12 and the connections to and requirements from the other WP**. Any precise further projections for the subsequent years would be not realistic enough at the moment, as explained in section 4. The current deliverable, as a living document, is reporting:

(a) an updated description of each CS;

(b) the data, monitoring and modelling needs to each CS, in particular those that contribute to and/or depend on the work in the other WPs in NATALIE:

- WP2: Co-creation of transformative solutions and mainstreaming of NBSs
- WP3: Methodologies, models, resilience assessment tools
- WP4: NBS Knowledge Booster: A digital twin for the implementation and monitoring of NBS
- WP6: Investing in Ecosystem based adaptation for Climate Resilient Development

(c) the overarching organisation, at the work package level, of a monitoring mechanism and plan for all these activities for potential amendment actions (e.g. for delayed work, lack of communication with stakeholders, lack of data, pandemic related issues, unforeseen emergencies etc.), which need to be reported to WP1 (management).

Within later updates (D5.2/D5.3/D5.5/D5.6), this deliverable will also report on the implementation and testing of the actions at each CS (Task 5.2), and the validation of the solutions and the development of evidence-based knowledge and recommendations (Task 5.3). However, all the implementation work in Task 5.2 is in the start-up phase and no results are yet available. The work in Task 5.3 has not yet started at the time of submission of this deliverable.

1.2 Structure of this document

The deliverable is organised as follows: an overview of all the CS is included in Chapter 2, followed by the details on the organisation, planning and monitoring of the activities up to M12 (Chapter 3). Chapter 4 presents the conclusions and next steps.

The deliverable is accompanied by three appendices:

- Appendix 1 includes a survey form used to collect information concerning modelling and data needs in the CSs – which feeds in particular WP3 and WP4,
- Appendix 2 reproduces the results of this survey for each of the 8 CS,
- Appendix 3 including all the detailed minutes and actions from the weekly meetings, from the very start of the project.

2 DESCRIPTION OF THE CASE STUDIES

2.1 Case Studies – Demonstrators and Followers

The central element in NATALIE is the demonstration of nature-based-solutions (NBS) as transformative solutions to address the multiple-hazards, as well as the cascading risks, resulting from climate change. The demonstration is organised through 8 case studies (CSs). Each case study consists of a Demonstration Site (DS). In 4 CS there is a twinning between the DS and a Follower Site (FL) where the outcomes from the demonstration site may be replicated either during or beyond NATATLIE. The total of 12 sites (8 DS and 4 FL) are located in 5 different biogeographical regions (Figure 1) and share common environmental challenges today or in a near future due to the impact climate change.

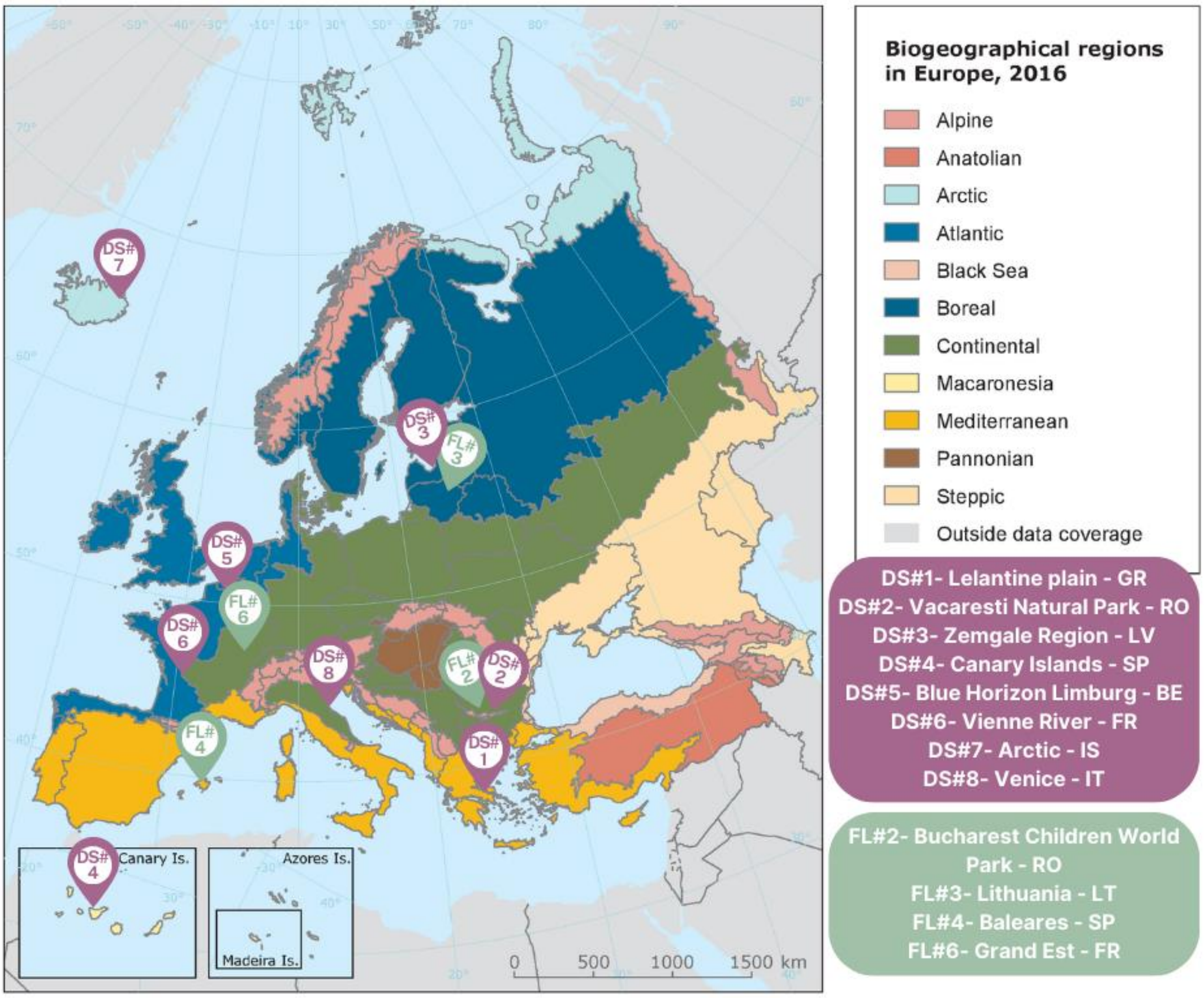


Figure 1: Location and related biogeographical regions of the NATALIE Case Studies (Demonstration Sites and Followers)

NATALIE aims to transform, implement, and test 18 NBS among the 8 DSs. An overview of the NBS that are part of NATALIE is provided in Table 1. The concept in NATALIE, which is the basis for the work in all CS, is based on the pillars of social innovation, transdisciplinary research and competences, social and citizen engagement, co-creation and design, working in multi-dimensional scales (both at local and biogeographical level) and transfer of knowledge and transformative NBS. The DSs and FLs are characterised as follows:

- Demonstrators

This category includes 8 sites (DS#1 to DS#8), where transformative NBS initiatives have started and/or are already advanced based on prior activities, projects or funding. Within NATALIE, the demonstrators will further develop, demonstrate, test and validate these activities. The procedures to be followed and the outcomes will serve as guidelines for other similar regions. These DSs have been selected to cover a range of local conditions and bio-geographic characteristics, based on the following criteria: (1) Climatic and bio-geographic conditions, (2) Type of climate change challenges related to NBS, (3) Social, cultural contexts, vulnerability, and (4) Governance structures. Furthermore, their excellence (in terms of implemented or envisaged NBS) has been taken into account through the following sub-criteria: (A) degree of maturity (maturity and funding) and implemented NBS technologies, including a range from hybrid or innovative technologies to region specific solutions; (B) willingness to share knowledge and experience to demonstrate, test and validate NBS; and (C) innovation, upscaling and mainstreaming potential.

- Followers

This category includes 4 less advanced sites (FL#2, FL#3, FL#4 and FL#6), with conditions and issues similar to a DS, to which they are twinned. They have been selected in accordance with their potential and readiness to assimilate and make use of the lessons learned from demonstrators and turn such knowledge into more tangible outputs (i.e., capacity building, preliminary plans related to the demonstrators), which will be reflected in watershed strategies for NBS mainstreaming, replication and upscaling.

A concise description of the content and challenges for each CS follows in section 2.2.

Nature Based Solutions

NBS are 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. NATALIE aims to transform, implement, and test 18 NBS among the 8 NATALIE Demonstration Sites. The NBS to be implemented are listed below.

Table 1 : NATALIE multi-dimensions NBS.

			NATALIE Multidimensional NBS			
NBS#	**Name**	**Related Site**	**Water**	**Forestry**	**Urban**	**Agri**
NBS1	River Restoration	DS#1, DS#8				
NBS2	Riparian forest recreation	DS#1, DS#6				
NBS3	Floodplain restorations and management	DS#1, DS#8				
NBS4	Wetland restorations and management	DS#1, DS#6				
NBS5	Retention ponds in mountainous areas	DS#1				
NBS6	Forest management	DS#1				
NBS7	Constructed wetlands	DS#3				
NBS8	Sustainable Urban Drainage Systems	DS#2, DS#4				
NBS9	Flood-prone park	DS#2, DS#4				
NBS10	Construction and testing of natural water treatment systems in rural areas	DS#4				
NBS11	Creation of artificial aquifer recharge	DS#4				
NBS12	Managed aquifer recharge	DS#4				
NBS13	Confined aquifer system	DS#5				
NBS14	Removal of ponds	DS#6				
NBS15	Catching, retaining and harvesting rainfall	DS#2				
NBS16	Green-blue corridor	DS#2, DS#8				
NBS17	Coastal protection against sea level rise	DS#7				
NBS18	Sustainable harvesting of seafood from fisheries and aquaculture	DS#7				

2.2 Case Studies descriptions

2.2.1 Case Study 1 – Flood and wildfire risk mitigation in Greece

Lelantine plain has suffered from several major floods and wildfires during the last decades. The area is prone to flooding due to excessive interventions in the riverbed and a high urbanization level, mainly at the delta. Also, the area has a high fire risk due to its fire-prone Mediterranean vegetation, as well as its dry and windy climate. Successive wildfires lead to significant forest loss and soil erosion, and hence further increase flood risk. Additionally, climate change plays a significant role in increasing the frequency and magnitude of extreme events.

So far, the implemented actions to reduce floods and fire risks in the studied area include infrastructure repairs and grey measures, while they generally serve as repressive rather than preventive measures. To date, no NBS interventions have been implemented, even though they have been widely promoted by the European Commission (EC) as an important and effective tool to address climatic challenges and more specifically to reduce the risk from extreme weather events. The implemented grey measures are not capable of addressing the challenging climatic conditions because the overall climatic resilience of the studied area is generally low, exacerbating the risk of flood and fire events.

Within NATALIE, climate-adaptive strategies will be designed to increase climatic resilience through NBS interventions, with the aim of reducing flood and fire risks in the studied area. The pilot areas, both for mitigating the flood risk (constructing small check dams in an ephemeral stream, tributary of Lilas river) and the fire risk (implementing prescribed burning to manage the forest fuel) will serve as a basis to introduce NBS actions in the Lelantine plain, and later to plan and replicate similar actions at the catchment area level. On a broader view, NATALIE will provide an opportunity for the case study area to abandon weak or outdated measures against natural hazards, and to introduce the NBS concept in the Lelantine plain as an effective climate-adaptive methodology to increase resilience against extreme climatic events.

This case study consists of a Demonstrator Site. It does not have any Follower Site.

Demonstration Site 1: Lelantine Plain – GR, Evia Island, Greece	**Lead Partner: WWFGreece**
Key system characteristics: The demonstration site, the Lilas river basin, is located in the Lelantine Plain, Evia Island, Greece. It concerns a rural/agricultural area (biogeographical type: Mediterranean) with an approximate area of 275km².	
 	

Challenges and related NATALIE actions: Climate change increases the risks of floods and wildfires in the Lilas river basin. A secondary hazard from climate change is biodiversity loss. The flood risk is exacerbated by forest loss and soil erosion caused by wildfires (compound risk). NATALIE will implement the following actions: 1) a minimum of 50 traditional stone-built check dams will be constructed in an ephemeral tributary of the Lilas river to mitigate floods risks and 2) implementation of prescribed burning and development of a fire risk management plan to mitigate fire risks. Measures aimed at fire control could also benefit flood control.

Because the NBS concept is not well-established in Greece, either in legislation or in practice, the implementation of NBS actions in Greece has been so far limited, small-scale and often non-systematic. Also, past case studies on flood control may have been implemented in smaller scales, but they were focused on groundwater recharge. On the contrary, the participation of this area in NATALIE is innovative and will provide a basis for introducing systematic data-driven landscape-scale NBS actions aiming to address major climatic hazards at the whole catchment level, such as floods and wildfires. Our proposed actions will further serve as a means of mainstreaming NBS in Greece and for the possible extension of these actions to other sites and regions facing similar climate challenges.

Description of the area: The study area is located in Evia island, Greece and is centred on the Lilas river. The Lilas river originates from the Xirovouni and Dirfys mountains in the central part of the island, flows through central Evia, and creates an extended delta (Lelantine Plain) draining into the South Evoikos Gulf. The total catchment area comprises 275 km^2. The river has an intermittent flow, with no flowing water during the warmest months of the year.

Climatic Challenges: The study area has suffered from several major floods and wildfires during the last decades. Due to excessive interventions in the Lilas riverbed and a high urbanization level (including coastal settlements at the estuary) in the river basin, the area has a high flood risk and several major flood events have occurred during the past 25 years. Moreover, Evia island has a fire prone Mediterranean vegetation and a dry and windy weather during the summer, and has suffered from several major fires during the last decades. Climate change increases the intensity and frequency of both flood and fire events.

Proposed actions: To date, no nature-based solutions have been implemented in the study area to mitigate the climatic challenges described above. Implemented actions have been focused on grey measures to reduce both the flood and the fire risks (e.g. gabions, dikes and fire zones) rather than on preventive measures. Infrastructure repairs (damages to roads, bridges etc) have been conducted after major flood events.

To explore flood control measures in the study area, a minimum of **50 traditional check dams will be constructed** in DS#1, in an ephemeral tributary of the Lilas river. Such check dams have been constructed for hundreds of years in the Mediterranean region, initially serving as a small-scale method to collect water for irrigation and other purposes. Here, we will explore the impact of such check dams in reducing the flood risk and in increasing water percolation, thus enriching the aquifer. Furthermore, these check dams will create small oases with the potential co-benefit of increasing biodiversity.

For fire control, NATALIE actions are **prescribed burning to manage the forest fuel** and the **design of a fire risk management plan**, which both have the potential to reduce the fire risk in the study area.
Lastly, an extended participatory approach with the local stakeholders will be undertaken to identify appropriate areas for the replication of NBS in the main Lilas water course.

Ambition during the project: This project is a pilot study for the implementation of NBSs in the Lelantine plain, which has suffered from major flood and fire events during the last decades. Our scope is to understand how these small-scale implementations can reduce both flood and wildfire risks in the study area, and later to **design a larger-scale holistic NBS plan at the catchment area-level**.

Ambition after the project: This pilot study will serve as an example for the upscaling of such NBS from the study area to the level of the catchment area. The work in WP6 on investing in ecosystem-based adaptations will have a significant role on upscaling, as it will map all the potential financial mechanisms and it will try to mature the financial conditions for implementation of similar actions in a wider scale in the area.

Upscaling potential: The measures proposed have the potential to be implemented in other sites, in other regions and at larger spatial scales:

- For flood risk control, we will select a tributary of the Lilas river to construct the check dams based on a multi-criteria selection process. This process will take into account geological, hydrological, anthropogenic and topographic data at the catchment level. Through this process, we will identify all possible tributaries throughout the basin where check dams can be constructed in the future. Following the example of our case study, this methodology could be applied to other regions and larger spatial scales.
- For fire risk control, we will follow a similar approach: first, we will create a fire risk map based on multiple criteria (vegetation, historical fire data, climatic data, etc.) to quantify fire risk in the study area. This map will guide us to implement prescribed burning in high-risk areas. Similar to our suggested flood control action, our methodology could be transferred to other high fire risk sites in the Lelantine Plain in the future, different regions and larger spatial scales.

Potential barriers:

- Funding: in many cases, the use of grey measures and non-NBS actions for flood and fire control are prioritised for funding.
- Governance: the governance systems and bureaucracy in the region are complex.
- Legislation: while the importance of NBS is widely mentioned in EU legislation, their incorporation into Greek legislation is unfortunately a rather slow process. Hence, while there is a direct need for nature restoration, there is in fact no clear legal or regulatory framework which promotes greener actions to address climatic challenges.
- Social acceptance: needs to be developed further through capacity building, education and awareness raising.

Modelling needs in relation to NBS at the Demonstration Site: Biophysical: flood risk will be modelled using a hydrological model for the tributary where the checks dams will be constructed. A combined hydrological and hydraulic–hydrodynamic modelling approach will be applied for flood inundation modelling and mapping in the Lilas ungauged watershed. Rainfall data of meteorological stations in the wider area at specific time intervals will be used to represent the spatiotemporal rainfall distribution and to estimate areal rainfall at sub-watershed level [1], [2], [3], [4]. Wildfire risk will also be modelled. Environmental: no modelling foreseen. Socio-economic: no modelling foreseen.

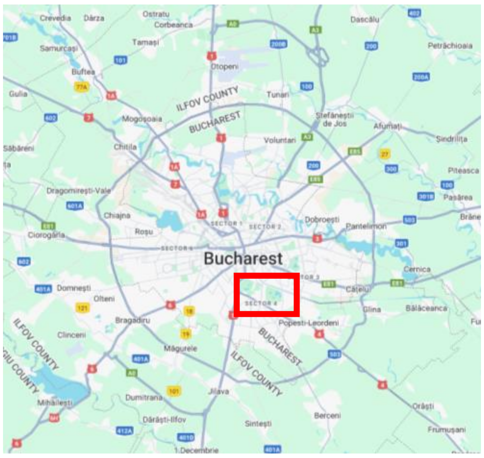
2.2.2 *Case Study 2 – Fresh water habitat restoration in urban ecosystems, Romania*

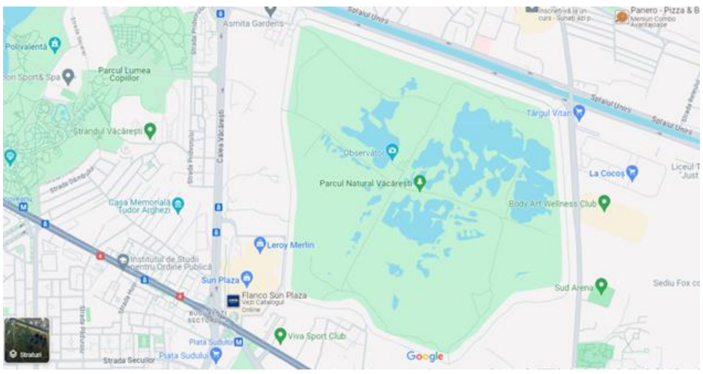
Case Study 2 is focussing on NBS implementation within city boundaries. This case study consists of a Demonstration Site and a Follower Site. The DS “Văcărești Natural Park (VNP)” and the FL “Children`s World Park (CWP)” are part of a **blue-green area of the city of Bucharest** (Romania). The parks are located in the southeastern part of the city and play a very important role in providing ecosystem services and mitigating the effects of climate change. In NATALIE these two parks are combined into one case study for several reasons. The first and most important is the difference in status between the two: VNP is a nationally protected area, while CWP is a classic, urban park. VNP can serve as an example in how natural landscapes and species can be managed through active management actions. Another important reason for choosing these two areas is the specific nature of CWP - a park highly frequented by the local community, especially families with children. Therefore, applying a green solution here will have the opportunity to bring it close to the citizens and bring them into contact with the solution. The awareness and support of citizens and the facilitation of education are very important in the project. Another reason is related to the proximity between the two parks, approximately 1 km, and the fact that through our approach we can lay the foundations for a blue-green corridor that connects the main blue-green areas in Bucharest. Last but not least, the diversity of local authorities and organizations to be involved presents a challenge to work together and succeed in developing a successful case that can be replicated in other areas.

This case study consists of a Demonstrator Site and a Follower Site.

Demonstration Site 2: Vacaresti Nature Park - RO, Romania	Lead Partner: VNPA (‘Vacaresti Nature Park’ Association)

Key system characteristics: The demonstration site, Văcărești Nature Park (VNP), is located in the city of Bucharest, Romania. It concerns an urban area (biogeographical type: Continental) with an approximate area of 183ha.





Challenges and related NATALIE actions: VNP is facing **diminishing water areas and related biodiversity loss**. NATALIE will design, test and implement integrated, socially accepted nature-based solutions that will address and solve these significant management challenges. NATALIE actions will also connect VNP to the **blue-green infrastructure of the city**. Thus, conditions will be created for habitat reconstruction, the conservation and restoration of biodiversity, and for the development of a bio-cultural infrastructure in the city / neighbourhood. Secondly, another objective is to establish a socially innovative methodology in the respective district, striving for policy continuity in the implementation of nature-based solutions in District 4, **scaling up in the city of Bucharest and the Bucharest-Ilfov region**, by implementing the **ConCensus [14] concept**.

Description of the area: The 'Văcărești Nature Park' (VNP) is a protected natural area in Bucharest, Romania, located 4 km from the city centre. Situated on the right bank of the Dâmbovița River, it spans 183 hectares, making it **the largest green space in Bucharest** and is sometimes referred to as the 'Bucharest Delta'. The park developed naturally on the site of a former water reservoir, initially designed and then abandoned by the former Romanian Communist regime in 1989. Following a national civic campaign in 2016, the area was officially designated as a nature park (IUCN category V, http://ananp.gov.ro/ariile-naturale-protejate-ale-romaniei/), becoming **Romania's first urban nature park**.

The Dâmbovița River, which originates in the Făgăraș Mountains, flows through Bucharest from the west to the southeastern part, serving as a tributary to the Argeș River after a course of 258 km. In Bucharest, it borders the VNP for over a kilometre but is no longer naturally connected to the reserve.

The 'Văcărești Nature Park' (VNP) is a **rich wetland**, home to over 300 species of vascular plants and more than 200 species of birds, including herons, egrets, cormorants, mallards, coots, swans, whiskered terns, and marsh harriers. The lakes and surrounding areas support 10 species of fish, 6 species of amphibians, and 6 species of reptiles. Several of these species, such as the great crested newt, the fire-bellied toad, and the European pond turtle, are protected under the EU Habitats Directive. Small mammals, including otters, foxes, and weasels, also inhabit this urban wetland.

The unique conditions of the park, such as its urban location, wetland environment, need for active management, and lack of integration with the city's green-blue infrastructure, present opportunities for implementing sustainable development measures in response to climate change impacts. The park's geography, notably the large ground excavation surrounded by a 10-meter-high concrete embankment, could transform into a substantial green belt for the park. VNP serves as a model for similar projects in the region and **could influence essential changes at the district and city management levels**, particularly in the challenging context of **planning nature-based solutions in Bucharest**.

VNP can be considered as a case study for urban regeneration based on nature-based solutions and sustainability, though not yet applicable at the Bucharest city level. Through this demo site, the project aims to find solutions for water management and biodiversity conservation by applying green solutions to connect the park and increase green areas in the city, **mitigating the urban heat island effect**.

Priority actions envisaged for development within the project include:

1. Water and wetland management by capturing, maintaining, and treating natural rainwater at two selected sites in VNP.
2. Creating conditions for connecting with other nearby green-blue areas by applying green solutions, such as green corridors through trees and meadows. This will have dual benefits: conservation of park biodiversity and urban regeneration through green solutions, contributing to the mitigation of climate change effects. The Romanian Network of Natural Parks, along with the 'Children's World Park' (FL) and Youth Park, will be involved in the upscaling of the project results.

Climatic Challenges: The Văcărești Natural Park is currently affected by changes in precipitation patterns and an increase in annual temperatures, leading to a rapid alternation of droughts and flash floods. Over the last five years, there has been a considerable diminution, clogging, and drying of wetlands and small lakes in the park. These issues are leading to biodiversity loss in the park and compound heatwaves in the urban area. The recent heatwaves in spring 2022 also led to another unwanted effect of climate change in VNP, Bucharest: fires in dried vegetation areas. The combined effects also lead to a decrease in the quality of life of the citizens in the City of Bucharest.

Proposed actions: Implementation of the following NBS:

- Sustainable Drainage Systems (SUDS),
- Flood prone park,
- Catching, retaining, and harvesting rainfall,
- Green-blue corridor.

Ambition during the project: The ambitions during the project are the following:

1. Cooperation and knowledge sharing within the project team for design, implementation and impact monitoring of the NBSs,
2. Enhance community awareness and knowledge base for NBS application and engagement of stakeholders in the process, for sustainability of the results on long term,
3. Validate the results and establish a monitoring scheme and adaptive management plan to assess the efficiency of the NBS implemented,
4. Create a solid, evidence-based reference for upscaling the results in regional, national and other Eastern European contexts.

Ambition after the project: The following lasting impacts are foreseen:

1. The pilot NBS will help establishing the base for the blue-green Bucharest path, supporting biodiversity,
2. By innovative rainwater management, the pilot NBS will improve the water resilience, including quality of water in the VNP,
3. The NATALIE NBS should reduce the urban heat in that area, contributing to the cooling effects during increasing summer heatwaves,
4. The NBSs in VNP provide educational opportunities for schools, community groups, and the public to learn about ecology, environmental sustainability, and the importance of biodiversity within their area (including community long term engagement),

5. Well designed and implemented NBSs will demonstrate cost-effective solutions for urban challenges, such as rain/stormwater management, and climate change adaptation, potentially contributing not only to improved wellbeing but also to cost savings on long-term (health, avoided damages due to extreme events, etc.).

Upscaling potential: Social engagement in DS#2 is developed through circles of interest. Tiers 1,2,3 are circles of interest that have to be grown from the whole CS in Bucharest (DS + FL). The Tier 1 involves a restricted group of initial interest, maybe 10-15 persons or/and organizations. They will be considered as the main body for taking decisions, at the Bucharest level (both DS and FL). Tier 2 is another circle, at the regional or national levels (stakeholders to be decided). Tier 3 is the expansion of this social engagement in countries on the lower Danube river basin, e.g. Bulgaria, Hungary, Moldova, Serbia. The development of Tier 2 and Tier 3 will offer the potential for transferring and upscaling the implemented adaptation solutions towards other urban communities in Bucharest and the surrounding region, as well as in other areas within the Lower Danube River basin.

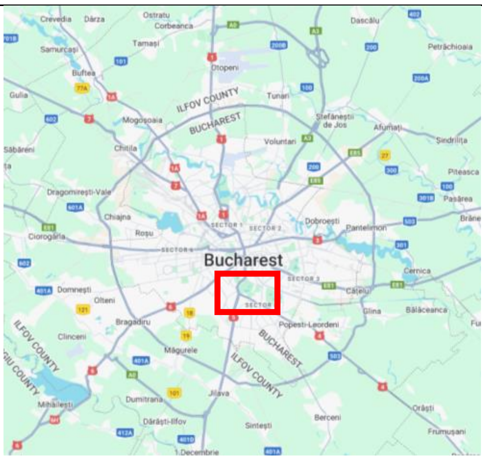
Potential barriers:

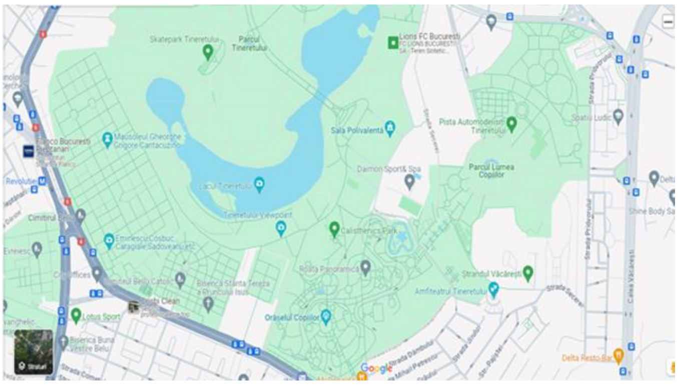
- Capturing and pumping rainwater from outside the park and incorporate it in a nature-based solution is a new approach and it is therefore expected to encounter different technical, legal and implementation challenges. The planned pilot intervention on a limited pre-determined park area will provide additional information to support assessing those barriers for overcoming them.
- Lack of experience and trust in NBS impact from key (Tier 1) stakeholders in the DS#2
- Influence of political factors (ex: election year in Romania at all levels, impacting the local, regional and national governance and policies implementation pace).
- Making NBSs adopted as a strategy at the level of the city to mitigate the climate change impacts.
- Expected limited availability of specific technical expertise at local level.
- Current costs of potential construction works due to the combined (2022) crisis (economic, environmental, etc.).

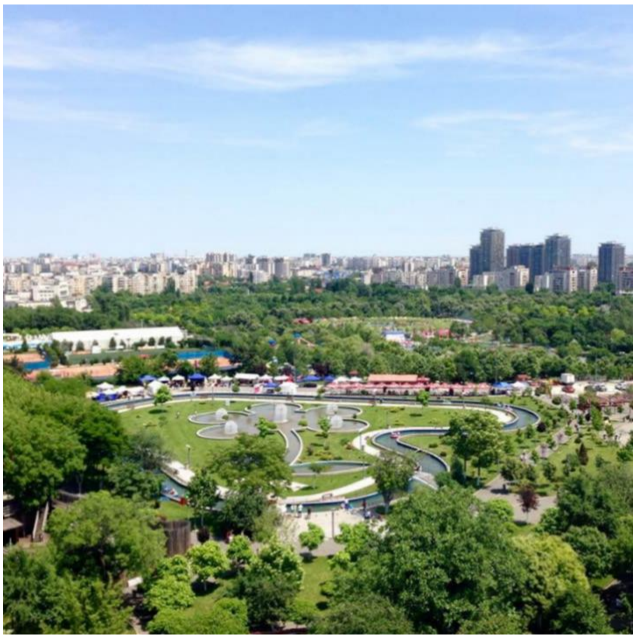
Modelling needs in relation to the NBS at the Demonstration Site: Biophysical: modelling of flood, drought and wildfire risk are foreseen. Environmental: modelling of biodiversity (evolution of both number of species and number of individuals using the site of the NBS), water quality improvement (turbidity, nutrients) and ecosystem services and benefits (integration of several tools or methodologies). Socio-economic: Socio-economic aspects of potential interest in the local context are connected with substantiating the sustainability of the applied solution on long term as well as scaling-up as the tested adaptation instrument(s) in urban contexts: a) Life cycle assessment and cost-benefit analysis; b) identification, evaluation and monitoring of co-benefits: changes in life quality (community well-being, local cultural values and benefits, employment indicators, community health, property values, etc.) and c) potential for integration with city and national climate adaptation strategies.

Follower Site 2: Bucharest Children World, Romania	Lead Partner: MS4 (SECTORUL 4 AL MUNICIPIULUI BUCURESTI)

Key system characteristics: The follower site "Children's World Park (CWP)" is located in the city of Bucharest, Romania. It concerns an urban area (biogeographical type: Continental) with an approximate area of 19.3ha.







Challenges and related NATALIE actions: CWP is facing **flooding by excess rainwater run-off and biodiversity loss**. NATALIE will design and implement a nature-based solution that will address these challenges. Furthermore, it will create a "show case" for nature-based solutions in the urban environment and urban biodiversity.

Description of the area: Children's World Park (CWP) is an **urban park**, part of a larger green area in southern Bucharest. This area also includes Vacaresti Natural Park, Tineretului Park, and Orășelul Copiilor (Children's Town), an amusement park. The Park is managed by the City Hall of Sector 4, Bucharest Municipality, and serves as a **recreational space** for tens of thousands of local residents. CWP is a popular destination for families, particularly for its playgrounds, fostering engagement with the younger generation.

Situated in a low-lying area near the Dâmbovița River, CWP's location and community involvement make it an ideal candidate for projects aimed at creating climate-resilient neighbourhoods. With many families visiting CWP, it presents an **opportunity for stakeholder engagement and raising awareness about green solutions to mitigate climate change**.

Climatic Challenges: The heavy rains in May and June often cause flooding near CWP, a growing concern for local authorities and residents. Conversely, the arid summers in July and September necessitate irrigation for park and roadside vegetation. The proposed interventions at CWP aim to mitigate these issues are measures to retain rainwater during wet periods for use in drier seasons.

Proposed actions: The plan is to **transform CWP into a rainwater catchment area** to address street flooding during heavy rains, particularly in May and June. This transformation also aims to increase biodiversity and contribute to the climate resilience of the area. Specific Follower Site related activities to be implemented include:

Research and data gathering:

- Surface and groundwater monitoring system implementation,
- Water balance study inside park and neighbourhood areas (to be decided),
- Surface quality analysis,
- Hydrogeological model, inside park and neighbourhood areas.

NBS implementation:

- On the basis of the solution tested by the related demonstration site: applying solutions for rainwater capturing on a pilot area inside the park.

Strategy:

- Developing a strategy for connecting the park to the green-blue infrastructure of the city with focus on the VNP,
- Development a strategy to raise awareness and build community climate resilience,
- Awareness campaigns execution (setting up, running, etc.), stakeholders' involvement and citizen engagement in activities aiming to diminish the climate change effects.

Ambition during the project: The ambitions during the project are the following:

1. Cooperation with the project partners for designing and implementing NBSs,
2. Improve knowledge of the local community (citizens science, education, awareness) and engage stakeholders,
3. Validate the results and establish a monitoring scheme and adaptive management plan to assess the efficiency of the NBS implemented.

Ambition after the project: The following lasting impacts are foreseen:

1. Establish a foundation for the blue-green corridor (Bucharest), aimed at enhancing biodiversity throughout the city,
2. Utilize innovative rainwater management techniques in the pilot - Nature-Based Solutions (NBS) to enhance the city's water resilience,
3. NBS should mitigate urban heat in the area, contributing to cooling effects during the increasingly frequent summer heatwaves,
4. Provide educational opportunities for schools, community groups, and the general public to learn about ecology, environmental sustainability, and the significance of biodiversity in their locality, fostering long-term community engagement,
5. Well-designed and implemented Nature-Based Solutions (NBSs) can offer cost-effective approaches to urban challenges such as rain/stormwater management and climate change adaptation, potentially resulting in long-term cost savings for the city (help organization for better urban planning).

Upscaling potential: The development of Tier 2 and Tier 3 can offer potential adaptation solutions for other urban communities in the Bucharest region or other regions in the Lower Danube River basin.

Potential barriers:

- Current costs of potential construction works due to the combined (2022) crisis (economic, environmental, etc.)

Modelling needs in relation to the NBS at the Follower Site: Biophysical: modelling of flood and drought risks based on the data from Demo Site #2. Modelling of heatwaves. Environmental: modelling of biodiversity (evolution of both number of species and number of individuals using the site of the NBS), water quality improvement (turbidity, nutrients) and ecosystem services and benefits (integration of several tools or methodologies). Socio-economic: aspects to be modelled include a) changes in life quality (community well-being, local cultural values and benefits, employment indicators, community health, property values, etc.), b) cost- benefit analysis including maintenance and c) integration with environmental and other sectors, using specific economic modelling software, scaling up potential.

2.2.3 Case Study 3 - Constructed wetlands in Latvia and Lithuania

Being located on flat terrain, with dense river coverage and subsurface and surface drainage networks topped up with fertile soils and intensive agricultural activities while having low population density within rural area of the territory, Zemgale region (DS#3) and Birzai district (FL#3) are facing similar climate change risks (flooding, local droughts) and environmental challenges (water quality, biodiversity loss). Finding sustainable NBS, such as **constructed wetlands**, will bring benefits to both neighbouring regions. The NATALIE project team in Latvia implementing the demonstration site activities will transfer their experience to the follower site in Lithuania (Birzai). The NATALIE project will provide an environment that will promote cooperation and mutual capacity building between the project partners.

Moreover, both the Zemgale region and Birzai district are part of the Lielupe River Basin District and share a common goal to **improve water quality by reduction of nutrient pollution** in the water bodies. Implementation of similar activities for the realisation of the potential of constructed wetlands in various applications (reduce pollution from diffuse and point sources) will promote networking of stakeholders, foster knowledge transfer, and enhance approaches to increase acceptance of NBS by local communities in both Latvia and Lithuania.

This case study consists of a Demonstrator Site and a Follower Site.

Demonstration Site 3: Zemgale region – LV, Latvia	Lead Partner: BEF (BALTIJAS VIDES FORUMS)

Key system characteristics: The demonstration site, the Zemgale region, is located in the central part of Latvia. It concerns a rural/agricultural area (biogeographical type: Boreal) with an approximate area of 10742km^2 (16.6% of Latvia).

Challenges and related NATALIE actions: The key challenge is to reduce the vulnerability to water related risks: **eutrophication** due to nitrogen and phosphorus leakage to water bodies from agricultural land (diffuse pollution sources) and **insufficiently treated wastewater** from small settlements and livestock facilities (point sources). NATALIE will implement constructed wetlands (surface and subsurface) as well as systemic and targeted planning for the Zemgale region and perform feasibility study for financing and investment for constructed wetlands in the region. Both types of constructed wetlands (surface and subsurface flow) retain water for a longer period thus reducing flooding risks in downstream water bodies. In addition, water from the surface flow of the constructed wetland can be available for irrigation or watering purposes if drought conditions are present around the installation. Both types of constructed wetlands, especially surface flow, address concerns related to **loss of biodiversity** as open water provides habitat for aquatic plants, invertebrates, reptiles, amphibians, and birds, in contrast to traditional agricultural ditches and regulated (straightened) parts of small streams.

Description of the area: The Zemgale Region is located in the central part of Latvia. It constitutes a lowland landscape that is characterized by flat terrain and a dense river network, which provides ecological corridors essential for biodiversity and recreational opportunities for people. Zemgale is crossed by 2 major rivers: Daugava and Lielupe. The water resources in the region provide sufficient water for economic activity and human consumption. The drinking water supply is ensured by a groundwater supply source. Because of fertile soils in the Lielupe River basin territory, this area has developed into an intensive agriculture land where large-scale farming dominates. Agricultural activities are well developed and focus on the cultivation of crops. Because of the flat terrain landscape, the region is characterised by **high flooding risk potential**.

Climatic Challenges: During the last decade, the area of croplands has increased while meadows and pastures have been reduced putting pressure on grassland habitats. This has led to a decrease in biodiversity as well as pollution of water bodies by nutrient leakage from agricultural land resulting in eutrophication problems. Thus, the interest is to apply **constructed wetlands as a solution for diminishing of eutrophication of water bodies along with maintenance of biodiversity and flood risk mitigation**.

Moreover, the low population density within rural area of the region is characteristic. NBS as constructed wetlands for treatment of wastewater from these small settlements can be seen as an option (as compared to a grey infrastructure WWTP).

Proposed actions: Demonstrate constructed wetlands applying surface and/or subsurface water flow in applications for treatment of diffuse pollution from agricultural fields, point-source pollution from livestock facilities and wastewater treatment plants from small settlements. The activities include:

- Stakeholder engagement (mapping of stakeholders, creating and implementing the dialogue and collaboration approaches with stakeholders, e.g., Regional Living Lab),
- Selection of suitable locations for implementation of constructed wetlands to treat municipal wastewater from small settlements and storm water and/or processing wastewater from livestock facilities,
- Technological aspects in operational demo cases (baseline assessment of NBS application in the region, testing of operational conditions, i.e., vegetation, treatment processes, water flow, clogging disturbance, monitoring, i.e., water sampling using a grab sampling approach and continuous measurements of water discharge and quality using multi-parameter sondes, accounting of species of flora and fauna from a biodiversity perspective),
- Lessons learned (estimating effects and results, i.e., improved biodiversity, reduced water pollution (N, P, sediments),
- Estimation of potential for constructed wetlands (mapping of potential pollution sources - diffuse pollution from agricultural fields, point-source pollution from livestock facilities and wastewater treatment plants from small settlements in the region, baseline assessment of NBS application including randomized selection of water sampling sites (5 counties) from the rural area where NBS can be applied); design of constructed wetland and application for livestock facilities; design of constructed wetland and application for small settlement,
- Knowledge base (capacity building, providing knowledge and evidence of the effects to stakeholders and to FL#3) as systemic and targeted planning, i.e., estimation of the areas in the Zemgale region where there are problems & where there is a lack of technologies with storm water and/or wastewater (e.g., from livestock facilities, small villages - geographical scope and locations), demonstrating the process for NBS implementation, pre-feasibility study for (potential) financing of the application of constructed wetlands in different locations withing the region.

Ambition during the project: The ambitions during the project are the following:

- increase awareness among stakeholders involved in water management about the potential of constructed wetlands to reduce nutrient losses to water bodies, meanwhile minimizing undesirable consequences of drought and flooding conditions and improving biodiversity. The DS shall increase the acceptance of constructed wetlands as a relevant wastewater treatment solution among the public and stakeholders involved in water management and decision-making processes. It shall also facilitate financial support for broader implementation of this solution. This ambition will be achieved through dissemination of the project results in public events with stakeholders and meetings with the Ministry of Agriculture and the Ministry of Environmental Protection and Regional Development,
- selection of suitable locations for the implementation of constructed wetlands to treat municipal wastewater from small settlements and storm water and/or processing wastewater from livestock facilities. The ambition will be achieved by sharing the monitoring results and experiences from already existing constructed wetlands and by creating a list of criteria that can be applied to select suitable locations for implementation of constructed wetlands to treat wastewater leaving municipal WWTPs and livestock facilities and runoff from agricultural areas,
- assess the performance of constructed wetlands in the light of climate impacts and hazards by applying modelling tools.

Ambition after the project: The expectation after the project is to achieve large scale implementation of NBS and subsequent improvement of the water quality and the increase of biodiversity. Identification of areas (sites) for potential establishment of constructed wetlands in the region shall enhance wider uptake of constructed wetlands.

Upscaling potential: The experience and results obtained from this CS in terms of implementation of constructed wetlands will be transferable on a national scale in Latvia and Lithuania as well as will be relevant for the EU member states and elsewhere in the Boreal biogeographical region.

Potential barriers:
The foreseen barriers are related to the following aspects:

- social acceptance of constructed wetlands as a relevant solution for proper wastewater treatment among public, controlling institutions, municipalities, water management companies and farmers,
- slow changes in national legislation to include constructed wetlands in the list of solutions to be implemented for wastewater treatment along with traditional and widely applied biological and chemical wastewater treatment plants,
- securing funding for erection of constructed wetlands throughout the region may be a challenge in case there is a lack of supporting mechanisms in place in the country.

Modelling needs in relation to the NBS at the Demonstration Site: Biophysical: The relevant hazards for the constructed wetlands are floods and local droughts. The project will prioritise aspects to be used for modelling, which will include for example simulation of physical, chemical and biological processes taking place in constructed wetlands (e.g. sedimentation, nitrification, denitrification, ammonification, adsorption, plant uptake etc) and the simulation of changes in the amount and/or quality of water discharged in constructed wetlands as driven by natural (changes in precipitation and air temperature patterns) and anthropogenic factors (more inhabitants connected to WWTPs, more livestock grown in facilities, intensification of agricultural production) to evaluate the performance of constructed wetlands under different scenarios. Environmental: no modelling defined yet. Socio-economic: Unfolding the potential of constructed wetlands on a regional scale will be linked to the decision making and acceptance from local population. Multi Criteria Decision Analysis (MCDA) techniques and the Analytic Hierarchy Process (AHP), including the pairwise comparison approach would be selected tools.

Follower Site 3: Lithuania	Lead Partners: BEF (Baltijas Vides Forums), BIRZAI (Birzu Rajono Savivaldybes Administracija)

Key system characteristics: The follower site, the Birzai district, is connected to the demonstration site 3 (Zemgale region). Birzai district is located in the north of Lithuania, on the Latvian border. It concerns a rural/agricultural area (biogeographical type: Boreal) with an approximate area of 1476km^2 (water bodies occupy 2.6% of the area, built-up areas occupy 1.3%).

Lithuania and Biržai district (in red)

Biržai district

Challenges and related NATALIE actions: The key challenge is to **mitigate the risks of floods and local droughts and to reduce eutrophication and loss of biodiversity**. As follower Birzai will gain the knowledge (methods, technologies) about constructing wetlands (NBS) from Latvia and transfer it to Lithuania (BIRZAI) in:

- Systemic and targeted planning,
- Feasibility study for financing and investment for constructed wetlands in the region.

Description of the area: Biržai district municipality is located in the north of Lithuania, on the Latvian border. The area of Biržai district municipality is 1476 km². A part of the territory of the Biržai district constitutes a karst region, dominated by strongly fragmented areas of agricultural land divided by individual karst ravines or their systems. The rivers Nemunėlis (bordering Latvia), Apaščia and Tatula flow in Biržai. There are 17 lakes and 2 ponds in the territory, the largest of which is the oldest artificial lake in Lithuania, Širvėna. Forests in the territory of the municipality constitute 26.4% of the area.

Climatic Challenges: Due to climate change, the hydro-meteorological conditions in the district are worsening, with a higher probability of stronger and more frequent rains. Active agricultural activity does not help water quality and biodiversity. Slow renewal and development of water quality improvement infrastructures, as well as growing operating costs of sewage and water supply networks, are conditions why it is necessary to look for alternative, more environmentally friendly solutions, including NBS.

Proposed actions: FL#3 will adopt knowledge and experience (by monitoring DS#3) on the following aspects:

- how stakeholders are involved,
- explain technological aspects in demonstration cases,
- assessing the potential of created wetlands,
- design and application of artificial wetlands for animal husbandry, for small settlements,
- systematic and targeted planning, demonstrating the NBS implementation process,
- feasibility study for obtaining funding and the adaptation of constructed wetlands in various parts of the region.

At the same time, with the help of experts, suitable areas for the installation of constructed wetlands in Biržai district will be studied, and the guidelines for planning, designing and implementing constructed wetlands prepared by DS#3 will be adapted.

Specific follower actions to be implemented:

Social acceptance:

- raising awareness, citizen engagement.

Governance (policy and regulation framework):

- identification of specific issues (i.e. roadmap setting),
- fostering links between science and policy decisions,
- planification.

Capacity building:

- share good practice & strategy & tool (i.e. on the creation and running of a financial tool dedicated to NBS implementation),
- training for public and private decision-makers and technical teams of local and regional authorities.

Replicability:

- identification of project owners ready to replicate,
- implement NBS locally (if financing can be secured).

Monitoring/evaluation:

- monitoring and evaluation strategy for the new NBS projects implemented locally.

Ambition during the project: As follower site, this is the ambition for the project:

- Gain experience and knowledge on the application of NBS,
- Obtain greater understanding of the benefits of the NBS application and popularity,
- Perform a feasibility study for financing and investing in constructed wetland in the region,
- Adapt guidelines from the demonstration site for the planning, design and implementation of constructed wetlands for water treatment in livestock facilities and small villages.

The maximum outcome is to have at least one wetland installed for water purification in the district. The costs for this implementation are not included in the NATALIE budget and would come from other sources.

Ambition after the project: The feasibility study will be the basis for obtaining funding for the installation of wetlands – as a result of which the application of NBS to improve water quality will spread and become popular. The ambition is that NBS are widely used because they are understandable to the public and are considered a desirable solution. In parallel, as a result of implementation of NBSs, the biodiversity will hopefully increase, and the risk of flooding will decrease.

Upscaling potential: The planning, design and implementation guidelines developed by the Zemgale Region (ZPR) for the water treatment of constructed wetlands will be adapted to Lithuania and due to our initiative, changes to the legal framework for the implementation of NBS will be made, making application of the NBS in the region easier.

Potential barriers:

The foreseen barriers are related to the following aspects:

- Social recognition is the first obstacle that may have to be faced while planning the installation of artificial wetlands. Information campaigns and open discussions with residents will be implemented to prevent social recognition as an obstacle;
- Obtaining financing - financial resources are necessary for the implementation of NBS. Within the framework of this project, it is expected to prepare the necessary documents that will help to obtain such financing;
- Legislation - it may turn out that there is no legal, juridical practice, on how and by whom artificial wetlands need to be managed, administered and monitored and with which funds.

Modelling needs in relation to the NBS at the Follower Site: Biophysical: priorities for modelling in FL#3 are water pollution and floods hazards. Environmental: water quality in wetlands, based on experience and expertise from DS#3. Socio-economic: a scenario planning method for modelling the socio-economic impact of water treatment using NBS methods would be appropriate. This will help decision-makers anticipate and plan for a range of possible outcomes. This method will serve to attract investments for the realization and development of NBS in the region. It is appropriate to analyse these socio-economic factors related to water quality too:

- **Public Health** - ensuring clean and safe water is essential for public health. Contaminated water can lead to waterborne diseases, affecting communities' well-being and placing a burden on healthcare systems,
- **Tourism and Recreation** - clean water bodies are attractive for tourism and recreational activities. Pollution can deter tourists and affect local economies dependent on these industries,
- **Fishing and Aquaculture** - water pollution can negatively impact fish populations and aquaculture. Many communities rely on fishing and related industries for their livelihoods,
- **Real Estate prices** - proximity to clean water bodies can enhance property values. Conversely, polluted water can lead to decreased property values and affect the real estate market in an area,
- **Municipalities operations and costs** - compliance with water quality standards should impact operations and costs of municipalities,
- **Social Justice** - Access to Clean Water Resources ensuring equitable access to clean water is a social justice issue.

In addition to the scenario development, FL#3 could apply the DS#3 approach for unfolding the potential of constructed wetlands at a regional scale by applying Multi Criteria Decision Analysis (MCDA) techniques and the Analytic Hierarchy Process (AHP), including the pairwise comparison approach.

2.2.4 Case Study 4 - Alternative water management solutions in Spanish Archipelagos

Islands are one of the most vulnerable elements to the effects of climate change. It is urgent to find solutions to safeguard water availability in aquifers, prevent flooding from torrential water courses generated during rain events and protect water quality pollution into the receiving water bodies. The challenges are exacerbated by pressures from tourism, an important industry on many islands. NBS can provide solutions to adapt to climate change in particular in vulnerable areas such as islands. NBS also provide co-benefits for climate change mitigation and society through eco-system services and biodiversity.

Three sub-cases of study are presented **in the Canary Islands** (volcanic islands) (Demonstration Site DS#4), mainly related to floods and water quality, in both surface and underground contexts. In Menorca (Balearic Island, limestone) (Follower Site FL#4), similar problems to those in the Canary Islands are found, especially concerning the availability and quality of water in aquifers. One of the main ambitions of this project is the combination of surface and underground hydrodynamic models, analysing their interaction with the proposed NBS for the different islands.

The results of this project can be replicated in other islands in Macaronesia, the Mediterranean Sea and the Atlantic Ocean.

This case study consists of a Demonstrator Site and a Follower Site.

Demonstration Site 4: Canary Islands – SP, Spain	**Lead Partners: ULL (UNIVERSIDAD DE LA LAGUNA), AQUA (AQUATEC PROYECTOS PARA EL SECTOR DEL AGUA SA)**
Key system characteristics: The demonstration site consists of **three of the Canary Islands**: **Tenerife, Gran Canaria, Fuerteventura**. The island is located in the biogeographical region Macronesia. The activities are located in **three separate sites and at each site different NBS will be implemented**. The sites have the following characteristics: • Tenerife (DS#4TEN): urban • Gran Canaria (DS#4GC): urban and natural reserve	

- Fuerteventura (DS#4FUE): rural

More specifically, actions in the sites will be implemented in:

- DS#4TEN: La laguna (basin) of 10km^2
- DS#4GC: Maspalomas (basin) of 18km^2
- DS#4FUE: Fuerteventure (0.25km^2)

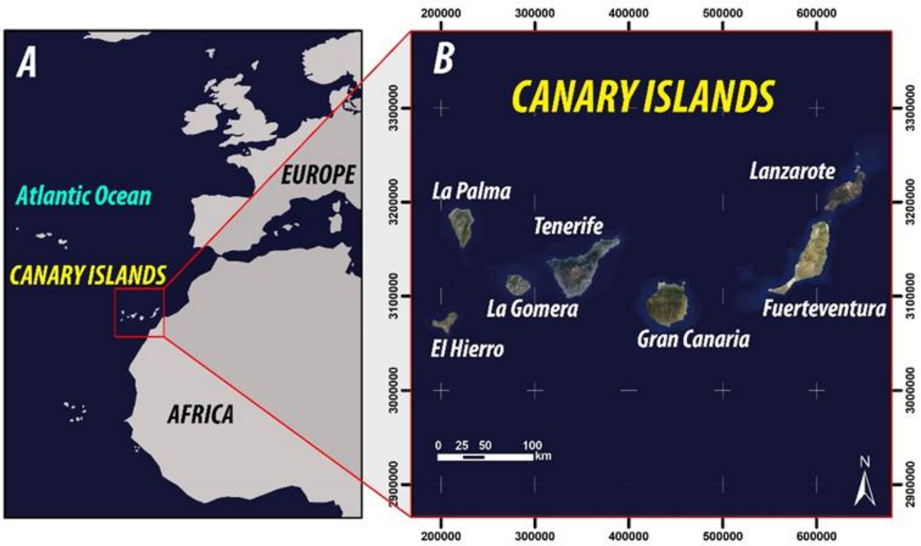


Figure 2 : Impressions of the three sites of DS#4. From top left clockwise: La Laguna, Fuerteventura, Maspalomas.

Challenges and related NATALIE actions: Implementing NBS successfully to achieve the following improvements on each island:

1- Tenerife (DS#4TEN): Enhance the city's response to runoff and reducing flood risk. Enhancing the biodiversity potential amenity of the location through the creation of the Floodable Park of La Vega.

2- Gran Canaria (DS#4GC): Improve the water quality of surface runoff and potential Combined Sewer Overflows (CSO) from sewer network reaching the Maspalomas Pond through SUDS implementation.

3- Fuerteventura (DS#4FUE): Improve water quality using regenerated water for aquifer recharge through the implementation of natural treatment systems.

Description of the area / Climatic Challenges / Proposed Actions:

Tenerife (*DS#4TEN*):

The goal is to manage surface runoff, prevent flooding in the area, alleviate the strain on the sewer network and enhance the biodiversity potential amenity of the area through Nature-Based Solution (NBS) in the form of a floodable park.

The Flood Risk Management Plan (PGRI) of the Tenerife Hydrographic Demarcation outlines the meadow area within the Area of Significant Potential Flood Risk (ARPSI). The project for the construction of a floodable park with a wetland has been approved by the Laguna city council. Local authorities in Tenerife are actively developing a floodable park project.

This solution would help to reduce the risks associated with flooding, while also restoring an old wetland, thus reviving the original ecosystem enhancing biodiversity and establishing a recreational area.

Gran Canaria (*DS#4GC*):

The goal is to reduce the pollutant load of stormwater discharged and potential Combined Sewer Overflows (CSO) from sewer network into the Maspalomas pond through developing Sustainable Drainage Systems (SUDS) systems.

Situated in the southern part of Gran Canaria, the municipality of San Bartolomé de Tirajana is home to the Special Natural Reserve of the Maspalomas Dunes. It is flanked to the north by the tourist developments of Playa del Inglés and Campo de Golf, and to the west by Campo Internacional and Oasis de Maspalomas.

The urban pollution carried by rainwater into the stream from the surrounding areas has adverse effects on the local fauna, leading to severe consequences in some cases.

Local authorities in Gran Canaria have allocated funds for the implementation of a series of Sustainable Urban Drainage Systems (SUDS) in short term.

This solution would enable the control of discharge quality from the stormwater network into the natural environment, enhance the permeability of the urban basin, and generate co-benefits for the city through green infrastructure.

Fuerteventura (*DS#4FUE*):

The goal is to improve water quality using regenerated water for aquifer recharge through the implementation of natural treatment systems.

Fuerteventura is the Canary archipelago's least studied island in terms of aquifers, lacking an adequate hydrogeological model despite being primarily utilized for agriculture.

The rise in dry periods and temperatures is intensifying hydrological droughts, worsening the desertification process, and exerting significant impacts on human activities, such as agriculture, as well as the biodiversity of the island.

Fuerteventura has four identified groundwater bodies associated with the East, West, Gran Tarajal, and Sotavento de Jandía basins. Unfortunately, all these exhibits poor groundwater quality.

The proposed activities would enable the implementation of natural treatment systems, producing regenerated water that can be utilized for aquifer recharge, the restoration of degraded wetlands and cultivation for forage.

Ambition during the project:

Tenerife* (DS#4TEN)*: Implement a novel approach to flood management in endorreic areas using flooding parks as an effective measure, addressing both surface water flooding and groundwater inundation.

Gran Canaria* (DS#4GC)*: Improve the quality of Maspalomas pond, increase the permeability and the biodiversity of Maspalomas basin through Sustainable Urban Drainage Systems (SUDS).

Fuerteventura* (DS#4FUE)*: Be the first aquifer recharge pilot in the Canary Islands through Natural Wetland Treatment.

Ambition after the project:

Tenerife* (DS#4TEN)*: The Floodable Park will remain operational for La Laguna municipality. Elaboration of Best Practices guidelines and organisation of a wide dissemination to achieve replicability within the island.

Gran Canaria* (DS#4GC)*: The SUDS implemented will remain operational, and more SUDS proposals defined within the project could be implemented by the municipality. Establish a long term NBS strategy approach with the local communities. Elaboration of Best Practices guidelines and organisation of a wide dissemination to achieve replicability within the island.

Fuerteventura* (DS#4FUE)*: Elaboration and dissemination of best practice guidelines to achieve the applicability in other rural areas.

Upscaling potential: All NBS could be replicable in other areas within Canary Island with similar risks. As the Macaronesian islands are of similar size and face similar challenges, replication potential exists in the Azores, Madeira and Cape Verde, for example.

Potential barriers:

The foreseen barriers are related to the following aspects:

Tenerife* (DS#4TEN)*: Delay in implementation because of the administration's long-term approval of the project (ongoing) and its execution.

Gran Canaria* (DS#4GC)*: Low annual rainfall volume. A few rainfall events that could delay the campaign of water quality characterization.

Fuerteventura* (DS#4FUE)*: Uncertainty in the involvement of local authorities. Lack of definition of the pilot plant location. Absence of funding.

Modelling needs in relation to the NBS at the Demonstration Site:

Biophysical:

Tenerife* (DS#4TEN)*:

- Drain and sewer flooding
- Groundwater flood

Gran Canaria* (DS#4GC)*:

- Drain and sewer flooding
- Coastal flooding

Fuerteventura* (DS#4FUE)*:

- Drought

Environmental:

Tenerife* (DS#4TEN)*:

- Biodiversity loss

Gran Canaria* (DS#4GC)*:

- Runoff/ non-point source pollution
- Wetland loss/degradation
- Biodiversity loss
- Sea water intrusion

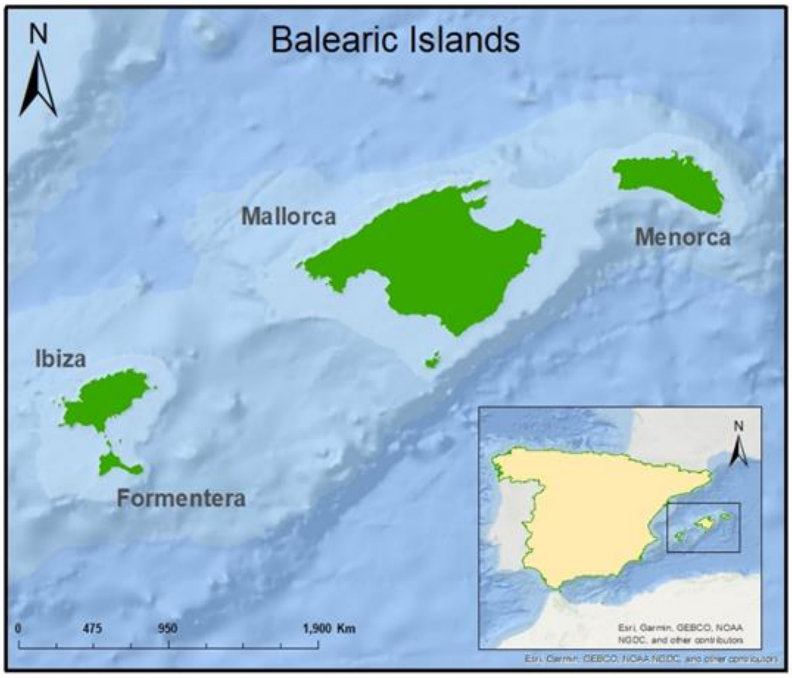
Fuerteventura* (DS#4FUE)*:

- Runoff/ non-point source pollution
- Wetland loss/degradation
- Biodiversity loss
- Desertification
- Sea water intrusion

Socio-economic**:** Cost-benefit assessment.

Follower Site 4: Baleares – SP, Spain	Leading partner: UIB (UNIVERSITAT DE LES ILLES BALEARS)

Key system characteristics: The follower site, the Menorca Island, which is part of the Balearic Islands, is connected to demonstration site 4 (Canary Islands). Menorca is located in the Mediterranean Sea. The follower site is an urban and/or rural area (the exact location of the **infiltration pond** is not yet decided but will probably be located near the waste-water treatment plant of Addaia, located in a rural area near the coastal urbanisations area). The area is classified as biogeographical type: Mediterranean.



Challenges and related NATALIE actions: Groundwater bodies on the island of Menorca are affected by overexploitation and pollution (nitrates, saline intrusion). Future scenarios of climate change are expected to exacerbate these problems. In NATALIE, NBS will be implemented for **recharging groundwater bodies**. Recharge will be carried out **using regenerated water from waste-water treatment plant**.

Description of the area: The water resources in the island of Menorca come from groundwater. The island has six groundwater bodies with the most important being located in the south. These calcareous aquifers have **overexploitation problems.** Decade long groundwater pumping for supply, an increasing population (tourism) and agriculture has caused a water-level drawdown, water pollution (nitrates) and saline intrusion. The results are three groundwater bodies classified in bad ecological status. In one of these groundwater bodies (Maó, located on the south-east of the island) a pilot study was carried out with the injection of treated wastewater. The results were positive decreasing conductivity and nitrate content in the aquifer.

Climatic Challenges: The project will also study the impacts of droughts on streams and aquifers and the management of groundwater bodies under future climate change scenarios.

Proposed actions: The challenge is to find a different method for recharging this aquifer using treated water from wastewater treatment plants from ponds (spreading grounds) or from wastewater effluents to streams (infiltration). The interest is in applying new methods and possible nature-based solutions to manage aquifer recharge (MAR). The project will propose the most suitable site/s for recharging the aquifer in collaboration with the regional and local authorities and stakeholders.

Specific follower actions to be implemented:

Capacity building:

- Implementation of Managed Aquifer Recharge (MAR).

Ambition during the project To be the first aquifer recharge experience using a nature-based solution in the Balearic Islands.

Ambition after the project: Elaboration and dissemination of best practice guidelines to allow the applicability in another islands, like Mallorca and Ibiza.

Upscaling potential: All NBS could be replicable in another areas and islands within the Balearic Island's archipelago.

Potential barriers:
The foreseen barriers are related to the following aspects:

- Exactly location of the recharging site(s),
- Involvement of the regional and local governments for the implementation of the NBS.

Modelling needs in relation to the NBS at the Follower Site: Biophysical: Groundwater, droughts. Environmental: Infiltration, non-point source pollution. Socio-economic: Cost-benefit assessment for green-blue infrastructures.

2.2.5 Case Study 5 - Aquifer recharge for water reuse in Belgium

This case study we will use **Aquifer Storage and Recovery (ASR) to replenish the groundwater reserves** in southern Limburg (Flanders, Belgium). The groundwater reserves are drought sensitive, and groundwater abstraction may have side-effect such as land-subsidence. ASR is investigated as a solution for replenish groundwater reserves, **using treated wastewater** as a source for infiltration water, thus facilitating indirect reuse. This will contribute to safeguarding the mid- to long-term supply of safe drinking water in the region.

This case study consists of a Demonstrator Site. It does not have any Follower Site.

Demonstration Site 5 – Blue Horizon Limburg – BE, Flanders, Belgium	Lead Partner: DeWater (VLAAMSE MAATSCHAPPIJ VOOR WATERVOORZIENING)

Key system characteristics: The demonstration site Blue Horizon Limburg is located in Flanders, Belgium. The demonstration site concerns an urban area (biogeographical type: Atlantic) with an approximate area of 2427km^2.

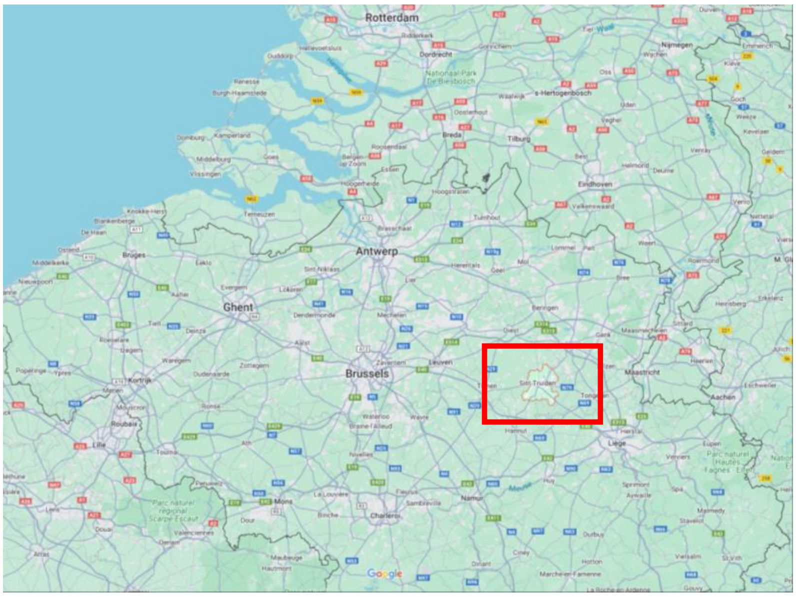


Figure 3 : Arial photograph of the Sint-Truiden WWTP – possible site for the CS5 ASR pilot.

Challenges and related NATALIE actions: DeWater faces challenges around maintaining existing groundwater resources, not only for continuous drinking water supply, but also to prevent side effects such as ground subsidence. In addition, drought periods are becoming more intense and longer, which exacerbate the pressure on groundwater resources. As a consequence, it has become more difficult and complex to renew existing environmental permits. NATALIE will examine the feasibility of ASR (Aquifer Storage and Recovery) at a suited location with the objective of supplementing drinking water supply and/or replenishment of groundwater reserves. The solution will be demonstrated at pilot scale (10m^3/h) during the project, resulting in an operational decision for scaling up (100m^3/h).

Description of the area: The study area is located in South Limburg in Flanders, Belgium. The drinking water supply in southern Limburg (Mid-East region) consists exclusively of groundwater pumping. Supply and demand seem reasonably balanced in size and spatial distribution. The permitted groundwater abstraction exceeds 23 million m^3 and the effective drinking water production is 17.5 million m^3. However, there are concerns such as drought sensitivity of the aquifers from which groundwater is extracted. With implications for available water resources and other potential problems for people and nature. The groundwater extractions in southern Limburg are among the most vulnerable extractions in Flanders.

Climatic Challenges: Existing water supplies are under revision. For instance, there are ongoing complaints against DeWater that extraction at Bovelingen would cause cracks in nearby houses due to subsidence caused by groundwater abstraction. In the context of declining groundwater supplies and rising complaints, environmental permits are more and more difficult to obtain and when renewed, are subject to substantial volume reductions. In Bovelingen area as example, the permit was restricted to 58% of the original volume (1,46 x 106 m^3/y), with an additional restriction to diminish the volume to 31% of the original volume in 10 years. A simple assumption of a 50% reduction of the licensed groundwater volume for sites with a high drought risk (Bovelingen, Menebeek), and a 25% reduction for sites with a moderate drought risk (Diets-Heur, Overlaar, Tongeren and Velm), reduces the licensed groundwater reserve by almost 10% (2.3 million m^3/y) for the impacted area. This can be further reduced if groundwater reserves are not replenished in the long term. Since drinking water demand is expected to stabilise if not rise due to demographic growth with dwindling resources, it is strongly recommended that we increase our security of supply in the medium term, with the main region being South Limburg and more specifically the Bovelingen-Gingelom region.

DeWater thus faces **challenges around maintaining existing groundwater resources**, not only for continuous drinking water supply, but also to prevent side effects such as ground subsidence. In addition, we see that climatically, drought periods are becoming more intense and longer. Because of the above reasons, it also becomes more difficult and complex to renew existing environmental permits. It can also be said that, for this region, there is a clear lack of diversification in drinking water supply as groundwater is the sole source for the region.

Proposed actions: The use of alternative water sources (e.g. WWTP effluent, industrial process water) can complement groundwater as a source of drinking water. In urbanised areas, some of this surface water is discharged effluent from WWTPs. The indirect use of effluent from surface water is thus already a reality in many urbanised locations. For example, it has been estimated that globally about 65% of the irrigation water is already impacted by urban wastewater flows.

Applications of designed wastewater reuse for drinking water are also already available today (e.g. Torreele, Belgium), although these are exceptional. Using municipal wastewater effluent has advantages. For instance, its composition and flow rate are fairly constant, making design and operation of treatment easier. In addition, it is a secure source, less dependent on weather conditions for minimum flows. In the context of circular thinking, this also contributes to retaining water in the water system, thus reducing pressure on external sources.

The treatment objectives regarding the **use of alternative water sources are similar or more challenging** than surface water, with specific challenges towards **microbial safety, chemical safety and salt load**. However, the current state of treatment technology makes it possible to address these challenges to achieve drinking water quality in a direct or indirect way.

In this case we want to use indirect reuse as an alternative water source, whereas the **nature-based system is located sub ground**. A **confined aquifer system** will act as a water reservoir creating a seasonal buffer. The injected water is enriched with minerals because of the water already present in the cretaceous aquifer and the soil composition. Moreover, long residence times improve the microbial quality and diminish the operational requirements in case of calamities. This will enable **indirect reuse of the treated wastewater effluent** whenever it is needed. The injection of this water into an aquifer for later recovery and use is called Aquifer Storage Recovery (ASR). In this case the water is injected in the cretaceous layer. The capacity of the Cretaceous aquifer to store water by ASR approach will be assessed as part of the DS#5 actions.

Ambition during the project:
Obtain a better idea of the feasibility of ASR for drinking water supply and/or replenishment of groundwater reserve. Gaining initial experience with the possibilities but also complexities around indirect reuse, preferentially starting from an alternative water source

Ambition after the project:
If the implementation of the ASR is successful, the intention is to implement the technology at large scale (100 m^3/h). Moreover, there is a replication potential at other sites.

Upscaling potential: It is estimated that DeWater will face a shortage of 2,3 Mm^3/y of raw groundwater, resulting in 1,7 Mm^3/y of drinking water shortage due to climate change. One large scale ASR solution (100 m^3/h drinking water) has the potential to supply 50% of the estimated shortage in demand, comparable with an additional groundwater source for the region. It is not expected that many replication sites are present, due to the different preconditions that are needed, but even a couple of sites would be sufficient. Moreover, DeWater is looking at additional regional strategies (e.g. diminish Non Revenue Water, increase connectivity between regions etc.) to remain a highly reliable drinking water provider for now and in the foreseen future, fully compliant with its mission as public drinking water utility.

Potential barriers:
Potential barriers could be legislation and social acceptance.

Legislation
Regarding DS#5, permits are very important. Permits are needed for drilling the well and testing it. If problems arise with this, it could affect the DS, especially regarding the project timing. If the alternative resource of drinking water is not present or difficult to obtain in the timeframe of the project, an option could be to start from drinking water. This can also be a way-out when permits do not allow the injection of other water resources.

Social Acceptance
To use an alternative water source for the production of drinking water (e.g. effluent from wastewater or process water), social acceptance also plays a key role. Nevertheless, studies as well as stakeholder interactions have shown that acceptance is high as drinking water companies are seen as very reliable providers. Indirect reuse, as proposed in this DS, also diminishes drastically the potential risks for water quality.

This case depends on another project that has already been started, called "**Blue Future Limbur**g", which is part of the Blue Deal of the Flanders government. The dependency of NATALIE on this project consists in the planned treatment pilot; it is planned that this will be realised as part of the Blue Future Limburg project, and that this will act as the alternative water source for NATALIE DS#5. At the moment, there are still some uncertainties with this treatment pilot (location, setup) but this will be clarified soon.

Modelling needs in relation to the NBS at the Demonstration Site: Biophysical: Droughts and Groundwater. Environmental: Groundwater quality, effects of ASR on total water balance. Socio-economic: Standard business economic approaches (investment costs, operational costs, depreciation, CAPEX, OPEX) to be used, no socio-economic modelling foreseen.

2.2.6 Case Study 6 - Aquatic system restoration and water management in France

Climate change is resulting in increasing (summer) temperatures and changes in rainfall patterns. For example, in the Vienne Basin, France (the primary site in Case Study 6) average temperatures basin have increased by 1.86°C in the previous 65 years. This trend is predicted to continue, with climate scenarios predicting between 2.6°C (RCP 4.5) and 5.1°C (RCP 8.5) of warming by 2100 compared to the 1951-2016 average. This increase in temperatures leads to increased evaporation, which impacts the flow of waterways, particularly during the summer period. Restoring watercourses and wetlands can help to attenuate these harmful effects on the quantity (and quality) of water resources.

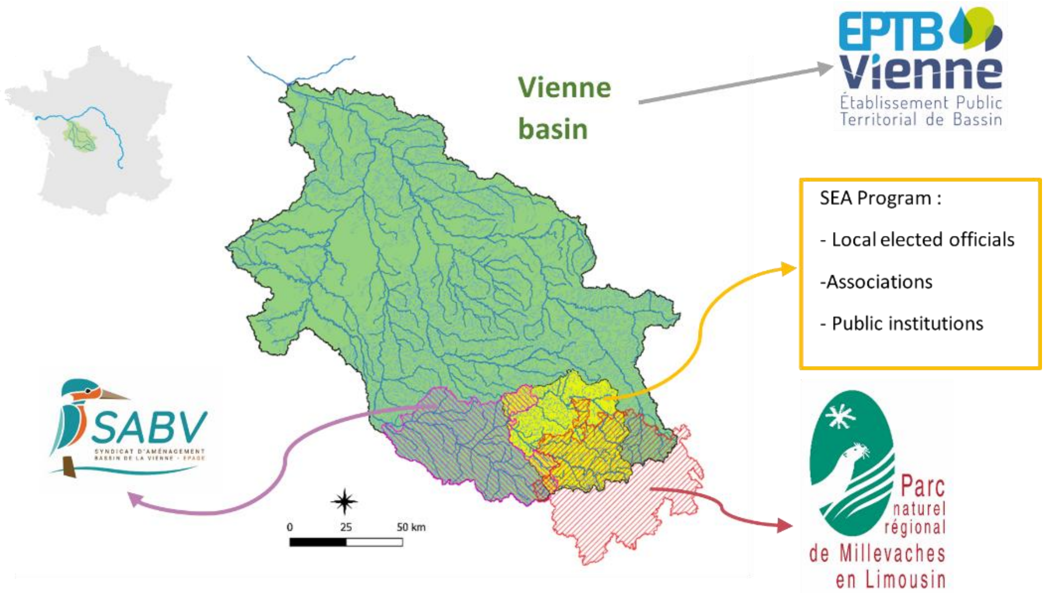
The fact that adaptation to climate change is an important issue in water resources management is recognised and in France several initiatives are trying to address this. Examples include the LIFE Eau&Climat project, which aims to help the local water resource managers to improve their knowledge and to mobilize them on this issue, thus supporting long-term local decision-making for climate-adapted water management. A further project focussing on adaptation to climate change is the Life integrated ARTISAN project that builds the capacity of stakeholders and improves institutional, financial and normative frameworks to remove the obstacles to the generalization of nature-based climate change adaptation solutions (NBCCAS). The medium- and long-term objective is that the use of these solutions should become fully integrated into regional planning.

The NATALIE project, in particular the activities of CS#6, connects to and strengthens the activities in these two LIFE projects, the partners of CS#6 being already involved in these projects. Through their experiences in the fields of water and NBS, the members of CS#6 are relevant partners for implementing NBSs that respond to the hydrological challenges posed by climate change in France.

For DS#6, NATALIE offers the opportunity to boost the momentum around NBSs, which was launched in 2011 with the “Sources en Actions” (SEA) programme. The NBS set up will provide examples and feedback that can feed into the thinking of other willing actors. In addition, scientific monitoring of NBS will provide solid evidence that will support in convincing local actors of the usefulness of these measures. The actions carried out with NATALIE benefit from a network of experienced players and complement the dynamic of the NBS already in place in the region.

DS#6 (Vienne River) can share its technical knowledge to FL#6 (Grand-Est) actors interested in NBS implementation for their territories to manage water quality and quantity. It could directly help project leaders to bring their projects to life, and link biodiversity - water and territories adaptation. On the other hand, FL#6 can help with animating the territory and reuniting various actors (companies, landowners, cities, regions, associations...) around water management and biodiversity issues. This twinning will benefit both regions.

This case study consists of a Demonstrator Site and a Follower Site.

<table>
<tr><th>Demonstration Site 6: Vienne River – FR, France</th><th>Lead Partner: EPTBV (ETABLISSEMENT PUBLIC TERRITORIAL DU BASSIN DE LA VIENNE)</th></tr>
<tr><td colspan="2">Key system characteristics: The demonstration site, the Vienne River basin, is located in the central part of France. It concerns a rural/agricultural area (biogeographical type: Atlantic) with an approximate area of 10742km^2. The NBS implementation will take place in at least 6 sites. The first 4 have been identified:
• site 1, 36120 m²: 4 water bodies to remove
• site 2, 68280 m²: 1 water body to remove
• site 3, 13450 m²: 1 water body to remove
• site 4, 25760 m²: peatland to be restored

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Challenges and related NATALIE actions: The key challenge is to **reduce the vulnerability to low water flow / dry riverbeds of the water courses in the Vienne River basin**, which are the result of global warming and the destruction of wetlands and natural riverbeds in the last decades, in particular due to the creation of ponds. Besides reduced water flows, this also leads poor water quality and warming of the water and reduced biodiversity. **Restoring watercourses and wetlands** can help to attenuate these harmful effects on the quantity (and quality) of water resources, even if a return to original functioning is not always possible, at least in the short and medium term. It is therefore urgent and necessary to deploy them in the territory of the Vienne River basin, but also on a larger scale, to deal with water security problems mainly caused by global changes and to try to slow down the process. The NATALIE project therefore offers an opportunity to carry out larger-scale actions in the basin – complete monitoring, showcase sites, broad communication, financing assistance – and thus accelerate the restoration of aquatic/wet environments in the region. It also makes it possible to scientifically establish and quantify the impacts of NBSs, which will be a strong argument in the deployment of these solutions.

Description of the area: DS#6 is located in France, in the Nouvelle-Aquitaine region. It is made up of several sites – currently four have been identified – that are spread across the Vienne River basin, a tributary of the Loire. The sites are located at the head of the Vienne upstream watershed, an area since 2011 involved in a program for the conservation and restoration of aquatic environments ("Sources en actions"). This programme brings together several local players, including EPTB Vienne, PNR Millevaches and SABV, who have joined forces within the NATALIE project to form the DS#6.

Climatic Challenges: In 65 years, average temperatures in the Vienne River basin have increased by 1.86°C. This trend continues and climate scenarios predict between 2.6°C (RCP 4.5) and 5.1°C (RCP 8.5) of warming by 2100 compared to the 1951-2016 average. This increase of temperatures leads to an increase of evaporation, which impacts the flow of waterways, particularly during the summer period. This phenomenon is massively amplified by the presence of numerous artificial bodies of water (from 3000 in the 60s to 24,500 today in the Vienne River basin) built in the middle of the riverbeds and whose stagnant water heats up, thereby causing water eutrophication. Modelling on the Vienne River basin indicates a significant drop in flow rates (up to minus 50%) in progress and in the future, endangering biodiversity and water uses.
In addition, water bodies were dug in place of wetlands, rich ecosystems which play an important role in regulating hydrological flows. These artificial water bodies are not the only threat to wetlands, since many are drained to plant coniferous trees, cultivate the land or feed livestock. Drained wetlands can no longer ensure their ecological functions, including their hydrological functions, which aggravates water flow problems.

Proposed actions: In DS#6, **three types of NBS will be implemented and monitored**; (1) removal of artificial water bodies (ponds) in the beds of watercourses, (2) removal of drains in wetlands and (3) restoration of riparian forest by cutting coniferous trees and planting species adapted to humid environments. These NBSs will benefit from a scientific monitoring covering several aspects such as hydrology, pedology, geomorphology, biodiversity, etc. DS#6 partners will be supported in their actions by stakeholders involved in the SEA programme, who will be able to share their knowledge, give advice, follow operations, etc. These exchanges will be facilitated by the introduction of a NATALIE section on the various SEA committees (technical committee, steering committee, and scientific commission). This integration of local stakeholders into the processes and the work carried out jointly with FL#6 and the other WPs, particularly WP2 and WP6, must give a solid basis for strengthening the deployment of NBSs in the Vienne River basin.

NBS 1: Removal of artificial water bodies located in the bed of watercourses
Water bodies built directly in the bed of watercourses cause a great deal of environmental damage, in particular:

- Destruction of wetlands,
- Disruption of sediment flows (sediment retention, which amplifies erosion downstream),
- Water heating and evaporation,
- Eutrophication of water,
- Disruption of the hydrological regime of the watercourse (decrease in flow or even drying up),
- Loss of biodiversity associated with rivers and wetlands.

The levelling of the dike of these water bodies allows the watercourse to regain its normal morphology and functioning.

NBS 2: Neutralization of drains in wetlands
Drains are ditches or pipes installed in wet areas to capture water and drain it off more quickly into watercourses. As a consequence, drains cause a loss of water storage, filtering, result in low water support and a loss of flood regulation functions that are normally provided by wetlands. Because of this, drain are also associated with the disappearance of the biodiversity specific to these environments. Blocking these drains slows down water flows and replenishes water in the soil, allowing the reestablishment of the functions which were lost. NATALIE will qualify the effectiveness of this measure. However, as excessive degradation of wetlands leads to the sealing of the soil, it may prevent it from regaining its former functions, or only after a very long period of time (longer than the duration of NATALIE).

NBS 3: Restoration of riparian forest by cutting coniferous trees and planting suitable species
For exploitation purposes, coniferous trees have been planted in certain wetlands, often in conjunction with drainage. As well as drying out the soil, these species, which are not adapted to wetlands, acidify the water and clog-up riverbeds. Cutting back softwoods and planting suitable species makes it possible to stop these effects and benefit from the advantages of a riparian forest in good condition (strengthening the banks, cooling of water, improving water quality, etc.).

Ambition during the project: The ambition is to demonstrate the effectiveness of the three NBS types in **improving water flow and water quality** using evidence-based knowledge.

Ambition after the project: Because wetlands restoration can be a very long process, improvements on hydrology should continue beyond the lifetime of the project. Furthermore, it is expected that the NATALIE NBS will be examples that will be followed by stakeholders at a larger scale.

Upscaling potential: The NBS implemented in this DS are generic solutions and can be adapted in any other situation where artificial ponds are constructed on a watercourse or where former wetlands drained by open drains exist.

Potential barriers:

The foreseen barriers are related to the following aspects:

- Acceptance/understanding from the general public, as most people don't understand the importance of wetlands and attached importance to the built water bodies (often located in private properties),
- Scientific robustness of the results (based on a small number of sites and missing monitoring of the initial status of the site, making it difficult to quantify the impact),
- Lack of financial sources for the future replication actions,
- Administrative procedures to initiate the removal of a built water body.

Modelling needs in relation to the NBS at the Demonstration Site: Biophysical: There is an interest in modelling water flows in the rivers and streams in the Vienne River basin. Environmental: no modelling defined yet. Recolonisation by vegetation (area), evolution of biodiversity (dragonflies, amphibians and flora), water quality and soil humidity on the sites will be monitored. Socio-economic: Not defined yet.

Follower Site 6 – Grand Est - FR (France) **Lead Partner: NAT2050 (FONDS NATURE 2050)**

Key system characteristics: The follower site, the Grand Est region, is connected to the demonstration site 6 (Vienne River). The Grand Est region is located in the northeast of France, bordering Belgium, Luxembourg, Germany and Switzerland. It concerns a large and diverse region with rural/agricultural area as well urban and industrial areas. It is a mixed of two biogeographical types: partly semi-continental and partly alpine. As part of NALATIE, several sites will be identified in the region. The total Grand Est region covers 57,441 km² divided in 10 departments.

Challenges and related NATALIE actions: Many hazards have been experienced in the region. FL#6 will focus on **flooding, droughts and water pollution** (e.g. with pesticides used for viticulture). Climate change and its impacts (changes in precipitation and river flows and their variability over the years) is increasing droughts and leads to a shift in groundwater recharge across the year (more in spring, less in autumn). This results in **dry soils flooding events**, and **groundwater depletion**. The goals for FL#6 are to help various actors in the Grand Est Region in implementing NBS for water management and wetlands restoration. The main objective is to assess, and if possible, overcome sociopolitical and technical challenges getting in the way of biodiversity restoration.

Description of the area: The Grand Est region has a very wide diversity of natural environments and landscapes, ranging from forestry, agriculture (from open fields to bocage), plains and mountains. This exceptional environmental diversity is the consequence of the geology and the multiple climatic influences of the territory. It is one of the only continental French regions. Agriculture (viticulture) occupies almost 3 million hectares (59.3% of the region). The Grand Est region is a real crossroads located at the intersection of several large mountain ranges (Vosges, Jura) and vast limestone and clay-marl plateaus, crossed by large rivers (Rhine, Meuse, Moselle, Marne), with connections to neighbouring regions and countries (Switzerland, Germany, Luxembourg, etc.). This contributes to the ecological diversity of the region, but also increases the threats to biodiversity as anthropogenic pressures such as artificialization of land, environment fragmentation and diffuse pollution have a significant effect on the region's natural heritage (erosion of biodiversity).

Climatic Challenges: Climate changes weigh on the region's biodiversity, with notable impacts on the conservation of environments, the health of ecosystems and species richness. Various examples of impacts of climate change observed include:

- Increasing average temperatures, impacting floristic assemblages and phenology, proliferation of invasive species, increasing the urban heat island effect, …
- Increased flood risks (20% of the built-up area is in a flood risk zone), clay shrink/swell damage (46,5% of the built-up area in a risk zone), late frosts, spring flooding,
- Water resources challenges:
  - More severe low-water levels from spring onwards, with critical thresholds in late summer and early autumn; late and intense flooding with impacts on water quality and ability to infiltrate and store it in water tables,
  - Major uncertainties about the possibility to fill reservoir lakes in the event of a succession of dry years,
  - An increase in the average temperature of lake and river waters, with a consequent impact on water quality (particularly the proliferation of algae),
  - Agricultural and forestry sectors are suffering from lack of water due to water resources depletion, dry soils and invasive species and diseases proliferation,
- Biodiversity: the region is in a transitional period, with biodiversity in decline and environments occupied by an ever-decreasing number of dynamic new species,
- Pollution: important road traffic, coal-fired power station and agricultural pollution effects are increased by the meteorological condition changes.

Proposed actions: The intensity of the water related challenges will depend on the ability to:

- Encourage infiltration of groundwater in winter and spring, when rainfall is at its highest, so that groundwater can play its role in supporting the water table and the water tables can play their role of support in summer and autumn,
- Structure the necessary water savings through a collective, supportive and anticipatory approach.

The main goal of FL#6 is to help creating an engaged community of stakeholders in the Grand Est Region to link biodiversity, climate change adaptation and socioeconomical challenges (forestry, agriculture and champagne, …). NAT2050 is already working with several local stakeholders and is funding some projects in the Grand Est region (see: La carte des réalisations Nature 2050 for more details).
The Grand Est Region is already working on biodiversity challenges with the Life Biodiv'Est Project. FL#6 aims to **support the Biodiv'Est project and other biodiversity initiatives in the Region** and complement them with knowledge from NATALIE partners and its capacity to mobilize public and private actors to help

create and fund local projects. In the long term, some economic systems will have to shift their practices in order to adapt to future climate, hopefully by using biodiversity restoration.

Specific Follower Site actions to be implemented: **No NBS project implementation will be done** by FL#6 itself. The aim is to **help local actors design and implement projects themselves** and create new socioeconomics models using biodiversity-positive actions.

The first steps in FL#6 will be:

- Identification of issues and challenges specific to the region and its stakeholders,
- Identification of the overall commitment community (project leaders, local authorities, economic players, technical and financial partners). Creation of a working group with the EPTB Vienne demonstration site,
- Mobilization of private funding from local economic actors: events organization with local authorities (Strasbourg, Metz, Nancy, Reims),
- Identification of potential project leaders to implement NBS, and of the related obstacles and levers,
- Implementation of monitoring methodology and evaluation strategy for new NBS projects.

Ambition during the project: The ambition is to demonstrate the effectiveness of the three NBS types implemented within DS#6 in improving water flow and water quality using evidence-based knowledge.

Ambition after the project: Because wetlands restoration can be a very long process, improvements on hydrology should continue beyond the lifetime of the project. Furthermore, it is expected that the NATALIE NBS will be examples that will be followed by local stakeholders at a larger scale and temporality.

Upscaling potential: NAT2050 covers the entire French territory (metropolitan and overseas regions). Proven NBS could be implemented in the entire area where NAT2050 is active.

Potential barriers:
The foreseen barriers are related to the following aspects:

- Governance: FL#6 acts at a regional scale, with many administrative levels. It will be important to find the best support and facilitators to maximise the deployment of NBS. The Grand Est Region is a new region regrouping 3 former regions: Alsace, Lorraine, and Champagne-Ardennes. There are many disparities and a lack of communication within this new structure.
- Funding: There are many projects linked to the issues of global warming and biodiversity (such as the Life Biodiv'est project), so it will be important to avoid spreading funding too thinly and to find synergies between programs. We do not plan to use NATALIE funding to finance projects directly but to help organize synergies between local actors to support their own NBS projects.
- Social acceptance: the social acceptability of projects (based on knowledge of the benefits of NBS) is a lever we need to be able to count on.

Modelling needs in relation to the NBS at the Follower Site: Biophysical: not yet determined, depends on sites to be selected. Environmental: Not applicable. Socio-economic: Not applicable.

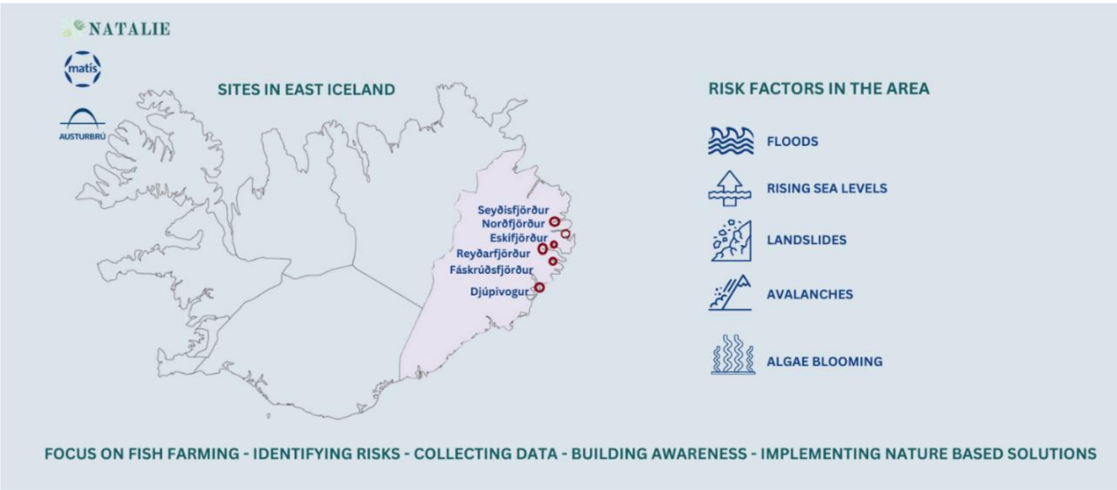
2.2.7 Case Study 7 – Coastal management with NBS in Iceland

The region of East Iceland has many small communities that rely on the ocean, fisheries and aquaculture being the largest industries. The region is facing various impacts from climate change, including sea level rise, flooding, landslides, avalanches and algae blooming. These impacts do not only threaten the towns but also the large industries and therefore the way of life of the communities in the region, with fishing being the mainstay for many of the coastal communities. Nature Based Solutions are a possible way to mitigate the impact of climate change on the communities, both to their infrastructure as well as to the fishing industry. CS#7 will have a specific focus on integrating traditional knowledge in the processes of diagnosing, designing, and testing of **NBS for coastal protection and the aquaculture industry**, in connection with Marine Spatial Planning (MSP) processes in the region.

This case study consists of a Demonstrator Site. It does not have any Follower Site.

Demonstration Site 7 – Arctic - IS, Iceland	Lead Partner: MATIS (MATIS OHF)

Key system characteristics: The demonstration site, the East Fjords in Iceland, constitutes several fjords in the east of Iceland: Seyðisfjörður, Norðfjörður, Eskifjörður, Reyðarfjörður, Fáskrúðsfjörður and Djúpivogur. This is a rural/coastal area of deep fjords surrounded by high and steep mountains (biogeographical type: Arctic) with an approximate area of 23,000 km².



Challenges and related NATALIE actions: Threats from climate changes (sea level rise, flooding, landslides, algae blooming) do not only threaten the towns but also the large industries in the region. DS#7 will diagnose, design, and test **NBS for coastal protection and the aquaculture industry** and connect its activities to the Marine Spatial Planning (MSP) processes in the region. Work in DS#7 will have a specific focus on integrating traditional knowledge in the selection and implementation of NBS in the East Iceland region.

Description of the area: The selection of regions for this project is based on regions within East Iceland that are already monitored due to **flood risk, avalanches, mudslides, and hydrological conditions leading to overflowing rivers**. These areas encompass Seyðisfjörður, Norðfjörður and Reyðarfjörður (which also includes the smaller Eskifjörður). Furthermore, the analysis will encompass Berufjörður and Djúpivogur which house the sole salmon slaughterhouse in the East.

Landscape, Geology and Ecosystems

The scenery of East fjords is unique, ranging from the expansive plains of Vesturöræfi north of Vatnajökull to the deeply incised fjords east of Héraðsflói and Héraðsöræfi. The mountains of East fjords are rugged, steep, and jagged, encircling the deep fjords and bays of the region from Héraðsflói in the north to Lónsöræfi in the south. The area encompasses numerous fjords and coves, with Reyðarfjördur being the longest and deepest fjord in the East, and Seyðisfjördur being the narrowest.

The fjords of East fjords exhibit a bathtub-like shape, with a U-shaped bottom, steep mountain slopes on either side, and egg-shaped mountain peak. These mountain slopes bear the marks of receding glaciers, forming domes within the fjords. As the glaciers melt, water carves deep gorges into the mountain slopes, transitioning into deep valleys, which serve as the catchment areas for the rivers that define the waterways of East Iceland. At the bottom of the fjords lie marl banks, shallows, or clay, while narrow stony beaches with steep descent adorn the fjords edges. The average depth of the fjords ranges between 100-200 meters [22].

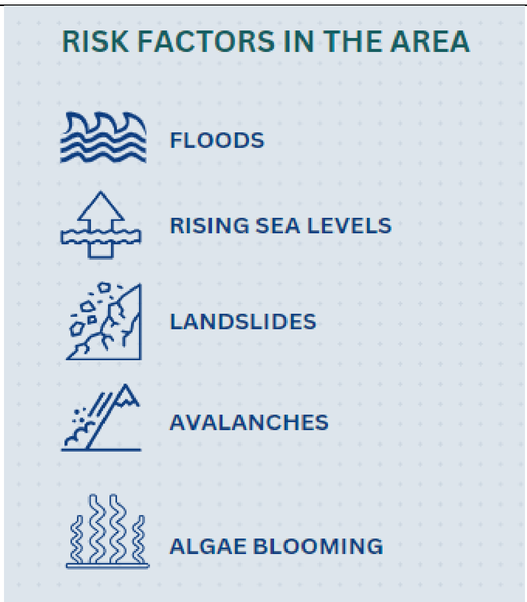
The bedrock of the Eastern fjords primarily comprises a composite layer of basalt and sedimentary layers. This area, fjords of East fjords, is estimated to have formed approximately 10-15 million years ago, while the fjords themselves took shape during the last ice age, which commended around 2,5 million years ago and concluded roughly 10,000 years ago [22].

In the East Fjords, a rich and diverse vegetation thrives within the valleys and fjords. Grasslands dominate the shores and riverbanks, while marshlands extend into the mountain slopes and fjord bottoms. Vegetation typical of highlands prevails above 400 meters. At the bottom of the fjords and along the slopes, it is common to encounter ocean gravel or glacial ridges. In these areas, vegetation is relatively sparse, although pockets of diverse flora, including mosses, lichens, and tall plants, can be found upon close observation. Permafrost may also be present in such ridges.

The primary threat to the vegetation of East Fjords is the proliferation of lupin, identified as an invasive species in Icelandic ecosystems by the Icelandic Institute of Natural History (Náttúrufræðistofnun Islands).

East Iceland is characterised by small villages near nature (the largest town in the region has a population of 2300 inhabitants). The main nature-reliant industry is fisheries although aquaculture is increasing rapidly. There is also significant agriculture, tourism and more. The population of the area is about 11.227 inhabitants (5.559 male/ 5.264 female) or 3% of Iceland people on 22,721 km^2.

Climatic Challenges: The following issues, resulting from climate change, challenge the region and its economic activities: sea level rise, flooding, landslides, avalanches and algae blooming.



Proposed actions: The work in NATALIE is centred around the **development of accurate mathematical models for hazard detection, the identification of combinations of suitable NBS that lead to better robustness, recovery and adaptability to the hazards following from climate change**. Furthermore, models to map the consequences of the implementation of these NBS will be developed.

The NBS target the following objectives:

- NBS as effective conservation strategies: coastal protection and sustainable seafood production habitat suitability for flora and fauna,
- NBS for sustainable harvesting of seafood from fisheries and aquaculture,
- NBS for safeguarding local communities from natural hazards.

Ambition during the project: To develop accurate mathematical models for hazard detection and mapping consequences of the implementation of NBS. To **identify and develop suitable NBS for the area** that are inclusive of traditional knowledge from local communities.

Ambition after the project: To protect the nature, environment and the communities in the East Iceland region.

Upscaling potential: The upscaling potential is significant. The NBS and mathematical detection models developed and demonstrated could be transferred to other artic areas.

Potential barriers:
The foreseen barriers are related to the following aspects:

- Financial – implementation of the NBS identified in the selection process depends on acquiring funding (not included in the NATALIE budget),
- Technological – the model developed need to be sufficiently accurate in order to select and design suitable NBS. It remains uncertain sufficient model accuracy will be achieved,
- Stakeholder participation – the role of local stakeholders in identifying, designing and implementing NBS is vital. Their sustained involvement and commitment to actions need to be obtained.

Modelling needs in relation to the NBS at the Demonstration Site: Biophysical: Modelling of flooding, mass movements (landslides, snow avalanches), sea level rise. Environmental: Quantification of susceptibility for mass movements (landslides, snow avalanches) and sea level rise based on

environmental factors; identification of relevant features for explainability and uncertainty quantification for early warning systems; anomaly detection and identification of critical factors for cause/effects relationships on ecosystems. Socio-economic: modelling of hazard damage and cascading impact analysis, analysing the consequences of individual and compound hazards.

2.2.8 Case Study 8 - Sustainable River restoration, maintenance and management in Italy

This CS is a clear example that it is possible to operate the transition toward a more sustainable society adopting NBS. The territory (Veneto Region) is strongly needing such a transition and also for these purposes the Region joined the Mission Adaptation.

This case study consists of a Demonstrator Site. It does not have any Follower Site.

Demonstration Site 8: Venice - IT, Italy	Lead Partner: THETIS (THETIS SPA)

Key system characteristics: The demonstration site, the Venice Lagoon Basin, is located in the Veneto region in northeast Italy. It concerns a rural/agricultural area (biogeographical type: Continental).

The implementation of the NBS and the related studies to compare its efficacy and impact will take place in **three rivers inside the area** of competence of “Acque Risorgive”, the local Land Reclamation Consortium and partner of the project (CBAR), which spans over more than 100.000 hectares (Fig.1). Such an area corresponds to approximately 50% of the entire **Lagoon of Venice drainage basin** and is included in Venice’s Metropolitan Area and in the Provinces of Padua and Treviso.
The site initially selected to do the testing was a stretch of the Roviego river in the Municipality of Salzano. Nevertheless, after the start of the project, the selected areas were sold to a company who is probably planning to change the land use. Moreover, first essays to characterize the soils bordering the river (which would be interested by project’s interventions) denoted a possible risk of contamination. Owing to such reasons, it was decided to change the site for implementing the NBS (Fig.2) and to enlarge the number of sites to monitor its efficacy. The final selection of the sites is still ongoing; criteria for selection include:

- the representativeness of the site compared to the typical environments of the Venetian countryside,
- the possibility to compare “traditional” and “Nature Based” approaches in the same river,
- the availability of data related to ongoing monitoring activities conducted by CBAR (e.g. water levels),
- the different typologies of hydraulic management (mechanical drainage or natural flow or mixed management),
- the presence of similar interventions already in place (in order to be able to monitor the state of a “mature” system),
- the possible presence of protected areas in the neighbourhood.

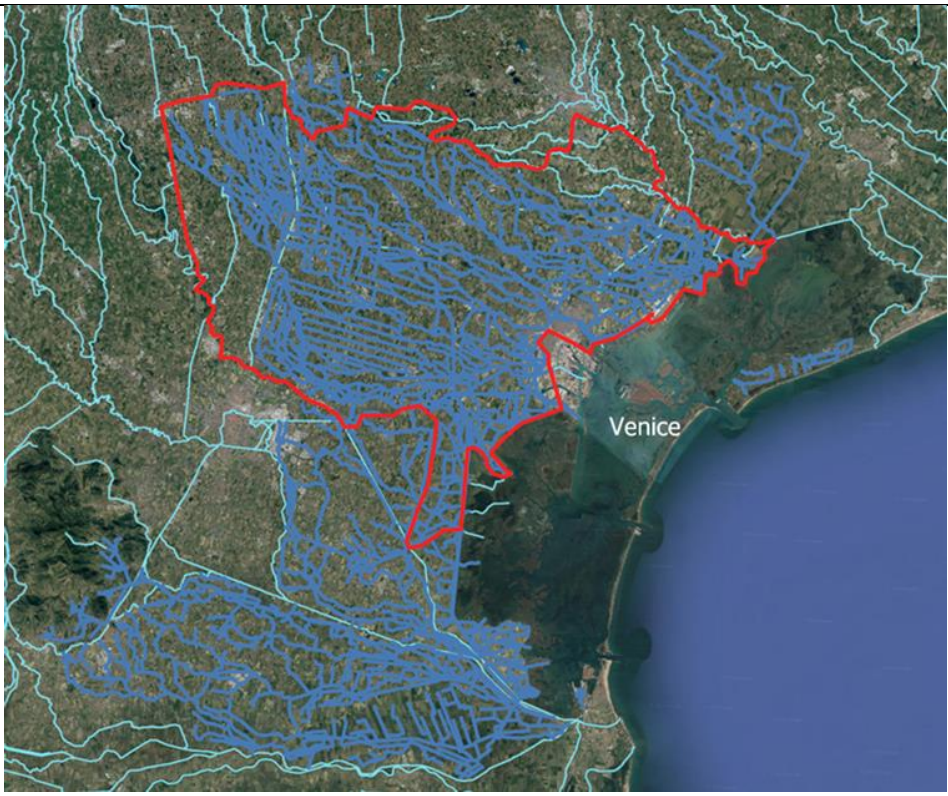


Figure 4 : The hydrographic network at the border of Venice Lagoon. Blue: rivers flowing inside the lagoon; Red: "Acque Risorgive" Land Reclamation Consortium competence area.

Figure 5 : Feasible sites to test the NBSs.

Figure 6 : Example of traditional maintenance along a representative steam in the region.

Challenges and related NATALIE actions: Climate projections suggest that the area could be subject to significant changes – mainly connected with temperatures' increase. Thus, multiple types of impacts could affect the region, including **flooding and soil erosio**n. The main goal of the DS is to demonstrate the feasibility of the transition to a **sustainable approach to river restoration, maintenance and management.** Maintenance of rivers is critical to prevent the risk of floods and drought. A sustainable maintenance should lead to an increased biodiversity and to a decreased soil consumption, while at the same time being compatible with hydraulic needs.

Description of the area: Veneto Region ranks 2nd in Italy for soil consumption [11] and in recent years is more and more suffering from river floods, drought and biodiversity loss. The maintenance of riverbanks is a fundamental practice for the proper functioning of the drainage network. The flow of water, especially in drainage areas where the water level is highly variable, erodes the banks and creates landslides within the channel. These landslides deposit the eroded material on the riverbed and thus reduce the water flow capacity of channels. During extreme rainfall events, this can lead to overflows and flooding of the surrounding areas. The maintenance of the banks is currently carried out by using hard infrastructures and unsustainable procedures. They require the quarrying, transport and installation of rocks and stones from the Alpine region, and result in a hardening of the canal bank. CBAR manages about 2300km of water streams in the Venice Lagoon's drainage basin. During the period 2018-2022, CBAR required approximately 37.5 kTons/year of raw materials to execute the maintenance (see figure 3).

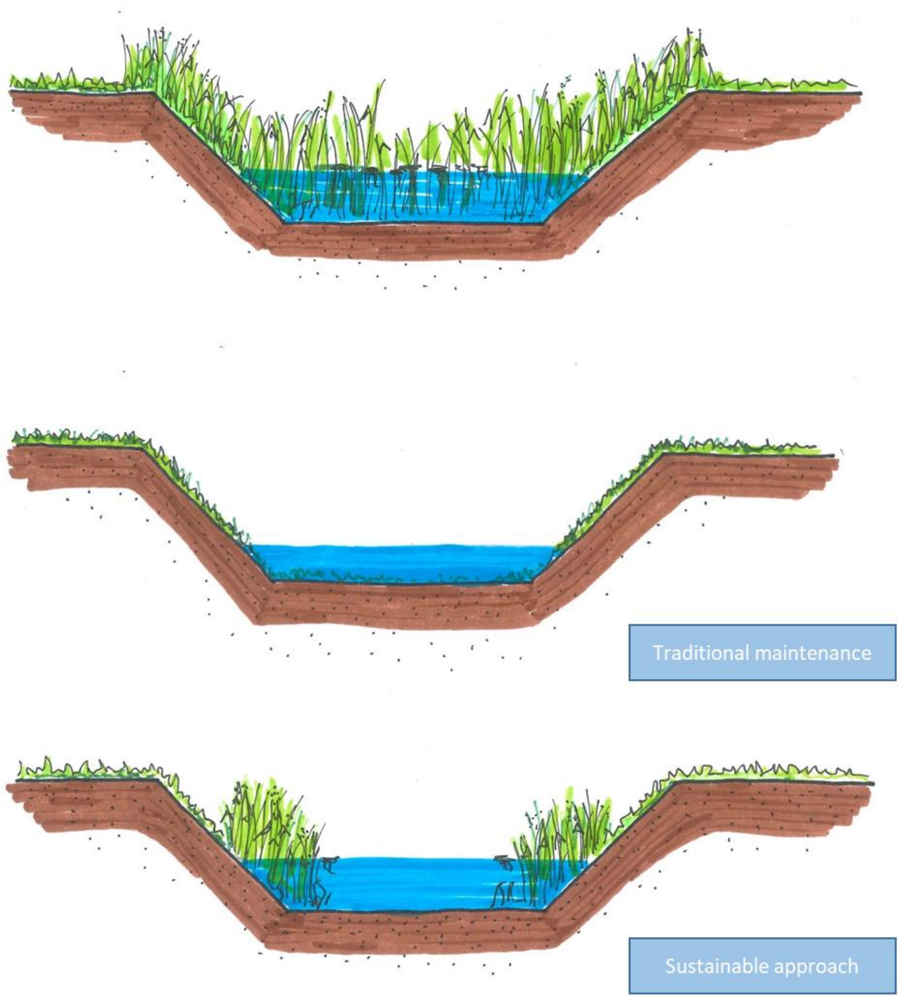
In the context of the demo site, canal bank landslides are a recurrent problem that requires maintenance in the near future. In these particular contexts, there is an opportunity to test and experiment a **new more sustainable and nature-based approach of river bank maintenance**. In addition to river management, the intervention is also particularly relevant for enhancing biodiversity and restoring natural habitats.

Climatic Challenges: Climate projections suggest that the area could be subject to significant changes – mainly connected with temperatures' increase - that could even motivate its inclusion in the Mediterranean biogeographical region [12]. Thus, multiple types of impacts could affect the region. The available historical data for the Veneto region (1993-2022) suggest a notable and growing yearly variability of rainfall events, although changes in the total precipitation are not statistically relevant. Extreme precipitation (95° percentile) is expected to increase in a high emission scenario (RCP 8.5) from +60 to + 80% in coastal areas and from +80 to + 140% in alpine areas by 2100 [13]. This trend is expected to generate increasing erosion of riverbanks (due to more variable and more intense precipitation) and an increasing risk of flooding. Moreover, air temperature is increasing, following the general global warming. Historical regional data suggest a warming trend of 0.57° per decade (1993-2022) and all scenarios consistently show a further increase of temperature for this century. Finally, local biodiversity is threatened by several anthropic pressures (agriculture, urbanisation, pollution), with additional pressure exerted by climate change (changes in temperature and water availability).

Proposed actions: Continuous River maintenance is the first prerequisite to avoid **landslides** along the banks, then it represents a fundamental type of measure to avoid **flooding** of territories. A proper and smooth water flow in the network may also mitigate the risk of **water shortages for agriculture**. In fact, the increase of temperatures affects not only the frequency of extreme storm and drought events, but also determines an increase in water demand of crops. Revegetation will contribute to decrease the risk of **biodiversity loss** and will increase the potential for ecological connection with other green areas.

In DS#8 two types of NBS will be implemented and monitored: (1) gentle maintenance, (2) slope reduction and vegetation.

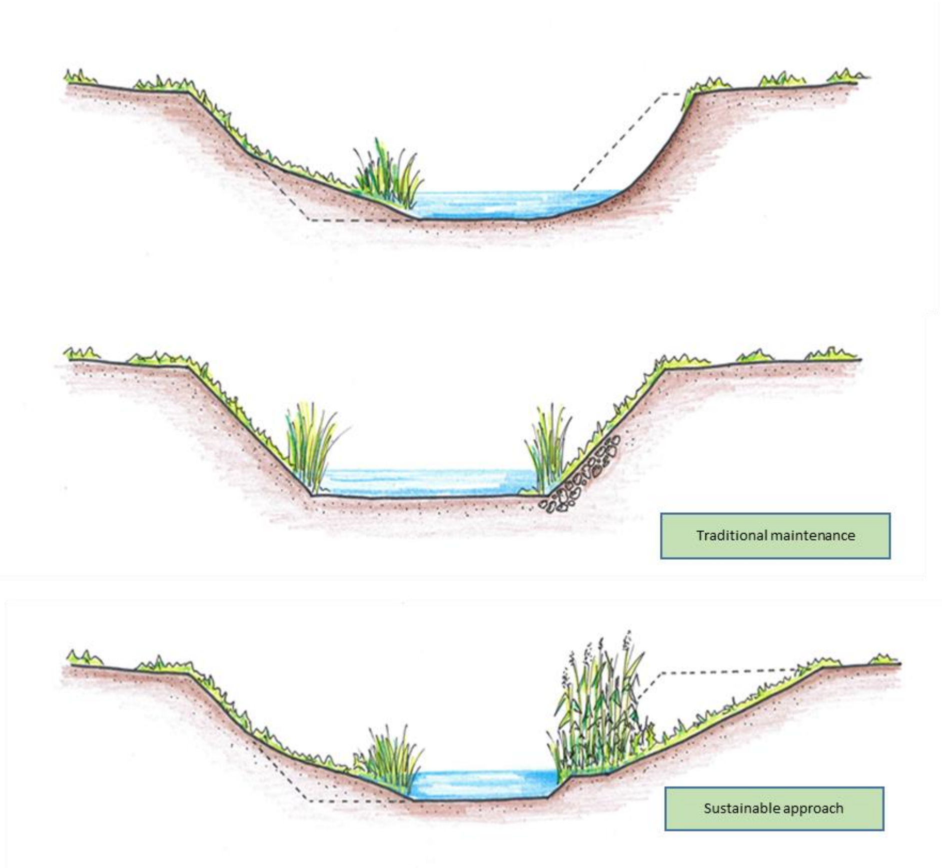
NBS1: Gentle maintenance
The first NBS will be used to prevent erosion. It consists of maintaining a strip with uncut herbaceous vegetation at the base of the banks.



NBS2: Slope reduction and vegetation

The second NBS will be used in sections of the river where landslides are already present. A number of activities will be implemented:

- ***River restoration and maintenance***. The core NBS will consist of the transition from a grey, "rigid", banks' management to a green management. The new approach will avoid the use of rocks and stones, favouring instead the widening of the canal bed and shaping fewer steep banks.
- ***Revegetation***. Transplanting and revegetating the banks will also help soil consolidation and reduce the risk of landslides, while helping increase biodiversity.
- **Capacity building**. Workers will be trained in order to be able to adopt the proposed approach. This will result in development of new skills and formation of qualified workers.
- **Social awareness**. A dialogue with citizens and landowners will be initiated. In particular, farmers' associations should be involved as important stakeholders.



Monitoring. This activity is fundamental to assess the advances of the NBS implementation process as well as the efficacy and the impact of the approach. Thus, all along the course of the project, appropriate indicators will be studied and then selected for monitoring.

Monitoring parameters will both refer to environmental and societal fields.

Environmental parameters will track changes in biodiversity, hydrology and geomorphology. Societal parameters incorporate capacity building and social acceptance Indicators.

Ambition during the project: NBS will be in place probably at the end of the second year, so at the end of the project, experience will be gained about the land acquisition procedure. Moreover, the monitoring the evolution of the site for at least a couple of years will provide evidence-based on the measure effectiveness and workers will have gained a new know how. Moreover, the solution will have been discussed with several stakeholders, mainly farmers association, hence increasing the social acceptance of the NBS implemented.

Ambition after the project: Implemented NBS will continue their function and the institution in charge of the maintenance will keep on carrying out the task, also to monitor the frequency needed for maintenance also in the medium-long term.

Upscaling potential: The elaboration of a preliminary plan for upscaling the approach over the area within the competence of CBAR is among the objectives of the project. The potential for "upscaling" the approach will be tested via the conduct of a consultation with others land reclamation consortia, initially those operating inside the drainage basin of the Lagoon of Venice.

Potential barriers:
Technical aspects are not expected to hinder the implementation of NBS, but proving the efficacy of some outcomes could be complex, especially in the short term. Several external factors (e.g. changes in the land use) could impair the comparison between ante operam and post operam monitoring results.

Social acceptance represents a possible barrier for implementing NBS in the case study area. The process of land expropriation is particularly challenging. Stakeholders such as farmers associations need to be properly engaged to overcome social barriers and to favour the NBS scaling.

Modelling needs in relation to the NBS at the Demonstration Site: Biophysical: There is an interest in modelling of erosion (in terms of shear stress) and floods (in terms of water level). The approach should consist in evaluating the shear stress with different types (slope) and conditions (vegetated, non-vegetated) of the banks. Moreover, the NBS (i.e. the resultant cross section, riverbed and banks' condition) must guarantee that the new hydraulic conditions don't increase the risk of flood. Environmental: N/A. Socio-economic: N/A.

3 ACTIVITIES RELATED TO THE CASE STUDIES (M1-M6)

3.1 Overview and scope

During the first six months of the project (from September 2023 to the end of February 2024), important key actions and activities related to the CS have taken place. These can be divided in five groups/types:

(i) Overarching organisation/communication/coordination activities concerning the case studies (related to task 5.1),
(ii) Starting up of the implementation and testing of actions in all the Case Studies (task 5.2),
(iii) Activities related to stakeholder mapping for the co-creation of transformative solutions and mainstreaming of NBSs (synergies with WP2),
(iv) Activities related to technical implementation requirements (related to WP3/WP4, i.e., the technical WPs and to task 5.2),
(v) Identification of the CS (not all) who will test the different investment bundle tools of WP6.

Activities in those first months do not yet include activities related to validation of solutions for each CS nor evidence-based knowledge and recommendations at EU level (task 5.3), because the related tasks will start much later in the project, i.e. in the fourth year.

This chapter provides a short summary of the results of the work of task 5.1, the status of the activities related to the other work packages, including a short roadmap for monitoring the progress in WP5 and the activities scheduled by each CS in M7-M12. This roadmap and monitoring plan will be an internal live document and will be updated throughout the entire lifetime of the project.

3.2 Organisation and coordination of the CS activities

Practically all the project partners are involved in activities related to the CS in WP5 and in Task 5.1, which coordinates, monitors and guides them. Moreover, the necessary actions for the implementation of the co-creation of transformative solutions and mainstreaming of NBSs for each CS are complex and diverse, due to the different key issues of all the CS, but also due to the interlinkages of this WP with all the other WPs in the project, which are shown in Figure 7.

Specifically, activities in WP5 are related to:

- WP2: for actions related to stakeholders’ engagement and the co-creation of transformative solutions & mainstreaming NBSs,
- WP3 for specific modelling and data purposes related to the CS,
- WP4 for the co-design of the NBS knowledge booster – a digital twin for NBS implementation & monitoring,
- WP6 for the realisation of investment in ecosystem-based adaptations for climate resilient development,
- WP7 for the building of an NBS communication & dissemination ecosystem.

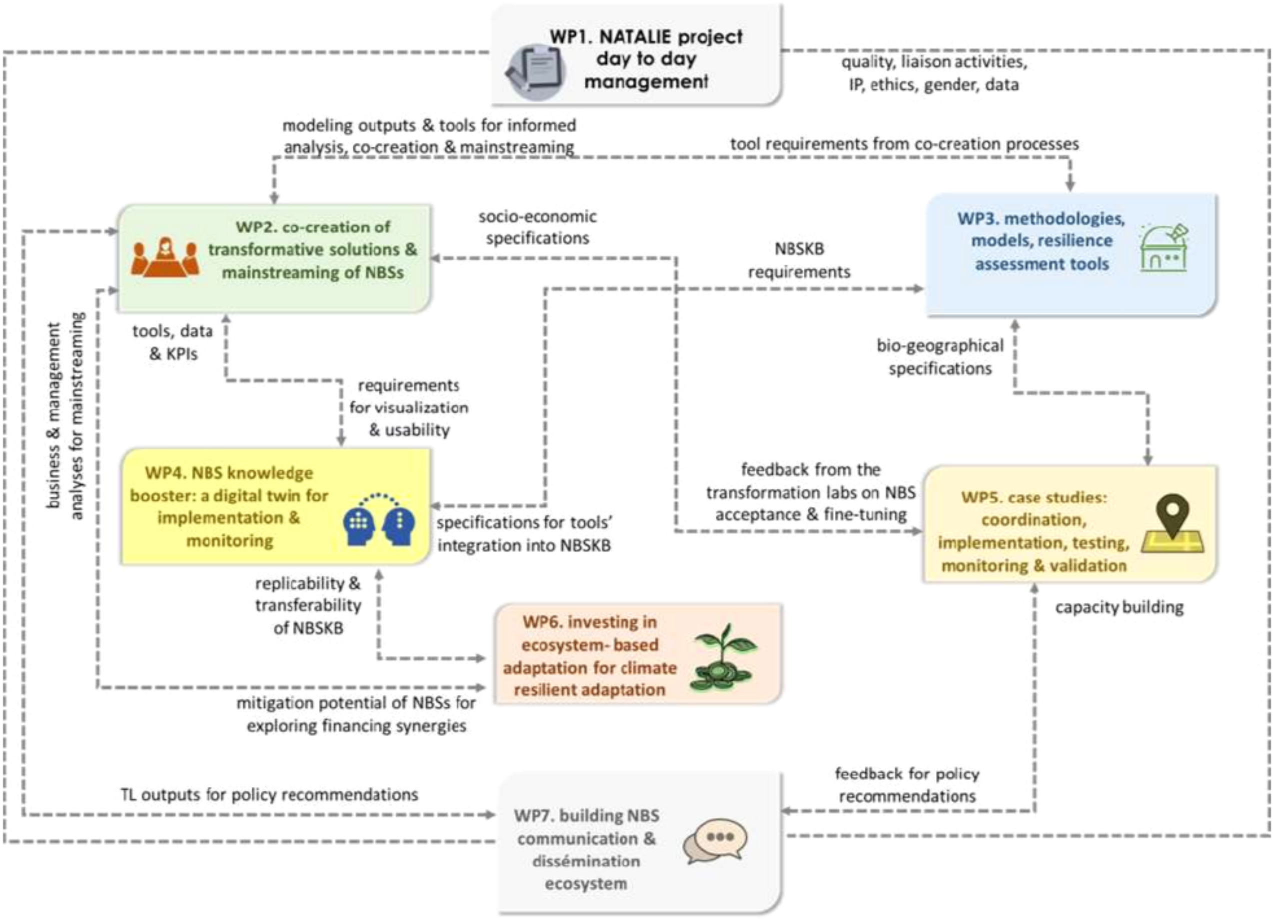


Figure 7: Schematic representation of the interlinkages between WP5 and the other WPs.

Consequently, it was decided early by the project coordinator (OiEau), the WP5 Leader (KWR) and the WP5 co-leader (BEF) to establish regular recurrent weekly virtual meetings, to organise and monitor the actions. Participation to these meetings is required for:

(i) at least one representative for each CS,

(ii) at least one representative from WP2, WP3, WP4, WP6 and WP7.

The first step was the definition of the partners (and specific people), who would participate in those regular meetings. The list of the required participants is given in Table 2. It should be pointed out that these meetings are open to all the people involved in the project. Any partner can participate, but for practical purposes, it was required by all the CS and the WPs to nominate a key contact person (for the meetings) as well as a replacement. Additional people were also welcome, but the minimum attendance had to be held.

Table 2 : Regular participants in the weekly meetings for the CS activities.

Title	Main partner	Other partner(s)	Key person(s) for the meetings
Task 5.1 (Hosts and WP leaders)	KWR	BEF	Lydia Vamvakeridou-Lyroudia (KWR), Joep van den Broeke (KWR), Ingrida Bremere (BEF)
DS#1: Lelantine Plain	WWF Greece		Giannis Alexiou, Thanos Giannakakis
DS#2: Vacaresti Natural Park	VNPA	BDG	Dan Barbulescu (VNPA), Ciprian Nanu (BDG)
FL#2: Bucharest Children World	VNPA	MS4, BDG	Dan Barbulescu (VNPA), Ciprian Nanu (BDG), Andrei Valentin (MS4)
DS#3: Zemgale Region	BEF		Ingrida Bremere, Daina Indriksone
FL#3: Lithuania	BEF	BIRZAI	Ingrida Bremere
DS#4: Canary Islands	ULL	AQUA	Noelia Cruz Perez (ULL), Beniamino Russo (AQUA)
FL#4: Baleares	UIB		Celso Garcia
DS#5: Blue Horizon Limburg	DeWater	VUB, KWR	Dries Borloo (DeWater), Miguel Moreno (VUB), Mina Yazdani (KWR)
DS#6: Vienne River	EPTBV		Justine Gaume
FL#6: Grand Est	PNR		Leo Vibert
DS#7: Arctic	MATIS		Anna Berg Samúelsdóttir
DS#8: Venice	THETIS		Sebastiano Carrer
WP1	OiEau		Sonia Siauve
WP2	UTH		Alexandra Spyropoulou
WP3	AQUA		Jesus Soler, Beniamino Russo
WP4	EURECAT		Iván Cester
WP6	GIB		Amanda Radstake
WP7	OiEau		Natacha Amorsi, Sadika Bernard

The regular weekly meetings occur every Monday at 13.00 CET (duration 1 hour). The purpose of the meetings is to record the progress of each CS and any issues that may arise related to WP5 activities, as well as any changes with regards to the Grant Agreement (GA), related to the CS. The meetings take place in Microsoft Teams, organised by KWR (Lydia Vamvakeridou-Lyroudia and Joep van den Broeke). The invitation list is wider than the persons mentioned in Table 2. At present, the invitation to the weekly meetings is being sent to 54 people within the project partners. More may be added as needed.

The standard agenda for every meeting is:

1. KWR-Update to all (5min)
2. Case Studies: Each CS in turn updates about their activities and issues – 5 min each. No presentations are required, oral reporting only
3. WP: each WP representative, only of needed, reminds the actions to be carried out by the CS in the context of their WP and answer questions from CS, if any
4. KWR-Summing up (5min)
5. AOB

Minutes are kept in an online document, which has been placed at the common Teams space. All the participants are free to see the minutes and edit them, as needed (edit mode). Thus access, openness and constant update is available for all the persons involved in the project. The participation of the representatives from the other WPS is also very important, because specific issues, organisational or technical, can be discussed and resolved during these meetings. The **detailed minutes**, for every week, are included in **Appendix 3**.

It is understandable that not everyone would be able to attend every week. However, for each CS and WP, there are at least two persons designated as the main contacts. The request is for at least one of them to be present in the meetings, to update the others about progress and issues related to each CS. This has been successfully achieved as in every meeting there has been at least one representative from each CS and from the other WPs. There has never been a lack of weekly communication with any of the CS or the other WPs. These regular weekly meetings will continue until the end of the project.

3.3 Initial roadmap for the implementation of NATALIE at the CS

At this stage, so early in the project (M6), it is not yet possible to formulate a detailed action plan, tailor-made for each CS, mainly because the CS are so different (Section 2) that it is impossible to generalise and plan for all. For now, within Task 5.1, emphasis was given to the necessary preparatory activities for starting smoothly and without delays the implementation action in Task 5.2 (starting in M4).

The immediate next step is the preparation of the conceptual graph of technical activities in each CS, which is under way (Section 3.4). This is expected to be completed by M7. Once this is finalised, the detailed plans and timeline of actions for Task 5.3 will be determined. This will also lead to the first major revision of this document, which is expected to take place in M12.

Consequently, the roadmap to implementation which is shown in Table 3 is generic, based on the general timeline of the project. It will be modified and broken down in more detailed actions in the next version of this deliverable. Detailed activity plans from all DS and FL for M7 – M12 are provided below in Table 4. Any generic activities concerning the provision of case study data to support the other WPs are not specifically mentioned in the activity plans.

Table 3 : Initial roadmap for the implementation of activities at the Case Studies.

Initial Roadmap for implementation of actions at the CS	M6	M12	M18	M24	M30	M36	M42	M48	M60
Communication and interaction mechanisms across the CSs	■	■	■	■	■	■	■	■	■
Internal regular meetings for each CS	■	■	■	■	■	■	■	■	■
Initial stakeholder profiling and mapping (with WP2)	■	■	■	■					
First stakeholder meetings / CoP organised		■							
Climate projections and scenarios decided (with WP3)	■	■							
Modelling implementations for each Case Study (with WP3)			■	■	■	■	■	■	
Development and monitoring of KPIs and assessment of NBS (with WP4)			■	■	■	■	■	■	
Implementation of the NBS			■	■	■	■			
Validation of the NBS							■	■	■

Table 4 : Activity planning for the CS for M7 – M12.

Case Study site (DS/FL)	Activity
CS#1	**Flood and wildfire risk mitigation in Greece**

DS#1	WP5:
	• Hydrological study in the study area
	• Geological study in the study area
	• Check dams
	  ○ selection of the construction manager
	  ○ area selection for the construction of check dams
	  ○ study and licensing
	  ○ monitoring
	    ▪ planning
	    ▪ start of pre-monitoring for biotic parameters
	    ▪ start of pre-monitoring for abiotic parameters
	• Maturing NBS in the Lelantine plain: one-to-one meetings/interviews
	
	WP2:
	• Preparation of the stakeholder short list
	• Organization of the 1st stakeholder meeting
	
	WP6:
	• Socio-economic analysis using NIL and SAVi will be elaborated with WP6
	
	WP7:
	• Preparation of a factsheet for the project
	• Articles in media

CS#2	**Fresh water habitat restoration in urban ecosystems, Romania**
DS#2	• Stakeholder mapping, informing main local organizations, planning for involvement. • Field visits for determination best NBS locations and characteristics. • Preparation of data collection and obtain most of them.
FL#2	• Same as DC#2 • Coordination for data contracting. • Define terms of reference for the study of the CWP area and NBS application.
Combined activities (DS#2 & FL#2)	• Broader community information and communication campaign. DS#2 & FL#2 project sheet. • First Community of Practice meeting in Bucharest. • Participation in conferences and national events.
CS#3	**Constructed wetlands in Latvia and Lithuania**
DS#3	On operational conditions of the existing constructed wetland for treatment of diffuse pollution from agricultural fields: • Collection of background data – baseline assessment • Monitoring of existing constructed wetlands (water sampling, counting of species) • Evaluating and adjusting operational conditions • Evaluation of modelling potential On the potential of constructed wetlands for treatment of pollution from point sources:

	• Elaborate criteria for selection of sites for both pilot areas • Water sampling and analyses for baseline • Identify the site for farm – get agreement • Identify the site for village – get agreement with a municipality • Prepare design for the constructed wetland (LBTU) • Prepare documentation for procurement of construction (ZPR) • Evaluation of modelling potential On systemic and targeted planning for NBS in the region: • Mapping pollution sources to identify areas in need for NBS (locations) • Preparing for application of MCDA techniques and the AHP for decision making and social acceptance Evaluating options for extreme event occurrence modelling
FL#3	• To collect information on which data (on WWTP in small villages, the amount of water discharged, water quality, reports submitted to the environmental service) are collected, available and what are their source. • Going for a study visit for stakeholders (SH) to existing 2-3 constructed wetlands to Latvia (Zemgale) – April /May 2024 (even if not to a small village) in combination with SH event. • Gather the opinions and insights of FL#3 specialists in the field of nature protection, water treatment about the installation of wetlands according to the data currently available; as they would like, they could contribute to this project in order to avoid mistakes; installation for wetland monitoring. • What data should have to be monitored in selected areas before and after constructing wetlands. • Accurately formulate the task for the expert and select the expert. • Accumulate knowledge about all the CS#3 actions
Combined activities (DS#3 & FL#3)	• List of criteria for selection of sites for constructed wetlands (number of inhabitants, level of water pollution). • Organisation of a joint study visit for LT SH to Latvia (SH event). • Regular CS partner meetings (remote, face to face).
CS#4	**Alternative water management solutions in Spanish Archipelagos**
DS#4	**General** - Downscalling IPCC 6th report climate variables **Tenerife (DS#4TEN):** - Compilation of available information - Drainage network monitoring campaign - Groundwater network monitoring campaign - Elaboration of the surface runoff and drainage network model (coupled models) - Elaboration of groundwater model - Executive project drafting of floodable park according to the local government funding **Gran Canaria (DS#4GC):** - Compilation of available information - Topographic campaign - Water Quality campaign

	- Drainage network monitoring campaign - Groundwater network monitoring campaign - Elaboration of the surface runoff and drainage network model - Elaboration of groundwater model - Executive project drafting of SUDS according to the local government funding **Fuerteventura (DS#4FUE):** - Definition of the site location according to local authorities needs - Compilation of available information - Water Quality campaign - Groundwater network monitoring campaign - Elaboration of the Natural treatment system model - Elaboration of groundwater model - Executive project drafting of Natural treatment system according to the local government needs
FL#4	**Balearic Islands (FL#4): Menorca** - Propose the most suitable site for MAR - Start collaboration with the regional and local authorities and stakeholders - Compilation of available information - Groundwater network monitoring campaign - Elaboration of groundwater model - Downscaling IPCC 6^{th} report climate variables
Combined activities (DS#4 & FL#4)	The FL is fully integrated with the DS team. It participates in all activities and asses all the actions, especially for Fuerteventura case study, strongly related to Minorca case.
CS#5	**Aquifer recharge for water reuse in Belgium**
DS#5	This year, we will mainly look at the different roles that each partner can fulfil, the ASR scenarios that are possible and the setup in combination with the other project (Blue Future Limburg). This will include looking at the information already available, choice of the location in respect with the preconditions and planning for the practical setup. It is also necessary to determine what is needed to prepare the permit application.
CS#6	**Aquatic system restoration and water management in France**
DS#6	• M5-M9: agreements with owners of sites where NBS will be implemented, tendering and awarding public contracts for NBS implementation, and installation of equipment • M9-M12: monitoring + defining precisely the way to use the data collected • M5-M12: Communication about NATALIE
FL#6	M6-M12: Meeting the various local stakeholders: • Federal structures (Life Biodiv'Est / Artisan) • Local authorities (Grand Est Region, cities (Metz, Strasbourg, Nancy, Reims) • Project leaders • Etc . M6-M12: Organising (and possibly staging) events to create synergies between local authorities/federal structures and project developers

<table>
<tr><td>Combined activities (DS#6 & FL#6)</td><td>M5-M12: meetings + define a plan for communication

M9-12: Define synergies between the CoP Vienne-Grand Est, the goals and outcomes of this community</td></tr>
<tr><td>CS#7</td><td>Coastal management with NBS in Iceland</td></tr>
<tr><td>DS#7</td><td>M5-M6: There was a change in the location of DS#7 from Norway to Iceland. The reasons for this change have been communicated to the EC project advisor and are chiefly due to the local partner in Norway (TFFK) dropping out of the project during the preparation of the Grant Agreement. These two months, there was an intense activity for upgrading the CS in Iceland (originally a Follower Case) to a Demonstration Site. A new local partner ASTUBRU has been sought and engaged as a partner in NATALIE, while MATIS took over as the leading partner for this CS. This action has now been completed.
M6-M12:
Further establishing the details in terms of computational needs for this CS, with the assistance of UNEXE
Organising the work and the cooperation between MATIS and UNEXE for collecting data and start modelling
Design and select NBS
Collecting data
WP2:
Preparation of the stakeholder short list
Organize stakeholder meetings
Maturity assessment
WP6:
Finance tools for implementing NBS – view options with WP6 admin
WP7:
Articles in local media</td></tr>
<tr><td>CS#8</td><td>Sustainable river restoration, maintenance and management in Italy</td></tr>
<tr><td>DS#8</td><td>The procedure for land acquisition is under definition, the procedure itself is foreseen to last approximately during the entire year 2024.

Next steps include:
the design of the intervention
the identification of parameters for modelling activities as well as the elaboration of a monitoring plan (which include an appropriate choice of indicators)
After the definition of field data collection and tests, acquisition of equipment (flowmeter and drone) will take place.</td></tr>
</table>

3.4 Initial monitoring plan

The monitoring plan will be carried out by the WP5 leader (KWR). At this stage, the plan is essentially generic and consists of some regular actions, but it also includes some periodic ones. It can be detailed or modified according to potential needs and/or risks that may occur for specific actions and/or on Case Studies request, which may need closer monitoring and attention, or even remedial actions. It will also be revised for the next version of this deliverable.

Table 5 : Initial monitoring of activities at the Case Studies.

Monitoring activity	Frequency	Action	Comments
Regular meetings for all the CS	Weekly	Regular reporting of CS activities/Guidance and coordination Monitoring of the action plan	Minutes kept online, updated all the time
Periodic longer meetings with each CS	Quarterly (starting after M4, when T5.2 starts)	WP5 leaders meet with each CS separately for longer discussions	Specific issues to be discussed and if necessary, reported back to the project Steering Group (SG)
Risk assessment	Every 6 months	Carried out by the WP5 leader (KWR) with information provided by the CS, and with supervision of the Project Coordinator (OiEau)	Reporting to the project Steering Group
Overall project KPI monitoring	Every 6 months	Carried out by each CS, with guidance from WP5 and WP1 (guidelines provided in D1.2)	Each CS reports to T1.2 and to the WP5 leader. Any issue is to be discussed within the project Steering Group
NBS KPI monitoring	Every 6 months	Carried out by each CS, with guidance from WP4	Each CS reports to T4.5 and to the WP5 leader

3.5 Activities related to WP2

As it has already been mentioned, a main task for the CS in this period was the compilation of the long list of stakeholders for each CS. For the fulfilment of this activity, the cooperation with WP2, and specifically task 2.1 (lead by UTH and WE&B), was necessary. This is due to the fact that any stakeholder mapping or engagement, or, indeed, any action that involves stakeholders in any way, needs to comply and be methodologically consistent with the wider NATALIE approach. The following actions have been undertaken:

1. Bilateral meetings of the WP2 team with all the CS to explain and instruct how to use the Stakeholder Mapping Guidelines.
2. All CS completed their long lists of stakeholders and uploaded them to the Teams folder for WP2 by February 2024.

A further activity that has started is the selection of the case studies where citizen engagement and monitoring of societal benefits of NBS through citizen science (Task 2.3) will take place. To initiate this, EARTHWATCH (EWE) completed the bilateral meetings with all CSs and reviewed the respective questionnaires. It has been decided that 4 sites will implement citizen science campaigns. The first 3 selected sites are: Tenerife (DS#4), Case Study 2 (combination of DS#2 and FL#2), Vienne River (DS#6). The selection of the 4th site is still pending.

3.6 Activities related to technical requirements and synergies (WP3/4)

The implementation of modelling and other technical activities for the CSs will take place within Task 5.2, which started in M4. The CSs will interact with WP3 for modelling and assessment tools and methodologies. Furthermore, the outcomes of the Case Studies will contribute to the NBS Knowledge Booster (WP4). To identify the interactions between WP3, WP4 and WP5, the modelling needs and the support that WP3 and WP4 can/need to give to the Case Studies to perform their modelling and assessment tasks, some preliminary and preparatory activities have already taken place. This was needed for another reason: the two technical

WPs (WP3 and WP4) had already started working since M1. Consequently, some discussions and interactions with the CS were needed for the progress of their own preliminary work.

Within this first period (M1-M6), a survey was sent to all DS and FL to collect the data, monitoring and modelling needs. The survey was completed by all the CS by February 2024. The template of the survey is included in this deliverable as **Annex 1** and the completed forms (minus the information presented in this deliverable section 2) are given in **Annex 2**.

3.7 Activities related to WP6

Activities in the case studies connecting to WP6 focussed on the Identification of the CS who will test one or several of the three investment bundle tools. Table 6 shows the results of the initial analysis conducted within WP6 and the tools that will be tested by which of the 13 sites. Please note that this table is subject to change during the course of the project.

Table 6: Case studies that will implement the Investment Bundle Tools in WP6.

	The Nature for Investment Launchramp	**The Natural Assurance Business Canvas**	**Sustainable Asset Valuation (SAVi)**
Demostration site #1 Lelantine Plain - Greece	X		X
Demostration site #2 Vacaresti Natural Park – Romania		X	
Follower site #2 Romania – Children's World Park		X	
Demostration site #3 Zemgale region - Latvia		X	
Follower site #3 Birzai district - Lithuania			
Demostration site #4 Canary Islands - Spain	X (Gran Canaria)	X (Tenerife)	X (Gran Canaria)
Follower site #4 Balearic Islands - Spain			
Demostration site #5 Blue Horizon Limburg - Belgium			
Demostration site #6 Vienne-River - France			
Follower site #6 Grand-Est – France	X		
Demostration site #7 Iceland	X		X
Demostration site #8 Venice - Italy			X

4 CONCLUSIONS

This document presents in detail the activities related to the organization, coordination, planning and monitoring of the activities related to the CS, which took place in the first six months of the NATALIE project. During this period, great emphasis had been given in getting to know the key people involved in each CS and in establishing a regular way to interact and communicate. As a result of these coordination/organisation actions, NATALIE achieved the following:

1. The contact lists of the persons for each CS within the project have been established and completed since M3.
2. Regular teleconferences for the WP5 have been organised (see Section 3.1 for details) since M3.
3. Good communication has been achieved among the key persons in all the CS and the key persons in the other WPs. They all came to be introduced to each other, they have contact details, and, most importantly, the CSs know "who is who" and "who is doing what" in the project. Thus, they know who to ask and who to contact in case of any issues or questions. This is a major positive outcome from the weekly meetings.
4. All the CS have organised their own internal meetings, hosted by the main partner leading each CS. These internal meetings take place regularly (mostly every week). Minutes and details about them will be reported in Task 5.1. In this document (Appendix 3), only the main points of CS meetings are reported every week, e.g. that if the meetings have taken place, or, whether there are any issues.
5. The long list of stakeholders was completed on time (M6), with the cooperation of WP2, so as to start the activities related to WP2 without any delays.
6. Technical partners from WP3 and WP4 are in regular contact with the CSs. A survey to identify data, monitoring and modelling needs and capacities/capabilities has been drafted, shared with the CS and has been completed by all of them. In this way NATALIE managed to establish regular communication between technical and CS partners. Technical issues and selections are discussed every week, dedicated workshops explaining scientific approaches are explained to the CS partners, who, in turn, can better communicate them to their own local partners and stakeholders.
7. There were differences among the CSs and the local partners, in terms of previous experience and readiness. Some partners had previous experiences from other EU projects, whereas others are participating in an EU project for the first time. With these regular meetings it was possible to smooth out the differences and assist/guide the less experienced partners in organising their activities within their own CS, without any CS lagging behind.
8. Each step for the implementation of the NATALIE approach and technical actions within the CS is being discussed and decided in a participatory way, with the participation of all within the project. This is important, because it is the foundation for building a "team spirit" in the project, which can lead to a better implementation of the activities at the CS level and, ultimately, to obtaining significative outputs for the project overall.

ANNEXES

ANNEX 1: Survey used to collect data and modelling information from case studies

Demonstration Site #	Leading partner: Leading person:
Title	
Linked Follower	
Biogeographical region	
Type	
Area:	
Map image/Photo	*Include the location on a map, and a photo (if relevant)*
Goals/challenges	*Which are the goals of your case study?*
Project partners involved	
Description	*Please provide a detailed description (around 1-1.5 page). Refer to the situation, the challenges, the interest and an outline of the proposed activities during the project.*
Hazards and type(s) of NBS planned/relevant	
Hazards	*Which are the hazards of interest in your case study? Which ones constitute major concerns, and which are considered secondary hazards? (Flooding, Droughts, Water Pollution, Coastal erosion, Sea Level Rise, Landslides, Erosion, Heatwaves, Wildfires, Biodiversity Loss, Environmental Pollution, Other... please explain)*
Compound hazard events	*Are you also interested in or planning to consider Compound hazard events due to concurrent or contiguous hazards? If yes, what hazard combinations do you plan to model in your case study?*
Types of NBS	
DATA and monitoring needs	
Physical data/need	*What physical data (Terrain data, assets, networks, geological data, land use, characterization of water…) do you need for your site?*
Physical data/availability	*What physical data (Terrain data, assets, networks, geological data, land use…) are available for your site?*
Calibration	*Are you going to develop models? If yes, do you have necessary information regarding historical events and climate data to calibrate your models?*
Historical/Scaling	*Do you feel that historical event data are sufficient to calibrate your models in view of future events? Do you feel that additional scaling or modelling will be required to better understand future extreme event return times and magnitudes?*
Climate variables	*Regarding the future climate scenarios and your goals, what are the climate variables to be downscaled for your CS? What is the required spatial and temporal resolution?*

Downscaling climate scenarios	*Do you have climate downscaled variables based or the possibility of access them provided by any regional or national stakeholder? If yes, on which IPCC (Intergovernmental Panel on Climate Change) report are they based: the 6th assessment (AR6) or fifth assessment Report (AR5)?*
Measurements	*What measurements do you expect will be needed from the NBS site during the project for monitoring?*
Additional Equipment	*Do you think that the installation of additional special equipment (i.e. sensors) will be necessary to obtain data for model calibration and NBS performance evaluation?*
Modelling needs in relation to the NBS at the Demonstration/Follower Site	
Technical bio-physical mathematical modelling	
Hazards	*What are the hazard aspects that you would like to model for your case study? (Floods, Droughts, Groundwater, Coastal Erosion, Sea Level Rise, Landslides, Erosion, Microclimate, Wildfire Risk)*
Tools	*Have you thought of or selected specific tools and methodologies to be employed in your case study for modelling these aspects?*
Background	*What is your expertise/background regarding hazard modelling within the group of local partners supporting your CS? (Floods, Droughts, Groundwater, Coastal Erosion, Sea Level Rise, Landslides, Erosion, Microclimate, Wildfire Risk, Water Quality)*
Compound hazard events	*What is your expertise/background regarding compound risk modelling and evaluation/assessment?*
History/References	*Please list/describe methodologies and modelling tools used in your previous experience/applications. Have you used any of the tools and methodologies to assess the performance of NBS in previous applications? (Please include the relevant references)*
Environmental modelling	
Aspects	*What are the environmental aspects that you would like to model for your case study? (Biodiversity (Ecosystems), Water quality)*
Tools	*Have you thought of or selected specific tools and methodologies to be employed in your case study for modelling these aspects?*
Background	*What is your expertise/background regarding environmental modelling within the group of local partners supporting your CS? (Biodiversity (Ecosystems), Water quality)?*
History/References	*Please list/describe methodologies and modelling tools used in your previous experience. Have you used any of the tools and methodologies to assess the performance of NBS in previous applications? (Please include the relevant references)*
Socio-economic modelling	
Tools	*Have you thought of or selected specific tools and methodologies to be employed in your case study for modelling socioeconomic aspects that are relevant to your case study?*
Background	*What is your expertise/background regarding socioeconomic modelling within the group of local partners supporting your CS?*
History/References	*Please list/describe any socioeconomic modelling tools or methodologies used in your previous experience. (Please include the relevant references)*
Capacity Expertise	
Project partners	*Have you detected any kind of gap or need that could be covered by other partners within NATALIE consortium?*

New researchers	*If your current expertise/capacity is not enough, are you planning to hire new researchers/experts?*
Outsourcing	*Are you planning to outsource (e.g. by subcontracting or paying for services) any modelling tasks?*
Other issues about data/modelling	
Other needs /gaps	*Is there any comment, observation, doubts you would like to express related to data, modelling, hardware and software tools, which has not been covered with the previous questions?*
Ambition	
Ambition during the project	*What are your expectations about the NATALIE NBS solutions proposed at the end of the project?*
Ambition after the project	*What are your expectations about the NATALIE NBS solutions proposed after the end of the project? Any lasting impacts?*
Upscaling potential	*Could the NBS solutions/approaches be transferred to other sites/regions, or could they be implemented at a larger scale?*
Potential barriers	*Barriers could refer to technology, governance, funding, legislation, social acceptance…. Please list them and explain.*
Stakeholders	
Initial list	*Have you identified (some) relevant stakeholders? Please include a preliminary list (to be refined later in WP2)*

ANNEX 2: Survey Results

This annex provides the results of the survey concerning modelling and data needs in the CSs. The general information concerning the case studies that is represented in chapter 2 of this deliverable has been omitted for reasons on conciseness.

Demonstration Site #1	Leading partner: WWFGreece Leading person: Giannis Alexiou, Thanos Giannakakis
Title	Lelantine Plain, Evia island, Greece
Hazards and type(s) of NBS planned/relevant	
Hazards	Major concerns: flooding, wildfires Secondary hazards: biodiversity loss
Compound hazard events	Flood risk is exacerbated by fire risk, through forest loss and soil erosion caused by wildfires. Actions to reduce fire risk could also benefit flood control.
Types of NBS	Actions for flood control: a minimum of 50 traditional stone-built check dams will be constructed in an ephemeral tributary of Lilas river Actions for fire control: prescribed burning, fire risk management plan
DATA and monitoring needs	
Physical data/need	Flood control: Elevation, slope, geological data, land use, hydrological data, meteorological data, groundwater level data, biodiversity indicators, protected area boundaries. Fire control: vegetation maps, fuel management maps, elevation, slope, biodiversity indicators, historical fire data, anti-fire zones, roads, administration data (municipality boundaries), meteorological data, protected area boundaries, electricity network, fire suppression facilities
Physical data/availability	Elevation, slope, hydrological study for Lilas, meteorological data, land use, protected area boundaries, historical fire data, anti-fire zones, roads, administration data (municipality boundaries)
Calibration	We plan to develop a hydrological model for the tributary where the check dams will be constructed. Currently, we do not have the information regarding historical events and climate data to calibrate the models.
Historical/Scaling	Historical data are required in terms of at least 30 years' time-series with a monthly frequency, concerning on rainfall and temperature. Focused on specific rainfall and flooding events, the analytical data of the specific phenomena are needed so that to have the hydrological regime of a) Rainfall Height, b) Rainfall Intension (hydrograph records every 15 min) and c) Runoff Values in critical sections of the case study torrents, so that to assess every specific extreme phenomenon. Concerning a) and b), there is scarcity of these kind of data, and we are based on the contribution of the National Meteorological Association of Greece (EMY – Ethniki Meteorologiki Ypiresia). Concerning on c), there is completely lack of these data, so it could be proposed the Systematic Sampling Monitoring of these values (once every week) and/or the Installation Settlement of a permanent Telemetric Hydrometric Station (Level, Velocity, Recharge)
Climate variables	Temperature and precipitation variables to be downscaled on regional spatial resolution and on daily temporal resolution.
Downscaling climate scenarios	No

Measurements	<u>Flood control</u> • Rainfall heights daily • Temperature values daily • Rainfall Heights for every rainfall incident (from the beginning to the end) • Rainfall Intensity for every rainfall incident (every 15 min, from the beginning to the end) • Recharge values on a weekly basis • Recharge values for every rainfall incident (every 15 min, from the beginning to the end, so that we could have the chance to a) calibrate our models and b) to calculate *in situ* the time of concentration – time from the peak of rainfall to the peak of recharge in critical points <u>Biodiversity</u> • Herpetofauna • Invertebrates • Vegetation • Habitats <u>Fire control</u> • Flora species rehabilitation • Biodiversity changes • Tree mortality • Soil erosion • Grazing effect
Additional Equipment	Flood control: sensors will be needed in terms of measuring river water flow and groundwater level Fire control: telescopic measuring rod, cameras, staff for measurements
Modelling needs for the NBS at the Demonstration Site	
Technical bio-physical mathematical modelling	
Hazards	Flood risk, wildfire risk
Tools	No, not yet.
Background	Hydrology & wildfires: experts from the teams of our local partners Geological data: an external geologist will support our team
Compound hazard events	The base data that underpins assessment of floodplain risk typically comprises the flow characteristics (the flow depth and velocity) in the flood-affected areas of Lilas river basin. Flood hazard could be estimated in this study using the DV criterion (DV = Depth * Velocity), which incorporates people, vehicle and structural (building) stability criteria in the resistance/resilience of the above categories on floods.
History/References	A combined hydrological and hydraulic–hydrodynamic modelling approach is applied for flood inundation modelling and mapping at Lilas ungauged watershed. Rainfall data of meteorological stations in the wider area at specific time intervals, are used to represent the spatiotemporal rainfall distribution of the areal rainfall at sub-watershed level. References: [1], [2], [3], [4].

Environmental modelling	
Aspects	No modelling
Tools	No modelling
Background	Environmental Monitoring Data, could support Assessment and Modelling of Water Quality and Ecosystems with Spatial and Temporal Models such as Stochastic Models, Artificial Neural networks, Deep Neural Network, with the scope of the Sustainable Management of Water Resources and the Environment.
History/References	Sentas A., Psilovikos A. & Psilovikos T., 2016. Statistical Analysis and Assessment of Water Quality Parameters in Pagoneri, River Nestos. European Water, Vol 55, pp. 115 – 124. Charizopoulos N., Zaggana E. & Psilovikos A., 2018. Assessment of natural and anthropogenic impacts in groundwater, utilizing multivariate statistical analysis and inverse distance weighted interpolation modeling: The case of a Scopia basin (Central Greece). Environmental Earth Sciences, Vol 77, No 380, doi.org/10.1007/s12665-018-7564-6. Sentas A., Psilovikos A., Karamoutsou L. & Charizopoulos N., 2018. Monitoring, Modeling and Assessment of Water Quality and Quantity in River Pinios, using ARIMA Models. Desalination and Water Treatment, Vol 133, pp 336 – 347. Elhag M., Gitas I., Othman A., Bahrawi J., Psilovikos A. & Al-Amri N., 2020. Time series analysis of remotely sensed water quality parameters in arid environments, Saudi Arabia. Environment Development and Sustainability, DOI: 10.1007/s10668-020-00626-z. Karamoutsou L. & Psilovikos A., 2020. Modeling of Dissolved Oxygen concentration using a Deep Neural Network approach in Lake Kastoria, Greece. European Water, Vol 71/72, pp. 3 – 14. Karamoutsou L. & Psilovikos A., 2021. Deep Learning in Water Resources Management: The Case Study of Kastoria Lake in Greece. Water 2021, 13, 3364, 16p., https://doi.org/10.3390/w13233364.
Socio-economic modelling	
Tools	No modelling
Background	No modelling
History/References	No modelling
Capacity Expertise	
Project partners	No
New researchers	External experts on hydrogeology and biodiversity
Outsourcing	No
Other issues about data/modelling	
Other needs /gaps	No

<table>
<tr><th>Demonstration Site #2</th><th>Leading partner: VNPA
Leading person : Dan Barbulescu</th></tr>
<tr><td>Title</td><td>Vacaresti Nature Park (VNP)–Bucharest, Romania - Urban regeneration based on nature-based solutions and sustainability</td></tr>
<tr><td colspan="2">Hazards and type(s) of NBS planned/relevant</td></tr>
<tr><td>Hazards</td><td>Major:
• Biodiversity Loss (also FL#2)
• Flooding (also FL#2)
• Droughts
• Heatwaves

Secondary:
• Wildfires
• Socio Economic: a decrease of the quality of life</td></tr>
<tr><td>Compound hazard events</td><td>Floods also cause deterioration of water quality.</td></tr>
<tr><td>Types of NBS</td><td>• Sustainable Drainage Systems (SUDS)
• Flood prone park
• Catching, retaining, and harvesting rainfall.
• Green-blue corridor</td></tr>
<tr><td colspan="2">DATA and monitoring needs</td></tr>
<tr><td>Physical data/need</td><td>• General data (position coordinates, description, history, etc.)
• Data to perform site(s) characterization
  ○ Technical drawings (DWG) of service infrastructure:
    ▪ Storm and sewer drainage network,
    ▪ Water distribution network,
    ▪ Utility lines (gas, electrical, telecommunications)</td></tr>
</table>

	- Land surface and physical attribute maps; georefenced versions of:
	  - Topographical map with elevations encompassing the entire VNCP and surroundings (include CWP),
	  - Surface type maps: buildings, roads, pathways, planted, open water,
	  - Surface infrastructure: streetlights, utility boxes, parking meters, benches, bike racks, tables, stairs,
	  - Critical landscape features: trees, vegetation, other (eg., fountains),
	  - Definition of focus areas for water management in the park,
	  - Planned landscape interventions,
	  - Flow maps from within the VNP.
	- Additional information when available:
	  - Land registry indicating ownership of parcels in the area,
	  - Aerial photographs,
	  - Images of water bodies at different times of year,
	  - Maps of structures and any existing site development plans,
	  - Existing water storage facilities on or near site,
	  - Groundwater protection zones,
	
	The above information allows us to perform a site characterization to understand levels and flows of surface water and any superficial hydraulic relationship between the four different proposed area of intervention, including potential infrastructure connections to be leveraged.
	
	- Data to analyse for aquifer recharge
	  - Geological / Geohydrological data
	    - Local groundwater users
	    - Geological models / maps
	    - Previous groundwater models applied.
	  - Legislation / permitting.
	    - Water quality requirements for infiltration
	    - Infiltration / extraction permits for Management Aquifer Recharge (MAR).
	
	- Data to understand user needs.
	  - Water demand - specific target for additional water volumes to be provided to the park (as a volume per time)
	  - Any data related to water quality requirements for endangered ecology/organisms (with priority parameters).
	  - Water chemistry data - where available
	    - Groundwater
	    - Deeper groundwater (in the case that of multiple aquifer units)
	    - Surface water quality within VNP

	The above data will form the starting point for our Program of Demand for the design of possible interventions. The following section describes interventions which we believe to currently be in line with your plans for the park.
Physical data/availability	Inventory of available data not yet completed at the time of submission D5.1 (February 2024).
Calibration	No experience or data type or availability ref. developing models within the Romanian project partners.
Historical/Scaling	Historical data needed to calibrate models and determine better understanding of the future events
Climate variables	Precipitation and heatwaves.
Downscaling climate scenarios	Romania's Climate Adaptation Strategy is considering RCP 4.5 or RCP 8.5. Data is available up to NUTS3 level. Further research is needed to identify availability of data for the CS level
Measurements	• Water level • Biodiversity
Additional Equipment	Sensors for the measurement the water level (and water quality) in different sites (the 2 NBSs in VNP are positioned in different specific locations) in the Vacaresti Park, as well as possible (not known yet if exists) equipment for monitoring biodiversity.
Modelling needs for the NBS at the Demonstration Site	
Technical bio-physical mathematical modelling	
Hazards	Flood risk, drought, wildfire risk
Tools	No, not yet.
Background	No expertise available within project team for hazard modelling. Further research is needed for identification of capabilities and experience of different stakeholders.
Compound hazard events	No expertise available within project team for hazard modelling. Further research is needed for identification of capabilities and experience of different stakeholders.
History/References	Biodiversity monitoring through direct observation.
Environmental modelling	
Aspects	1. Biodiversity (evolution of both number of species and number of individuals using the site of the NBS) 2. Water quality improvement (turbidity, nutrients) 3. Ecosystem services and benefits (integration of several tools or methodologies).
Tools	No specific tools or methodologies identified at this stage.
Background	The CS2 project team has no or little experience in modelling.
History/References	There is no previous experience with applications of NBS in DS#2.

Socio-economic modelling	
Tools	Socio-economic aspects of potential interest in the local context are connected with substantiating the sustainability of the applied solution on long term as well as scaling-up as adaptation instrument(s) in urban contexts: 1. Life cycle assessment and cost-benefit analysis. 2. Identification, evaluation and monitoring of co-benefits: changes in life quality (community well-being, local cultural values and benefits, employment indicators, community health, property values, etc.) 3. Potential for integration with city and national climate adaptation strategies
Background	The DS#2 team has no specific expertise in this socio-economic field.
History/References	No previous socioeconomic modelling experience.
Capacity Expertise	
Project partners	Gaps identified: 1. WP3 Modelling –no expertise and capacity in DS#2. 2. WP4 Knowledge HUB –limited experience. 3. WP5 -Design and implementation the NBSs.
New researchers	Yes
Outsourcing	Some resources for subcontracting expertise are allocated to DS#2 further planning of spending will be done in accordance with needs identified to ensure project objectives are achieved.
Other issues about data/modelling	
Other needs /gaps	No

Follower Site 2	**Leading partner: MS4** **Leading person : Andrei Tanase**
Title	Children`s World Park (CWP)
Hazards and type(s) of NBS planned/relevant	
Hazards	Major: • Loss of biodiversity (declining trend for quality and quantity of amphibians and their habitat) • Flooding, • Droughts, • Heatwaves. Other: • A low level of awareness about climate change for the park's community
Compound hazard events	Considering that we are talking about an urban park, surrounded by roads and blocks of flats, risks related to climate and climate change are added to inherent risks related to the presence of the city: air pollution, acid rain, soil sealing, noise, non-viable species.

<table>
<tr><td>Types of NBS</td><td>Sustainable Drainage Systems (SUDS)
Flood prone park
Catching, retaining and harvesting rainfall.
Green-blue corridor</td></tr>
<tr><td colspan="2">DATA and monitoring needs</td></tr>
<tr><td>Physical data/need</td><td>General data (position coordinates, description, history, etc.)
Data to perform site(s) characterization
Technical drawings (DWG) of service infrastructure:
Storm and sewer drainage network,
Water distribution network,
Utility lines (gas, electrical, telecommunications)
Land surface and physical attribute maps; georefenced versions of:
Topographical map with elevations encompassing the entire VNCP and surroundings (include CWP),
Surface type maps: buildings, roads, pathways, planted, open water,
Surface infrastructure: streetlights, utility boxes, parking meters, benches, bike racks, tables, stairs,
Critical landscape features: trees, vegetation, other (eg., fountains),
Definition of focus areas for water management in the park,
Planned landscape interventions,
Flow maps from within the VNP.
Additional information when available:
Land registry indicating ownership of parcels in the area,
Aerial photographs,
Images of water bodies at different times of year,
Maps of structures and any existing site development plans,
Existing water storage facilities on or near site,
Groundwater protection zones,
The above information allows us to perform a site characterization to understand levels and flows of surface water and any superficial hydraulic relationship between the four different proposed area of intervention, including potential infrastructure connections to be leveraged.
Data to analyse for aquifer recharge
Geological / Geohydrological data
Local groundwater users
Geological models / maps
Previous groundwater models applied.
Legislation / permitting.
Water quality requirements for infiltration</td></tr>
</table>

	▪ Infiltration / extraction permits for Management Aquifer Recharge (MAR). • Data to understand user needs. ○ Water demand - specific target for additional water volumes to be provided to the park (as a volume per time) ○ Any data related to water quality requirements for endangered ecology/organisms (with priority parameters). ○ Water chemistry data - where available ▪ Groundwater ▪ Deeper groundwater (in the case that of multiple aquifer units) ▪ Surface water quality within VNP The above data will form the starting point for our Program of Demand for the design of possible interventions. The following section describes interventions which we believe to currently be in line with your plans for the park.
Physical data/availability	Inventory of available data not yet completed at the time of submission D5.1 (February 2024).
Calibration	No experience or data type or availability ref. developing models within the Romanian project partners.
Historical/Scaling	Historical data needed to calibrate models and determine better understanding of the future events
Climate variables	Precipitation and heatwaves.
Downscaling climate scenarios	N/A (further research needed in conjunction with DS#2)
Measurements	• Water level • Biodiversity
Additional Equipment	See DS#2.
Modelling needs for the NBS at the Demonstration Site	
Technical bio-physical mathematical modelling	
Hazards	• Floods, (on the basis of DS#2 data) • Droughts, (on the basis of DS#2 data) • Heatwaves
Tools	No tools and methodologies known at this level.
Background	The local project partners have no expertise in the hazard modelling. It is a very limited expertise at the Bucharest level. We rely on the experience of the demonstrator (DS#2) to apply the best data and monitoring models to FL#2.
Compound hazard events	N/A
History/References	Direct observation (biodiversity monitoring).

Environmental modelling	
Aspects	• Biodiversity (evolution of both number of species and number of individuals using the site of the NBS) • Water quality improvement (i.e. turbidity, nutrients) • Ecosystem services (in general, integration of several tools or methodologies)
Tools	No tools or methodologies known at this level.
Background	N/A
History/References	No experience.
Socio-economic modelling	
Tools	• Changes in life quality (community well-being, local cultural values and benefits, employment indicators, community health, property values, etc.) • Cost- benefit analysis including maintenance. • Integration with environmental and other sectors, using specific economic modelling software, potential scalling-up?)
Background	No expertise in this field, relying on the experience tested and developed in DS#2.
History/References	No experience.
Capacity Expertise	
Project partners	Gaps identified: • WP3 Modelling –no expertise and capacity in DS#2. • WP4 Knowledge HUB –limited experience. • WP5 -Design and implementation the NBSs.
New researchers	Yes
Outsourcing	This will depend on the DS#2 activity, coordination with DS#2
Other issues about data/modelling	
Other needs /gaps	Not yet determined.

Demonstration Site 3	**Leading partner: BEF** **Leading persons: Ingrida Bremere, Daina Indriksone**
Title	Zemgale region (Latvia)
Hazards and type(s) of NBS planned/relevant	
Hazards	Main hazards: water pollution with nutrients causing eutrophication. Secondary hazards: flooding, local droughts, biodiversity loss
Compound hazard events	The key compound risk for the CS is related to water pollution in the recipient water bodies, which can be increased by nutrient runoffs particularly during flooding events.
Types of NBS	The major concern, which will be addressed by implementation of constructed wetlands, is **water pollution** mainly in terms on nitrogen, phosphorus,

	suspended solids, and organic substances. In case of implementation of constructed wetlands for treatment of municipal wastewater from small settlements and storm water and/or processing wastewater from livestock facilities either surface or subsurface flow constructed wetland will be selected, depending on the quality of effluent and local circumstances including presence and performance of the existing wastewater treatment system and plant, availability of the area for construction, topography etc. In case of implementation of constructed wetlands for treatment of runoff from agricultural areas only a surface flow constructed wetland can be considered.
DATA and monitoring needs	
Physical data/need	The following data are required for the activities planned in this case study as relevant for implementation of constructed wetlands for treatment of **municipal wastewater from small settlements**: • the geospatial data on location of municipal wastewater treatment plants (WWTP) in small settlements, • the technical information on the existing WWTP including the year of construction/renovation, type and setup of WWTP, number of inhabitants connected to the centralized wastewater system and WWTP, presence and connection of industrial facilities to the centralized wastewater system and WWTP, availability of the area for installation of constructed wetland, • the results of water quality monitoring at influent and effluent of municipal WWTP including the national database "2-Water" for initial evaluation of performance of the existing WWTP and additional water sampling carried out as part of the project for assurance after the initial evaluation. The following data are required for the activities planned in this case study as relevant for implementation of constructed wetlands for treatment of storm water and/or processing **wastewater from livestock facilities**: • the geospatial data on location of livestock facilities and number of livestock, • the technical information on the existing storm water and processing water collection systems, type and setup of the existing WWTP if present and available, availability of the area for installation of constructed wetland, • the results of water quality monitoring at influent and effluent of the WWTP including for the initial evaluation the data collected by the facility and/or controlling institutions if present and available and additional water sampling carried out as part of the project for assurance after the initial evaluation. The following data are required for the activities planned in this case study as relevant for implementation of constructed wetlands for treatment of **runoff from agricultural areas**: • the geospatial data on hydrological network including agricultural ditches and small streams (location, length and catchment area), land

	use with emphasis on the share of agricultural areas in the catchment of agricultural ditches or small streams of interest, • the results of water quality monitoring where water sampling will be carried out in agricultural ditches or small streams of interest as part of the project to identify potential locations for implementation of constructed wetlands and to evaluate the performance of the existing constructed wetlands, • digital elevation model to identify potential locations for implementation of constructed wetlands with emphasis on identification of naturally low-laying areas, which are not suitable for agricultural or forestry activities.
Physical data/availability	The following data are available for the activities planned in this case study as relevant for implementation of constructed wetlands for treatment of **municipal wastewater from small settlements**: • the geospatial data on location of municipal wastewater treatment plants (WWTP) in small settlements. The following data are available for the activities planned in this case study as relevant for implementation of constructed wetlands for treatment of storm water and/or processing **wastewater from livestock facilities**: • the geospatial data on location of livestock facilities and number of livestock. The following data are available for the activities planned in this case study as relevant for implementation of constructed wetlands for treatment of **runoff from agricultural areas:** • the geospatial data on hydrological network including agricultural ditches and small streams (location, length and catchment area), land use with emphasis on the share of agricultural areas in the catchment of agricultural ditches or small streams of interest, • digital elevation model with spatial resolution of 2 x 2 m and 20 x 20 m to identify potential locations for implementation of constructed wetlands with emphasis on identification of naturally low-laying areas, which are not suitable for agricultural or forestry activities.
Calibration	We are interested to use the modelling tools developed in WP3 for NBS performance assessment. The following questions have arisen at this stage of the project: • is it meant to simulate physical, chemical and biological processes taking place in constructed wetlands, for example, sedimentation, nitrification, denitrification, ammonification, adsorption, plant uptake etc.? • is it meant to simulate changes in the amount and/or quality of water discharged in constructed wetlands as driven by natural (changes in precipitation and air temperature patterns) and anthropogenic factors (more inhabitants connected to WWTPs, more livestock grown in

	facilities, intensification of agricultural production) to evaluate the performance of constructed wetlands under different scenarios? It is of note that currently LBTU has carried out monitoring activities to evaluate the performance of two constructed wetlands, where water samples have been collected monthly before and after two constructed wetlands representing the period from 2014 until 2023. Overall, the availability of existing monitoring data is rather limited to perform complex modelling tasks, however, potential remains if relevant approaches, tools, and methodologies are identified. Also, the historic climate data is available from the meteorological station located in the city nearby.
Historical/Scaling	The historic climate data are available from the meteorological stations located in the region. Additional modelling in cooperation with WP3 and WP4 will be required to better understand extreme event occurrence.
Climate variables	The need for downscaling the climate variables will be clarified during further steps of project implementation.
Downscaling climate scenarios	The State Limited Liability Company "Latvian Environment, Geology and Meteorology Centre" has developed the "Climate Change Analysis Tool" (https://www4.meteo.lv/klimatariks/en/). In this tool the historic data and projections for the future (2011-2040, 2041-2070, and 2071-2100) on air temperature, atmospheric precipitation, wind speed and snow cover is available on annual basis. There is a need to clarify with the agency would it be possible to access the projected data also on more detail time scale such as monthly or daily. In the tool two climate change scenarios of AR5 have been applied (RCP4.5 and RCP8.5) to project the climate variables.
Measurements	It is expected that water samples will be collected at the following sites and for the following reasons: • influent and/or effluent from livestock facilities (storm water and/or processing water systems) and municipal WWTPs to identify the current status before design and installation of constructed wetlands and after installation of constructed wetlands to evaluate the performance in reduction of concentration of nitrate-nitrogen, ammonium-nitrogen, total nitrogen, orthophosphate-phosphorus, total phosphorus, biochemical oxygen demand, chemical oxygen demand and suspended solids, • before and after already existing constructed wetlands established to treat runoff from agricultural areas to evaluate their performance in reduction of concentrations of nutrients and suspended solids. Water samples will be analysed for concentrations of nitrate-nitrogen, ammonium-nitrogen, total nitrogen, orthophosphate-phosphorus, total phosphorus in an accredited laboratory, while biochemical oxygen demand, chemical oxygen demand and suspended solids in the laboratory of LBTU.
Additional Equipment	A very wide range of factors can influence the performance of the wetlands, and all can be monitored for model calibration and performance evaluation. The basic parameters required are water quality, temperature, nitrate and phosphate, groundwater level and flow. For more detailed data, additional weather data (rainfall, temperature, humidity, wind speed), sediment data, and biomass (the growth of vegetation within the wetland) can be added.

	At this stage of the project development, no decision on equipment to be installed has been made.
Modelling needs for the NBS at the Demonstration Site	
Technical bio-physical mathematical modelling	
Hazards	The relevant hazards for the constructed wetlands are floods, local droughts. As an initial step a prioritisation for modelling activities needs to be made, focussing on e.g.: • simulation of physical, chemical and biological processes taking place in constructed wetlands, for example, sedimentation, nitrification, denitrification, ammonification, adsorption, plant uptake etc. • simulation of changes in the amount and/or quality of water discharged in constructed wetlands as driven by natural (changes in precipitation and air temperature patterns) and anthropogenic factors (more inhabitants connected to WWTPs, more livestock grown in facilities, intensification of agricultural production) to evaluate the performance of constructed wetlands under different scenarios.
Tools	Modelling tools have not been specified.
Background	There is very limited expertise and experience in hazard modelling among the group of local partners supporting our CS, especially in the case of implementation constructed wetlands.
Compound hazard events	No experience present.
History/References	The performance of constructed wetlands has not yet been modelled.
Environmental modelling	
Aspects	At this stage of project implementation, we are evaluating the possibilities to perform modelling tasks.
Tools	Not yet considered.
Background	In several previous studies hydro chemical modelling at the scale of small to medium size rivers have been carried out by the LBTU team using the FyrisNP and HYPE models [5],[6]
History/References	The performance of constructed wetlands has been assessed in the following according to methods in [7], [8], [9].
Socio-economic modelling	
Tools	Unfolding the potential of constructed wetlands on a regional scale will be linked to the decision making and acceptance from local population. Multi Criteria Decision Analysis (MCDA) techniques and the Analytic Hierarchy Process (AHP), including the pairwise comparison approach would be selected tools.
Background	BEF team has implemented an Analytic Hierarchy Process (AHP) approach to evaluate and prioritize the cross-sectoral interlinkages in WEFE Nexus context for Lielupe River Basin (within the EU project NEXOGENESIS).

History/References	NEXOGENESIS: An assessment of critical cross-sectoral interlinkages was linked to the mature development stage of the Conceptual model to reflect the full set of interdependencies. Stakeholders in Lielupe CS in both, Latvia and Lithuania sub-basins were invited to express their opinion on relative importance (important, moderate, low) of Nexus interlinkages by filling the template questionnaire. An attempt has been taken to use the Analytical Hierarchy Process (AHP) methodology for evaluation of interlinkages and applying the pair-wise comparison to indicate the most critical cross-sectoral interlinkages (Project Deliverable Milestone 15: Intermediate report on case study implementation and co-creation activities, February 2023).
Capacity Expertise	
Project partners	We see the capacity gap in development of modelling tools. To implement the modelling tasks, we rely on collaboration with NATALIE consortium modellers.
New researchers	When the modelling tasks for the DS are clarified, additional researchers with relevant competences and experiences might be hired by LBTU.
Outsourcing	No, we are not planning to outsource any modelling tasks.
Other issues about data/modelling	
Other needs /gaps	We will evaluate the overall possibilities to perform modelling tasks in collaboration with the project partners. We point out that we need some capacity building on modelling.

Follower Site 3	Leading partners: BEF, BIRZAI Leading persons: Ingrida Bremere, Daina Indriksone, Renata Graziniene
Title	Biržai district (Lithuania)
Hazards and type(s) of NBS planned/relevant	
Hazards	The hazards of interest in our case study are: • Major FL#3 concern is Water pollution, because it is one of Biodiversity Loss reasons (species are threatened with extinction). • Secondary hazards are floodings – because in the event of abnormally high rainfall or disasters (such as dam collapses) and the resulting rise in groundwater, sewage and pollutants enter water bodies.
Compound hazard events	In our case study, we have not envisaged modelling of the combination of hazards, but if financially feasible, we would be interested to assess the combination and linkages between threats to water pollution and biodiversity.
Types of NBS	Constructed wetlands – main interest is on small villages, also those ones that do not have WWT, or with very old WWTP, but perhaps also a farm (to be determined based on interest from Stakeholders).

<table>
<tr><th colspan="2">DATA and monitoring needs</th></tr>
<tr><td>Physical data/need</td><td>The following data are required for the activities for feasibility evaluation on application of constructed wetlands for treatment of municipal wastewater from small settlements:
the geospatial data on location of municipal wastewater treatment plants (WWTP) in small settlements,
the technical information on the existing WWTP including the year of construction/renovation, type and setup of WWTP, number of inhabitants connected to the centralized wastewater system and WWTP, presence and connection of industrial facilities to the centralized wastewater system and WWTP, availability of the area for installation of constructed wetland,
the results of water quality monitoring at influent and effluent of municipal WWTP including the national database for initial evaluation of performance of the existing WWTP and additional water sampling carried out as part of the project for assurance after the initial evaluation.</td></tr>
<tr><td>Physical data/availability</td><td>In Lithuania (FL#3) there is a digital map with different terrain data, assets, networks, geological data, land use etc. layers. https://regia.lt/ , but there is no characterization of water layer.

The company "Waters of Biržai" in Biržai district performs monitoring of the water entering and leaving the treatment plants - certain chemical and biological elements in each treatment plant are tested at a set frequency (depending on the amount of leakage). CHDSCr, permanganate oxidation, DHS7, pH, persistent substance, ammonium nitrogen, nitrite nitrogen, nitrate nitrogen, Kjeldahl nitrogen, total nitrogen, phosphate phosphorus, total phosphorus are regularly measured. The monitoring reports are published in the company’s website.</td></tr>
<tr><td>Calibration</td><td>We are now looking at what historical information and climate data are needed to carry out the modelling, whether this data is available to us.</td></tr>
<tr><td>Historical/Scaling</td><td>Not at this stage of project implementation.</td></tr>
<tr><td>Climate variables</td><td>The need for downscaling the climate variables will be clarified during further steps of project implementation.</td></tr>
<tr><td>Downscaling climate scenarios</td><td>Birzai municipality has proven a "Renewable resources of Biržai district municipality 2021-2030 energy use development action plan" https://www.birzai.lt/doclib/s4upurxwarrtt7x5vms9ru8n593w31mn

Other data collected:

According to the legal acts regulating environmental monitoring of the Republic of Lithuania, environmental monitoring of the municipality of Biržai district is carried out in order to obtain detailed information about the state of the natural environment of the municipal territory, to plan and implement local environmental protection measures that would ensure the appropriate quality of the natural environment. The purpose of monitoring is to manage the quality of the environment in the territory of the Municipality, so that detailed</td></tr>
</table>

	information on the state of the natural environment of the Municipality territory can be obtained after the observations. Aplinkos stebėsena | Biržų rajono savivaldybė (birzai.lt)
Measurements	• Basic climate data in the region, • Amount of water purified using NBS (in DS), • Water quality in constructed wetlands (improvement) (in DS), • Project data - whether the objectives of the project have been achieved.
Additional Equipment	Very wide range of factors can influence the performance of the wetland and all they can be monitored for model calibration and performance evaluation. Basic and necessary are Water Quality Sensors, Temperature Sensors, Nitrate and Phosphate Sensors, Groundwater Level Sensors, Flow Sensors (Flowmeters). For more detailed data there can be used Weather Stations (monitor rainfall, temperature, humidity, wind speed), Sediment Sensors, Biomass Sensors (measure the growth of vegetation within the wetland) as well. If there would be sensors - regular calibration and maintenance of these sensors has to be planned too. For working with data - Data Loggers and Communication Systems, GIS Software should be planned.
Modelling needs for the NBS at the Follower	
Technical bio-physical mathematical modelling	
Hazards	Water pollution and flooding are actual hazards FL#3 would prefer to simulate.
Tools	Not yet selected.
Background	Biržai regional park has experience in erosion monitoring and formation of sinkholes prognosis (modelling). Specialists of the Aukštaitija Protected Areas Directorate carry out: • monitoring of the landscape and its components (photo fixations of valuable panoramas, descriptions). • local monitoring of karst processes (sinkholes), the results of which are transferred to the Lithuanian Geological Service under the Ministry of the Environment for collection and analysis. • Inventory of natural habitats of European Community importance (wetlands, forests, water, meadows, etc.). After carrying out inventory repetitions and collecting enough data, inventory data analysis, threat assessment, forecast modelling are planned.
Compound hazard events	No experience.
History/References	Methodologies and modelling tools used in Biržai regional park has experience in erosion modelling. Information requested about the methods used.
Environmental modelling	
Aspects	Water quality: FL#3 could model the installation of a different scale (according to needs) of wetlands (analogue of DS#3) for the FL#3 territory.

Tools	Considering that FL#3 will seek to transfer DS experience, the following modelling methods, likely, could be used: • Data Manipulation and Analysis, • Exploratory Data Analysis, • Scalability, • Feature Engineering (for modifying or create new features to improve model performance. • Hyperparameter Tuning (optimizing model parameters for better performance). • Visualization.
Background	N/A
History/References	N/A
Socio-economic modelling	
Tools	Scenario Planning method for modelling socio-economic impact of water treatment using NBS methods would be appropriate to use. Scenario planning involves creating and analyzing multiple future scenarios. It helps decision-makers anticipate and plan for a range of possible outcomes. This method will serve to attract investments for the realization and development of NBS in the region. It is appropriate to analyse these socio-economic factors related to water quality too: • **Public Health** - ensuring clean and safe water is essential for public health. Contaminated water can lead to waterborne diseases, affecting communities' well-being and placing a burden on healthcare systems. • **Tourism and Recreation**-clean water bodies are attractive for tourism and recreational activities. Pollution can deter tourists and affect local economies dependent on these industries. • **Fishing and Aquaculture** -water pollution can negatively impact fish populations and aquaculture. Many communities rely on fishing and related industries for their livelihoods. • **Real Estate prices** - proximity to clean water bodies can enhance property values. Conversely, polluted water can lead to decreased property values and affect the real estate market in an area. • **Municipalities operations and costs** - compliance with water quality standards should impact operations and costs of municipalities. • **Social Justice** - Access to Clean Water Resources ensuring equitable access to clean water is a social justice issue. In addition to the Scenario development, FL#3 could apply the DS#3 approach for unfolding the potential of constructed wetlands on a regional scale by applying Multi Criteria Decision Analysis (MCDA) techniques and the Analytic Hierarchy Process (AHP), including the pairwise comparison approach.
Background	FL#3 (the municipality) usually subcontract such services (modelling) from specialists (as part of investment projects). The municipality has experience in information campaigns (to convince the society to accept unusual, new solutions), questionaries to inhabitants on their opinions. Surveys could be an aid to modelling socioeconomic aspects.

History/References	The municipal administration has experience in influencing the public in decision-making (e.g., encouraging residents to connect to the sewage system). In preparation for important changes that the society is not ready or does not want to accept, a public information company is carried out - informative articles are published in the local press, internet pages and social networks, justifying the benefits of the change with science and evidence, explaining what the damage will be and the consequences of not making the change, presenting good examples. Meetings of resident communities with specialists and scientists are organized for the same purpose. In particularly important cases, encouraging action with tax discounts or partial financing of activities.
Capacity Expertise	
Project partners	-
New researchers	Yes, we have planned to hire experts, who will help to assess the right places for the installation of constructed wetlands in the Biržai district; for the adaptation of the planning, design and implementation guidelines developed by DS#3 for the water treatment of constructed wetlands in livestock farms and small villages; assist in initiating changes to the legal framework for the implementation of NBSs; assist in communicating with local farmers/residents by explaining to them the potential benefits of NBS.
Outsourcing	Not planned
Other issues about data/modelling	
Other needs /gaps	It would be useful if partners with experience in modelling (all kinds) could share their experience and advice on: • which methodologies are worth applying (according to case); • which methodologies require scientific work, and which project administration staff could apply.

Demonstration Site 4	**Leading partner: ULL, AQUA** **Leading person: Juan C. Santamarta, Jesús Soler**
Title	Canary Islands
Hazards and type(s) of NBS planned/relevant	
Hazards	**DS#4TEN*:*** Major concerns: Drain and sewer flooding, Groundwater flood. Secondary hazards: Biodiversity loss. **DS#4GC*:*** Major concerns: Runnof/Non-point source pollution, Wetland loss/degradation. Secondary hazards: Drain and sewer flooding, Biodiversity loss, Sea water intrusion. **DS#4FUE*:*** Major concerns: Runoff/ Non-point source pollution, Droughts, Sea water intrusion. Secondary hazards: Wetland loss/degradation, Biodiversity loss, Desertification.

Compound hazard events	**DS#4TEN*:*** Drain and sewer flooding + Groundwater flooding + Wildfires **DS#4GC*:*** Drain and sewer flooding + Coastal flooding **DS#4FUE*:*** Runoff/ Non-point source pollution + Droughts
Types of NBS	**DS#4TEN*:*** Floodable Park. **DS#4GC*:*** Sustainable Drainage Systems (SUDS). **DS#4FUE*:*** Natural treatment systems and Managed Aquifer Recharge (MAR).
DATA and monitoring needs	
Physical data/need	**Common data need:** Climate and socioeconomic scenarios **Specific data needs :** **DS#4TEN*:*** Pluviometry, DTM, land use, drainage network, biodiversity indicators, geological and groundwater quality data. **DS#4GC*:*** Pluviometry, DTM, land use, drainage network, characterization of water quality, biodiversity indicators, coastal bathymetry, geological and hydrogeological data. **DS#4FUE*:*** geological and hydrogeological data**,** biodiversity indicators, WWTP data.
Physical data/availability	**DS#4TEN:** Pluviometry, DTM, land use, drainage network, biodiversity indicators, geological **DS#4GC:** Pluviometry, DTM, land use, drainage network, geological data. **DS#4FUE:** Geological data, WWTP data.
Calibration	**DS#4TEN*:*** Using historical rainfall (pluviometry, sensors measuring, photos, videos, etc.) and hydrogeological data. **DS#4GC*:*** Using historical rainfall and hydrogeological data. Not historical data regarding water quality. **DS#4FUE:** Using historical wastewater flow and hydrogeological data.
Historical/Scaling	The historical data series is necessary for model calibration; however, AR6 climate projections are required to make future predictions that can be comparable with other case studies.
Climate variables	Climate variables to be downscaled : • Rainfall • Temperature • Wind • Evapotranspiration Spatial resolution: 100x100m Temporal resolution: hourly (Temperature, wind, evapotranspiration), 5 min (rainfall)
Downscaling climate scenarios	There are data available based on the 5th Assessment Report; these data are owned by the Government of the Canary Islands and are openly published. We are developing our own downscaling to have manageable data based on the 6th Assessment Report.

Measurements	**DS#4TEN*:***
	• Drainage network
	    o Discharge
	    o Water level
	• Floodable Park
	    o Discharge
	    o Water level
	    o Water quality
	    o Biodiversity indicators
	• Hydrogeological data
	    o Groundwater level
	    o pH
	    o Conductivity
	    o Major and minor elements
	    o Trace/Heavy metal contaminants
	    o Emerging pollutants
	
	DS#4GC*:*
	• Drainage network
	    o Runoff water quality of roofs
	    o Runoff water quality of drains
	    o Runoff water quality of sewers
	• Mas Palomas pond
	    o Water quality
	    o Water level
	    o Biodiversity indicators
	• Mas palomas coastal aquifer
	    o Groundwater quality
	    o Groundwater level
	    o EC vertical profiles
	
	DS#4FUE*:*
	• WWTP
	    o Discharge
	    o Water quality
	• Natural treatment wetland
	    o Water level
	    o Water quality (outlet)
	    o Biodiversity indicators
	• Hydrogeological data
	    o Groundwater level
	    o pH
	    o Conductivity

<table>
<tr><td>Additional Equipment</td><td>Installation of additional equipment will be required for the following parameters.

DS#4TEN:
• Floodable Park
    o Discharge
    o Water level
    o Water quality
• Hydrogeological data
    o pH
    o Conductivity
    o Major and minor elements
    o Trace/Heavy metal contaminants
    o EPs

DS#4GC:
• Drainage network
    o Runoff water quality of roofs
    o Runoff water quality of drains
    o Runoff water quality of sewers
• Mas palomas pond
    o Water quality
    o Water level
    o Biodiversity indicators

DS#4FUE:
• Natural treatment wetland
    o Water level
    o Water quality (outlet)</td></tr>
<tr><td colspan="2">Modelling needs for the NBS at the Demonstration Site</td></tr>
<tr><td colspan="2">Technical bio-physical mathematical modelling</td></tr>
<tr><td>Hazards</td><td>DS#4TEN:
• Drain and sewer flooding
• Groundwater flood
DS#4GC:
• Drain and sewer flooding
• Coastal flooding
DS#4FUE:
• Drought</td></tr>
</table>

<table>
<tr><td>Tools</td><td>DS#4TEN:
Drain and sewer flooding
ICM InfoWorks (1D/2D flood model)
Groundwater flood
Geomodeller
FEFLOW
DS#4GC:
Drain and sewer flooding
ICM InfoWorks (1D/2D flood model)
SWMM (1D model with SUDS module)
Hydrogeological
Geomodeller
FEFLOW
PHAST
DS#4FUE:
Hydrogeological
Geomodeller
FEFLOW
PHAST</td></tr>
<tr><td>Background</td><td>Modelling expertise focused on water resources and Risk assessment (AQUATEC and CANARAGUA).

Modelling expertise focused on the modeling of aquifers on islands (ULL, CSIC and UIB).</td></tr>
<tr><td>Compound risks</td><td>Risk assessment in several EU projects (ICARIA, RESCCUE, BINGO...)</td></tr>
<tr><td>History/References</td><td>Experience through previous European research projects:
ARSINOE (HE ClimaMission)
RESCCUE (H2020)
ICARIA (HE ClimaMission)
KNOWING (HE RIA CL5)
SOTERIA (HE ClimaMission)
CLIMEMPOWER (HE ClimaMission)
UP2030 (HE Climate Neutral and Smart Cities Mission)
FREE and open-source software tools for WATer resource management (FREEWAT)
Managing Urban Shallow geothermal Energy (MUSE)</td></tr>
</table>

<table>
<tr><th colspan="2">Environmental modelling</th></tr>
<tr><td>Aspects</td><td>DS#4TEN:
• Biodiversity loss
DS#4GC:
• Runoff/ non-point source pollution
• Wetland loss/degradation
• Biodiversity loss
• Sea water intrusion
DS#4FUE:
• Runoff/ non-point source pollution
• Wetland loss/degradation
• Biodiversity loss
• Desertification
• Sea water intrusion</td></tr>
<tr><td>Tools</td><td>DS#4GC:
• Runoff/ non-point source pollution
  ○ ICM InfoWorks (1D/2D flood model)
  ○ SWMM (1D model with SUDS module)
• Saltwater intrusion
  ○ FEFLOW
  ○ PHAST
  ○ PHREEQC

DS#4FUE:
• Water pollution
  ○ Water pollution model based on Excel sheets
• Unsaturated and saturated zone depuration
  ○ FEFLOW
  ○ PHAST
  ○ PHREEQC</td></tr>
<tr><td>Background</td><td>Modelling expertise focused on surface water quality (AQUATEC and CANARAGUA) and groundwater quality (ULL, CSIC and UIB).</td></tr>
<tr><td>History/References</td><td>Experience through previous European research projects:
• ARSINOE (HE ClimaMission)
• RESCCUE (H2020)
• BINGO
• ICARIA (HE ClimaMission)
• KNOWING (HE RIA CL5)
• SOTERIA (HE ClimaMission)
• CLIMEMPOWER (HE ClimaMission)
• UP2030 (HE Climate Neutral and Smart Cities Mission)
• FREE and open-source software tools for WATer resource management (FREEWAT)
• Managing Urban Shallow geothermal Energy (MUSE)</td></tr>
<tr><th colspan="2">Socio-economic modelling</th></tr>
<tr><td>Tools</td><td>Cost-benefit assessment methodology and tools for green-blue infrastructures developed within RESCCUE and BINGO projects.</td></tr>
</table>

Background	Risk assessment and cost-benefit analysis (AQUATEC) Stakeholder engagement through the application of a Living Lab in ARSINOE project (https://periodismo.ull.es/la-ull-y-el-proyecto-arsinoe-trabajan-para-adaptar-los-cultivos-al-cambio-climatico/)
History/References	Experience through previous European research projects: • RESCCUE (H2020) • BINGO • ARSINOE (HE ClimaMission): Through WP3 and WP4, it is the first time that we have reached such an advanced stage regarding the hydrogeology of the islands of El Hierro and La Palma. We have been able to obtain a 3D geological model of the islands by leveraging existing data and using *GeoModeller* software. This methodology can be exported to the rest of the Canary Islands, playing a crucial role in enhancing our understanding of the behaviour of island aquifers. The newly acquired information can be integrated into future Hydrological Plans for the islands, serving as a fundamental tool to establish management measures that consider future scenarios resulting from climate change. Also, through WP2, we have achieved citizen engagement through various sessions of a Living Lab, allowing us to address the social aspect of the project on a topic such as the increase in temperatures and its impact on the main crops of the archipelago.
Capacity Expertise	
Project partners	Lack of specialised biodiversity background. Lack of socioeconomic background specialized on social modelling.
New researchers	Not for now.
Outsourcing	No
Other issues about data/modelling	
Other needs /gaps	N/A

Follower Site 4	**Leading partner: UIB** **Leading person: Celso García**
Title	Balearic Islands
Hazards and type(s) of NBS planned/relevant	
Hazards	Major concerns: Non-point source pollution, Droughts Secondary hazards: Flooding, Water pollution, Sea level rise effects on groundwater bodies
Compound hazard events	Not considered.
Types of NBS	Managed Aquifer Recharge (MAR)

DATA and monitoring needs	
Physical data/need	Pluviometry, DTM, land use, stream network, geological and hydrogeological data. Climate and socioeconomic scenarios
Physical data/availability	Pluviometry, DTM, land use, stream network, geological and hydrogeological data
Calibration	Yes, historical wastewater flow and hydrogeological data.
Historical/Scaling	The historical data series is necessary for model calibration; however, we require AR6 climate projections to make future predictions that can be comparable with other case studies.
Climate variables	Climate variables to be downscaled : • Rainfall • Temperature • Wind • Evapotranspiration Spatial resolution: 2 km Temporal resolution: hourly (Temperature, wind, evapotranspiration), 10 min (rainfall)
Downscaling climate scenarios	There are two simulations for the Balearic at a resolution of 2 km using a dynamic model (WRF) based on the 6th assessment (AR6)
Measurements	• Hydrogeological data: groundwater level, conductivity, pH, nitrates • Waste-water treatment plant: discharge, water quality
Additional Equipment	Yes, piezometric levels on wells
Modelling needs for the NBS at the Follower	
Technical bio-physical mathematical modelling	
Hazards	Groundwater, droughts
Tools	FEFLOW
Background	Modelling expertise focused on water resources and Risk assessment (AQUATEC and CANARAGUA). Modelling expertise focused on Hydrogeological (ULL, CSIC and UIB)
Compound risks	No
History/References	No
Environmental modelling	
Aspects	Infiltration, non-point source pollution
Tools	Groundwater and reactive and solute transport ○ Geomodeller o FEFLOW o PHAST Citizen science through WP2 (EWE)
Background	Modeling expertise focused on surface water quality (AQUATEC and CANARAGUA) and groundwater quality (ULL, CSIC and UIB).
History/References	Same DS#4

Socio-economic modelling	
Tools	Cost-benefit assessment methodology and tools for green-blue infrastructures developed within RESCCUE and BINGO projects.
Background	Risk assessment and cost-benefit analysis (AQUATEC) Stakeholder engagement through the application of a Living Lab in ARSINOE Project (https://periodismo.ull.es/la-ull-y-el-proyecto-arsinoe-trabajan-para-adaptar-los-cultivos-al-cambio-climatico/) .
History/References	N/A
Capacity Expertise	
Project partners	For now, it seems that everything we need will be covered through the colleagues from the different work packages of the project.
New researchers	Yes, a new researcher
Outsourcing	No
Other issues about data/modelling	
Other needs /gaps	N/A

Demonstration Site 5	Leading partner : DeWater Leading person : Dries Borloo
Title	Blue Horizon Limburg – Flanders Belgium
Hazards and type(s) of NBS planned/relevant	
Hazards	Major concerns: Groundwater availability, droughts Secondary hazards: Environmental permits downscaled, climate change
Compound hazard events	There are no plans to study compound hazard events in DS#5.
Types of NBS	The use of Aquifer Storage Recovery (ASR) as NBS.
DATA and monitoring needs	
Physical data/need	Geological stratification, hydrogeological parameters (hydraulic conductivity, porosity, storage coefficients), natural groundwater recharge estimated from precipitation, temperature, land use and soil maps, measured groundwater levels, water quality of injected water, requirements water quality, specifications of the wells (discharge, screen section, diameter, well efficiency)
Physical data/availability	Geological stratification, hydrogeological parameters, natural groundwater recharge estimated from precipitation, temperature, land use and soil maps measured groundwater levels, asset plans (pipelines, electricity schemes,…) for WWTP site, specifications ASR to be designed.
Calibration	We will develop a 3D physically-based spatially distributed groundwater flow and transport model in MODFLOW and MT3DMS. The model will be calibrated using historical measured groundwater levels and groundwater levels and water quality measurements during the pilot stage.
Historical/Scaling	Future estimates of groundwater recharge under climate change are inherently uncertain. However, as we are considering a confined aquifer and as we are using treated domestic wastewater as a relatively continuously available water source, these uncertainties will not have huge impact on our results.
Climate variables	Precipitation and temperature

Downscaling climate scenarios	We have sufficient information on downscaled precipitation and temperature based on AR6.
Measurements	Measurements of the injected water in the cretaceous layer is needed. It is necessary to monitor the water quality change (during injection, during residence in the aquifer, during extraction) as well as the volume flows to estimate the potential of the well. We will also monitor groundwater levels in observation wells around the pilot site.
Additional Equipment	Groundwater level will be measured using pressure transducers ('Divers'), discharges will be measured and injection pressures.
Modelling needs for the NBS at the Demonstration Site	
Technical bio-physical mathematical modelling	
Hazards	Droughts and Groundwater
Tools	We will develop a 3D physically-based spatially distributed groundwater flow and transport model in MODFLOW and MT3DMS.
Background	We have ample expertise in modelling groundwater flow and transport.
Compound hazard events	-
History/References	MODFLOW and MT3DMS
Environmental modelling	
Aspects	Groundwater quality, effects on total water balance
Tools	MT3DMS
Background	Ample experience with MT3DMS
History/References	MT3DMS
Socio-economic modelling	
Tools	Identification of defined technical and economical screening criteria for replication sites, and subsequent identification of possible replication sites in Flanders based on screening criteria, is the final activity for CS#5. This activity is due to start in M48. We have not yet defined tools and methodologies, other than standard business economic approaches (investment costs, operational costs, depreciation, CAPEX, OPEX). This NBS solution will result in new business relations between Aquafin (supplier of effluent) and De Watergroep (using effluent for balancing groundwater and as an indirect drinking water source). During the project, it will become clear if this can be organized via traditional economic agreements, or that new models may have to be developed.
Background	Within the CS#5 partners there is expertise in standard business economic approaches (investment costs, operational costs, depreciation, CAPEX, OPEX) and financing. There is no expertise in socioeconomic modelling.
History/References	For now, not applicable.
Capacity Expertise	
Project partners	Wide range of knowledge within the partners involved in this case study. It is not expected that knowledge will be needed from other partners within the consortium except maybe support with communication and dissemination

	activities, if necessary (because no real communication partner involved in our case).
New researchers	VUB has hired a PhD researcher and postdoctoral researcher with expertise in groundwater modelling, managed aquifer recharge, hard-rock hydrogeology and groundwater quality. No further additional recruitment of researchers/experts is expected.
Outsourcing	Modelling will be carried out by the partners involved in this case study
Other issues about data/modelling	
Other needs /gaps	No further comments

Demonstration Site 6	Leading partner: EPTBV
Title	Vienne River-FR
Hazards and type(s) of NBS planned/relevant	
Hazards	Primary concerns: Low water flows/Dried-up watercourses due to global warming, as well as damaged wetlands and watercourses; disturbed water flows, in particular during the summer time. Secondary hazards: water pollution, warming waters as they are related to water flows and wetlands. • NBS implemented: • removal of artificial water bodies in the bed of watercourses • neutralisation of drains in wetlands • restoration of riparian forest by cutting coniferous trees and planting suitable species
Compound hazard events	Study precipitation, temperature, wind, evapotranspiration and groundwater, as these are related to water flows in the Vienne River basin.
Types of NBS	Watercourses and wetlands restoration (see the DS description above for more information)
DATA and monitoring needs	
Physical data/need	Terrain data : • Water flows above and below the ponds/damaged wetlands + Water flows before and after the NBS implementation • Temperature data (atmospheric and of water) • Precipitation data • Wind data • Atmospheric level of humidity • Precise topographic data • Levels of groundwater • Watercourses morphology

	• Pedologic data • Biodiversity evolution
Physical data/availability	• DEM (DTM 5 m and DSM 50 cm) • Geological data (BD Charm 50 : 1/50 000) • Orthophoto
Calibration	No models to be developed.
Historical/Scaling	A model for calculating present and future water flows (at the scale of Vienne basin) is available, but not expected to be used for NATALIE. The DS#6 work will focus on obtaining more information about the effects of a specific NBS.
Climate variables	Temperature, precipitation, wind, humidity, (solar radiation ?) and evapotranspiration at the Vienne basin for the next decades. Climate data and downscaling are provided by MétéoFrance (except for solar radiation) for AR5 and is available on their website DRIAS (https://www.drias-climat.fr/) with mesh sizes of 8 km by 8 km. For AR6, data should be available in June 2024.
Downscaling climate scenarios	Downscaled climate variables are available on MétéoFrance website DRIAS. For the moment, data is based on AR5 but data based on AR6 should be available in June 2024.
Measurements	• Water flows above and below the ponds/damaged wetlands + Water flows before and after the NBS implementation • Temperature data (atmospheric and of water) • Precipitation data • Wind data • Atmospheric level of humidity • Precise topographic data • Levels of groundwater • Watercourses morphology • Pedologic data • Fauna and flora inventories
Additional Equipment	Yes : • Water level and temperature probes (for watercourses and groundwater) • Meteorological station (precipitation, atmosphere temperature, wind…)- for 1 or 2 sites, not for all • Drone (for photography and topography) • Measuring equipment for physico-chemical parameters
Modelling needs for the NBS at the Demonstration Site	
Technical bio-physical mathematical modelling	
Hazards	Water flows
Tools	• For statistical analysis; tools not defined precisely yet.

	• Data from probes: monitor evolution through statistical analysis
Background	For other projects, we have used water flow models that are downscaled: data come from the MétéoFrance site Drias, which provides regional climate projections (https://www.drias-climat.fr/). The models used are: SIM2 and EROS. For SIM2, data based on AR6 are now available.
Compound hazard events	No expertise/background
History/References	N/A
Environmental modelling	
Aspects	We will study the recolonisation by vegetation (area), evolution of biodiversity (dragonflies, amphibians and flora), water quality and soil humidity on the sites, but these will not be modelled.
Tools	• Recolonisation by vegetation : compare the area of vegetation with drone photos. • Dragonflies, soil humidity : LigérO surveys (surveys developed for the Loire basin to have a common database) • Water quality : laboratory analysis and physico-chemical measures twice a month to see the evolution (statistical analysis)
Background	No modeling background.
History/References	N/A
Socio-economic modelling	
Tools	N/A
Background	N/A
History/References	N/A
Capacity Expertise	
Project partners	Gap in the socio-economic aspect of the Case Study activities (raising awareness, evaluation, tool development…). Looking at assistance from WP2, WP6 and FL#6.
New researchers	No.
Outsourcing	For water flows modeling/analysis, PNR plans to call on the services of an independent consultant in wetland science and conservation (during NATALIE).
Other issues about data/modelling	
Other needs /gaps	-

Follower Site 6	Leading partner : NAT2050
Title	Grand Est Region
Hazards and type(s) of NBS planned/relevant	
Hazards	Many hazards have been experienced. The Follower Site will focus on flooding, droughts, water pollution (with pesticides used for viticulture for example). Climate change and water distribution evolution in the past years increases droughts and a shift in groundwater recharges over the year (more in spring, less in autumn). It results on dry soils and flooding events, and the groundwater recharges depletion.
Compound hazard events	N/A for now. Possibly in the future if some FL sites are in need for such data
Types of NBS	• Soil renaturation for biodiversity and water management • Sustainable water management: bioswales, runoff absorption, floodplains, … • Transition support: species diversification, forest management, agroecological infrastructures, … • Wetlands restoration and management • Green blue corridors
DATA and monitoring needs	
Physical data/need	N/A for now. Possibly in the future if some FL sites are in need for such data.
Physical data/availability	N/A for now. Possibly in the future if some FL sites are in need for such data.
Calibration	N/A
Historical/Scaling	N/A
Climate variables	N/A, probably at the region scale if needed.
Downscaling climate scenarios	Yes, from Météo France: • at regional scale with the website ClimatHD (temperature; precipitation; warm day ; frost days; soil moisture) • And many more on a finer scale with the website “DRIAS les futurs du climat” Data is based on AR5, but data based on AR6 should be available in 2024.
Measurements	N/A for now. Possibly in the future if some FL sites are in need for measurements.
Additional Equipment	N/A for now. Possibly in the future if some FL sites are in need for such data (e.g. some water quantity in the water tables in the case of wetlands restoration…).

Modelling needs for the NBS at the Follower	
Technical bio-physical mathematical modelling	
Hazards	Difficult to determine now, but perhaps: floods, droughts, ground waters, soil moisture, Erosion, wildfire Risk).
Tools	N/A
Background	N/A
Compound hazard events	N/A
History/References	No experience/background. All Nature 2050 projects are monitored by at least 5 various indicators type (soil health, N15 natural abundance (for terrestrial projects), biodiversity, climate and socioeconomic indicators defined together with the project leader, photographic monitoring, and work progress indicators). [10]
Environmental modelling	
Aspects	N/A
Tools	N/A
Background	N/A
History/References	N/A
Socio-economic modelling	
Tools	N/A
Background	No socioeconomic modeling expertise/background.
History/References	N/A
Capacity Expertise	
Project partners	No
New researchers	No
Outsourcing	No
Other issues about data/modelling	
Other needs /gaps	No

Demonstration Site 7	Leading partner: MATIS
Title	East Fjords, Iceland

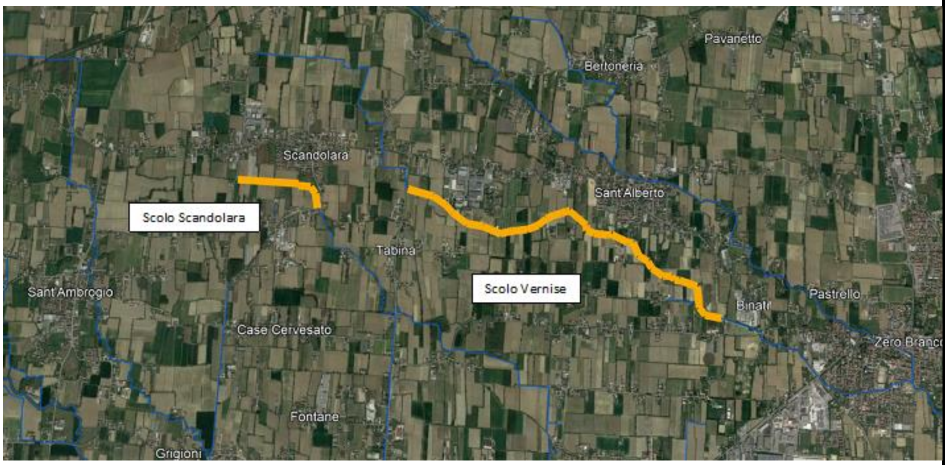
Hazards and type(s) of NBS planned/relevant	
Hazards	1. Landslides and Avalanches 2. River Flooding and Sea level rise 3. Algae Blooming / Biodiversity
Compound hazard events	Cascading failures with direct and indirect consequences on interconnected services resulting from given hazards, and quantification of some impacts on the population.
Types of NBS	Identification of suitable NBS is a primary objective in NATALIE. No specific NBS has been identified at this point.
DATA and monitoring needs	
Physical data/need	• Topography data, environmental attributes • Weather and climate data (observations, projections, analysis): precipitation, flow discharge, river level, tidal level, storm surge height; land surface temperature; sea surface temperature; humidity; pressure; wind speed; wind direction; land use/land cover; snow cover; snow water equivalent; digital elevation model; digital terrain model; lithology; bathymetry; water quality; water turbidity; water salinity/acidity; • Critical infrastructure assets and networks • Socioeconomic and demography data • Fish production and reproduction (areas, characteristics, temporal trends) • GIS data • Climate projections Details will be determined later depending on focus.
Physical data/availability	• Topography data, environmental attributes • Weather and climate data (observations, projections, analysis): precipitation, flow discharge, river level, tidal level, storm surge height; land surface temperature; sea surface temperature; humidity; pressure; wind speed; wind direction; land use/land cover; snow cover; snow water equivalent; digital elevation model; digital terrain model; lithology; bathymetry; water quality; water turbidity; water salinity/acidity. • Critical infrastructure assets and networks • Socioeconomic and demography data • GIS data • Climate projections
Calibration	Not yet known whether data for calibration will be available.
Historical/Scaling	The models developed will have to deal with the fact that climate models are not yet able to fully grasp the consequences of climate change in their entirety. The work will likely use worst-case projections that go beyond standard models and showcase what the system breaking point would look like and how to prevent some damage, as recent events (e.g. Volos in Greece, 2023) show that considering currently acceptable return times (e.g. 1 in a 10000 year return period rainfall over 6 hours for a flood event) are not sufficient under current climatological developments.
Climate variables	The spatial and temporal resolutions are normally coarser than the ones used for hazard modelling. Any finest available resolution will be useful for modelling. Regarding the future climate projections, it could include multiple

	horizons to reflect the plausible climate scenarios in the future, in increasing order of uncertainty, a short-term period of 10-20 years, medium term of 20-40 years, and a long term view of around 80 years.
Downscaling climate scenarios	
Measurements	Change of terrain elevation and coastline, flow discharge, river level and water level.
Additional Equipment	To be determined whether additional equipment will be required. Access to historical and statistical data might be sufficient.
Modelling needs for the NBS at the Demonstration Site	
Technical bio-physical mathematical modelling	
Hazards	Flooding, mass movements (landslides, snow avalanches), sea level rise
Tools	Previously developed models for flood simulations (UNEXE) and compound hazard modelling, characterization of cascading effects of mass movements on human settlements and of sea level rise on coastal areas.
Background	UNEXE has experience in modelling pluvial and coastal flooding, cascading failure of critical services, and water quality. The characterization of the impact of mass movements and sea level rise relies on the expertise gained on quantifying the direct (e.g., probability of a town of being hit by a landslide) and indirect (e.g., probability of being isolated because of landslides hitting roads connected to a specific town) effects of mass movements and sea level rise on human settlements, infrastructures, and ecosystems.
Compound hazard events	UNEXE is currently working in ICARIA project to develop compound hazard modelling. The characterization of the impact of mass movements and sea level rise has been developed in the framework of the IMPETUS project.
History/References	Experience in assessing integration flood and drought hazards and cascading effects [15], [16], [17], [18], [23], [24].
Environmental modelling	
Aspects	Quantification of susceptibility for mass movements (landslides, snow avalanches) and sea level rise based on environmental factors; identification of relevant features for explainability and uncertainty quantification for early warning systems; anomaly detection and identification of critical factors for cause/effects relationships on ecosystems.
Tools	Graph-based data analysis for causal investigation and learning; manifold embedding of environmental datasets onto continuous spaces for prediction, inference, and assessment. The environmental variables are mapped onto data structures able to integrate the diversity at spectral, spatial, and temporal level of the considered records. The methods that have been developed and published in technical literature allow us to overcome nonidealities characterizing operational datasets (e.g., missing data, variability, noise, semantic unbalance), so to obtain a robust understanding of the factors and impact of floods, mass movements, and sea level rise on ecosystems and human welfare.
Background	The characterization of the impact of mass movements and sea level rise has been developed in the framework of the EU H2020 IMPETUS project and EXTREMEARTH project. Also, the characterization of environmental models has been developed in the framework of collaborations within national and international projects (e.g., centre for research-based innovation funded by Research Council of Norway (RCN) "CIRFA"; RCN centre for research-based

	innovation “Visual Intelligence”; Framsenteret Polhavet flagship project 2020 “AMUSIC”; Singapore Climate Transformation Program)
History/References	[23], [24], [25], [26], [27], [28]
Socio-economic modelling	
Tools	UNEXE has built a series of models for hazard damage and cascading impact analysis, traffic modelling, system dynamic model, etc. The models will be adopted for the application in CS#7 to analyse the consequences of individual and compound hazards. Model modification will be needed to be adapted to Icelandic conditions and the very specific business cases of fjord fisheries. This applies also to the graph-based data analysis methods for causal investigation, learning, prediction and inference that have been previously mentioned and that are used for characterization of mass movements and sea level rise analysis.
Background	In previous CORFU, PEARL, RESCCUE and EU-CIRCLE projects, UNEXE has developed a hazard impact assessment tool to evaluate the direct and indirect damage of hazards, and the cascading effects of critical infrastructure failure. A cascading failure engine is developed in the ARSINOE project. The models of reuse of wastewater developed in the ULTIMATE project used to project cost/benefit analysis. The NEXTGEN project has modelled the compound effects of different Nature Based Solutions and measures on the urban water cycle, circular economy, energy and water quality. The characterization of the impact of mass movements and sea level rise has been developed in the framework of the EU H2020 IMPETUS project and EXTREMEARTH project. Also, the characterization of human/environment interaction has been developed in the framework of collaborations within national and international projects (e.g., centre for research-based innovation funded by Research Council of Norway (RCN) “CIRFA”; RCN centre for research-based innovation “Visual Intelligence”; Framsenteret Polhavet flagship project 2020 “AMUSIC”; Singapore Climate Transformation Program).
History/References	Previous work by UNEXE is described in [19], [20] and [21]. See also for the characterisation of impact of mass movements and sea level rise: [23], [24], [25], [26], [27], [28]
Capacity Expertise	
Project partners	No
New researchers	No
Outsourcing	No
Other issues about data/modelling	
Other needs /gaps	-

Demonstration Site 8	**Leading partner: THETIS**
Title	Sustainable river restoration, maintenance and management
Hazards and type(s) of NBS planned/relevant	

Hazards	Climate projections suggest that the area could be subject to significant changes – mainly connected with temperatures' increase - that could even motivate its inclusion in the Mediterranean biogeographical region [12]. Extreme precipitation (95° percentile) is expected to increase in a high emission scenario (RCP 8.5) from +60 to + 80% in coastal areas and from +80 to + 140% in alpine areas by 2100 [13]. This trend is expected to generate increasing erosion of river banks (due to more variable and more intense precipitation) and an increasing risk of flooding. Moreover, air temperature is increasing, following the general global warming. Historical regional data suggest a warming trend of 0.57° per decade (1993-2022) and all scenarios consistently show a further increase of temperature for this century. Finally, local biodiversity is threatened by several anthropic pressures (agriculture, urbanisation, pollution), with additional pressure exerted by climate change (changes in temperature and water availability). Continuous river maintenance is the first prerequisite to avoid **landslides** along the banks, then it represents a fundamental type of measure to avoid **flooding** of territories. A proper and smooth water flow in the network may also mitigate the risk of **water shortages for agriculture**. In fact, the increase of temperatures affects not only the frequency of extreme storm and drought events, but also determines an increase in water demand of crops. Revegetation will contribute to decrease the risk of **biodiversity loss** and will increase the potential for ecological connection with other green areas.
Compound hazard events	Not at the present moment
Types of NBS	NBS will be of two types. **1) Gentle maintenance** the first NBS will be used to prevent erosion. It consists of maintaining a strip with uncut herbaceous vegetation at the base of the banks. **2) Slope reduction and vegetation** The second NBS will be used in sections of the river where landslides are already present. A number of activities will be implemented: ***River restoration and maintenance***. The core NBS will consist of the transition from a grey, "rigid", banks' management to a green management. The new approach will avoid the use of rocks and stones, favouring instead the widening of the canal bed and shaping less steep banks. ***Revegetation***. Transplanting and revegetating the banks will also help soil consolidation and reduce the risk of landslides, while helping increase biodiversity.
DATA and monitoring needs	
Physical data/need	In order to design interventions a Digital Elevation Model is needed. • Water levels, flow regime, geophysical data of riverbed and banks (slope, grain size, etc.) before and after the interventions are needed also to estimate roughness and run the hydraulic model. • Biological data (vegetation, fauna) to assess biodiversity (at local scale) both on soil (design of monitoring activities is part of the present project) and on water environment (WFD indicators)

	• Some physical data (functional to estimate banks' roughness) will be likely collected in similar areas that have undergone the same type of interventions
Physical data/availability	Terrain data will be collected via the use of a drone. Other data will be collected with specific monitoring campaigns and/or deducted from similar areas. As mentioned above, the availability of data is a criterion that will inform the final choice of the sites. Some areas where similar NBSs were already implemented (scolo Scandolara e scolo Vernise, Figure 4) will be monitored (or surveyed in order to find historical data) to determine parameters that could be used in models (e.g. roughness of the banks). These areas could be defined "reference sites".  *Figure 4: Other reference sites.*
Calibration	A hydrodynamic model will be probably developed. It is possible to retrieve historical rainfall data but no other site specific (levels, flows) data that will be collected on purpose. Physical data on "reference sites" will also be used to set up the model
Historical/Scaling	We feel that there is some knowledge, also at local level, about return times and magnitude of rainfall events. We also feel that additional scaling or modelling is not required within the scope of the present project. Nevertheless some elaborations could be needed at local level in order to study site specific inflow-outflow ratio.
Climate variables	The most important climate parameters are precipitation, return time of extreme rainfall events, seasonal temperature, heatwaves duration
Downscaling climate scenarios	Downscaled projections for the case study area (yearly or seasonally averaged until 2100) are accessible from an online climate regional platform that covers the north-eastern Italy. Projections are based on 5 different regional models (EURO-CORDEX initiative, CMIP5) and run with three different scenarios (RCP2.6, RCP 4.5, RCP 8.5) defined in the 5th IPCC Assessment Report. The models have a spatial grid of 500m and 5km for temperature and precipitation respectively and the effective resolution of the output is 2-3 times lower (1-2km and 10-15km). The resolution is considered l sufficient for the project's purposes.
Measurements	Water level and flow for testing periods; *una tantum*: physical characteristics of the site (see above). Biodiversity monitoring.
Additional Equipment	Yes, the use of a flowmeter will be needed.

Modelling needs for the NBS at the Demonstration Site	
Technical bio-physical mathematical modelling	
Hazards	Erosion (in terms of shear stress) and floods (in terms of water level)
Tools	Probably HEC-RAS will be used.
Background	THETIS has experience with floods, coastal erosion, sea level rise and water quality; CBAR has experience with floods and erosion
Compound risks	None
History/References	THETIS used mainly MIKE by DHI to model hydrodynamic and water quality in the lagoon of Venice and other lagoon and lakes around the world. CBAR uses MIKE and HEC-RAS for river and flooding analysis.
Environmental modelling	
Aspects	NA at the moment
Tools	N/A
Background	N/A
History/References	N/A
Socio-economic modelling	
Tools	Not at the moment (we will explore opportunities for collaboration with WP6 for cost-benefit analysis)
Background	None at the moment/with the staff currently involved
History/References	None at the moment/with the staff currently involved
Capacity Expertise	
Project partners	We could need help from WP3 partners in order to design at best the approach for assessing efficacy of the NBS. WP6 (probably IISD) could help in conducting a cost-benefit analysis which could be used to assess the validity of the NBS in comparison with the traditional “grey” approach. Other partners implementing similar NBS could give advice about indicators (one – NAT2050 - already shared some experiences) and maybe in the NBS KB platform (EURECAT) it would be useful to find a list of assessment indicators used or proposed.
New researchers	Very likely IUAV will hire one or two researcher to carry out part of the activities
Outsourcing	No
Other issues about data/modelling	
Other needs /gaps	-

ANNEX 3: Minutes of the weekly meetings (M3-M6)

This is an open document noting down the main points out of the weekly meetings (Mondays) for WP5. The meetings are organised by KWR and Task 5.1. We are recording:

- Progress for each Case Study (CS).
- Any issues.
- Any changes.

NATALIE
Accelerating and mainstreaming transformative NATure-bAsed solutions to enhance resiLIEence to climate change for diverse bio-geographical European regions

MINUTES of WP5 meetings

Additional information

Date: Recurring every week (Mondays 13.00-14.00 CET)
Place: Teams
Specific objective (if any): Weekly update of the CS
Organiser: KWR (Lydia Vamvakeridou-Lyroudia and Joep van den Broeke)

[20/11/2023]

General announcements:

- Organising Deliverable 5.1 (M6)
-

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	WWF-GR (Giannis)	Meeting as CS expected by Dec 4-Report
DS#2: Vacaresti Natural Park (Romania)	BDG (Ciprian)	Due to the CS approach, DC#2 and FL#2 meetings will be organized together (same area of study, same stkhs, etc). Meeting before Limoges took place (Oct7th)-Next meeting by end of Nov 2023-First week December2023.Frequency-TBD.
FL#2: Bucharest Children World (Romania)	BDG (Ciprian)	See above (correlation with DC#5)
DS#3: Zemgale Region (Latvia)		Not present
FL#3: Lithuania		Not present
DS#4: Canary Islands (Spain)	ULL (Noelia) - CAN (Rafael)	Meeting on Nov 17 took place- Internal meetings start on Dec 1st-twice per month-Workshop before Limoges all the partners (3 days)- Also FL#4
FL#4: Baleares (Spain)	UIB (Celso)	See above
DS#5: Blue Horizon Limburg (Belgium)	DeWater (Dries)	First meeting Oct 17- Next meeting Dec 15, meeting every month. TBD the frequency of the meetings.
DS#6: Vienne River (France)	EPTBV (Justine)	Three meetings (Sep 29, Nov 02 and Nov 06)-Frequency once a month- Not defined yet whether the meetings will be with FL#4- To be seen from January 2024 when Leo will be full time.
FL#6: Grand Est (France)	NAT2050 (Leo)	Report about planned meetings on Nov27- Leo will start in January. Marie to work in the meantime
DS#7: Tromsø (Norway)	UiT (Katalin/Andrea)	Meeting before Limoges (26 October) with FL#1. Next meeting Dec 7- Frequency twice per month.
FL#1: Iceland	MATIS (Anna)	See above

DS#8: Venice lagoon (Italy)	CBAR (Marco)	5/9, 28/9, 31/10 meetings before Limoges. Next meeting Nov 23- Frequency TBD.
Communication from other WPs		
WP1	OiEau (Sonia)	Amendment to start later this week. Minutes from Limoges next week.
WP2	UTH (Chrysi/ Alexandra), WE&B (Beatriz/Karine)	Regular meetings every Monday 12.00-13.00, one week internal WP2 and one week with DS/FL, also WP6/WP7.
WP3	AQUA (Jesus)	Regular meetings WP3/WP4 Tuesdays 13.00-14.00 – All welcome.
WP4	EUT (Ivan)	See above
WP6	ICA (Gloria, Inna) GIB (Amanda)	CS assessed through internal meetings- from Dec2023 will reach out to the CS
WP7	OiEau (Natacha, Sadika)	Communication with CS through WP2- January 2024 general plan expected.

[27.11.2023]

General announcements:

- **Presentation of D5.1 structure**
  Questions raised: not so many as for the moment, CS prefer starting to fill in this template (put on Teams) and then come back with questions if any
- Suggestions: for any questions arising: use the "add comment" directly in D5.1 + use the discussion thread of WP5 channel (with taking the habit of putting a title to the thread)
- Deadline to fill in the template with all the info you find easliy: 20th Dec
- January: answer to your questions and maybe bilateral phone calls to support CS finishing the completion of D5.1
- Final D5.1: due to end of February 2024

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis or Thannos (WWF-GR)	CS meeting arranged for 28/11 + meeting in person 8th Dec => preparation / organisation of all the actions (WWF Greece, UTH, PSTE, Chalkis)
DS#2: Vacaresti Natural Park (Romania) FL#2: Bucharest Children World (Romania)	Ciprian Nanu (BDG)	VNPA (Dan)currently in meeting with Green City Bucharest team; 1st meeting with Bucharest municipality(Environment div.) last Thursday(23.11) => information of people what is going to be done in NATALIE =next meeting 29th Nov (at site of Natural Park, with project partners (including DS2+FL2).Next meeting stkh: Water Public company, December 7th. Looking for new resources on biodiversity modelling.
DS#3: Zemgale Region (Latvia)	Ingrida Brémère (BEF)	CS meeting => normally next week to discuss mainly WP2 requests (difficult to find a common date). 1 meeting already took place.
FL#3: Lithuania		Involved in the DS#3 meetings + regular communication
DS#4: Canary Islands (Spain)	Jesus Soler (AQUA)	Meeting 1st Dec: data are being gathered + thinking about the monitoring campaign + working on the downscaling or climate variables
FL#4: Baleares (Spain)	Celso	Participating in the same meeting of DS4
DS#5: Blue Horizon Limburg (Belgium)	Han (de Watergroep)	Working on the 2 templates from WP2: SH engagement and citizen science 15th Dec : organisation of a team meeting during which they speak about D5.1 template + decision about who from the team will follow which activity specifically (WP2, WP5 WP6 ect.)
DS#6: Vienne River (France)	Justine Gaume (EPTBV)	Meeting 1/month Public contracts under redaction to buy materials and recruit consultancy offices
FL#6: Grand Est (France)		Frequency of meeting not established => waiting Leo to be in full time
DS#7: Tromsø (Norway)	Katalin Blix (UiT)	Meeting 1st Dec: agenda established; Iceland will participate

FL#1: Iceland		
DS#8: Venice lagoon (Italy)	Sebastiano Carrer (THETIS)	Internal meeting Thursday 23/11 with project partners; focus on modelling aspects (hydraulic modelling), data will also be collected in another river (close to the studied river in NATALIE)=> better to have more data to develop the model, they have decided not to work on water quality but to study biodiversity In Dec: next in person meeting (frequency: 1/month)
Communication from other WPs		
WP1		Nothing
WP2	Georgia (UTH)	Presentation (meeting today) of a template explaining how to complete the long list (deadline: 24th January) WP2 leader is encouraging all the CSs to invite at their internal meeting the responsible person for his CSs from WP2
WP3		
WP4		
WP6	Amanda (GIB)	CS have been invited to a WP6 meeting: 11th Dec (same time of WP2 classical meetings but dedicated to WP6 for this time) + a doodle is circulating to organise bilateral meetings with each CS. The meeting will be planned in January 2024.
WP7		Nothing.

[December 4, 2023]

General announcements:

- Explanation about the D5.1 template (KWR)
- AQUA: They have a glossary to be included in D5.1

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	Meetings frequency 2 weeks. 12 Dec meeting in person scheduled (WWF-GR, UTH, Reg Central Greece, Municipality of Chalkis) in Chalkis
DS#2: Vacaresti Natural Park (Romania)		Not present
FL#2: Bucharest Children World (Romania)		Not present
DS#3: Zemgale Region (Latvia)	Ingrida	WP2 template filled. Dec 13: F2F meeting DS+FL (BEF, Zemgale planning region, LBTU, Birzai)
FL#3: Lithuania		WP3 template . See above for F2F meeting.
DS#4: Canary Islands (Spain)	Noelia, Rafael	Internal meeting last Friday. Started with D5.1, Separate file for meetings with stakeholders from the islands. Gran Canaria: meeting with stakeholder Maspalomas Touristic Consortium.
FL#4: Baleares (Spain)	Celso	Common meetings with DS every 2 weeks, filling template, contacting local government in Minorca
DS#5: Blue Horizon Limburg (Belgium)	Han	Meeting scheduled for Dec 15. There is the need to schedule a regular meeting. Internal meeting in De Watergroep about the link to another project, producing the water.
DS#6: Vienne River (France)	Justine	Filling the template D5.1, December planned meeting. Need to set up a regular meetings more frequently.
FL#6: Grand Est (France)		Full time from January.
DS#7: Tromsø (Norway)	Katlin	TFFK withdrew from the project. Change of local partner changing for the 2nd time. Pending issue. Last meeting Dec 1, 2023 (with FL#1 too). Document about possible partners now on Teams
FL#1: Iceland		See above
DS#8: Venice lagoon (Italy)	Sebastiano and Marco	Last week CBAR hosted a meeting with Uni of Florence about the location of the DS-exploring also the other sites (potential to collect data from other streams too)
Communication from other WPs		
WP1	Sonia	Question to CS#1 about denying external people to access Teams WWF-GR to get back to Sonia
WP2	Alexandra	Meeting today (WP6/WP7 also present). Finalised instructions for stakeholders assessment and maturity assessment for the

		NBS. ,on D2.2. Bilateral meeting with the CS (with WP6)
WP3	Beniamino	Trying to organise a webinar for the climate projections (with ARSINOE). Then a Working Group to define how it will be transferred to the CS.
WP4	Ivan	Waiting the input from the questionnaire in D5.1
WP6	Amanda	See also under WP2 for meetings. Dec 11 introductory meeting for the DS and FL Leaders- sent invitations.
WP7	Sonia	Hired new person to work in WP7 (Salima). Website expected January.

[December 11, 2023]

General announcements:

- The CS asked Sonia to organise thematic webinars about NBS. WP1 agrees to organise this. Document for votes and requests-specific webinars ca be organised in 2-3 months list to be circulated. After D5.1.

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	Regular meetings every 2 weeks. Tomorrow F2F meeting in Chalkis, Working on D5.1 and the stakeholder long list.
DS#2: Vacaresti Natural Park (Romania)	Ciprian	Not plenary meeting yet. Filling the forms, some difficulties with the existing data-whether they have them. Next meeting on Dec 15-First draft TBD
FL#2: Bucharest Children World (Romania)	Ciprian	See above.
DS#3: Zemgale Region (Latvia)	Ingrida	Meeting next Wednesday F2F, also with FL#3, collaboration about filling the form.
FL#3: Lithuania		See above
DS#4: Canary Islands (Spain)	Noelia	Working on the form and the stakeholders' long list.
FL#4: Baleares (Spain)	Celso	Completing the forms for D5.1, also in collaboration with DS#4
DS#5: Blue Horizon Limburg (Belgium)	Dries	Meeting with partners next Friday, also to arrange regular meetings every 2 weeks. Working on D5.1
DS#6: Vienne River (France)	Justine	Working on D5.1- First version filled, waiting for internal feedback. Meetings every 2 weeks on Thursdays.
FL#6: Grand Est (France)	Justine	Not present. Justine to contact them. New person expected form January 2024
DS#7: Tromsø (Norway) to change	Anna/Katalin	Reversing the order (DS-FL), Iceland to be DS, Norway FL, revising the Task. Meeting planned for tomorrow. Meeting with the project coordinator on Wednesday.
FL#1: Iceland to change	Anna/Katalin	See above
DS#8: Venice lagoon (Italy)	Sebastiano	Next Friday, in person meeting with 3 experts, meeting also the new people involved. Working on the template D5.1, next week to finalise the first draft. Change in the area bordering the river taken into account.
Communication from other WPs		
WP1	Sonia	Postponing the opening of the amendments to take into account the changes in CS#7
WP2	Alexandra	Meeting dedicated to WP6, discussing about the tools.

WP3	Beniamino	Scheduled the webinar about climate and SSP scenarios (ARSINOE experts) Dec 19. Link in the calendar-the webinar is for experts. Glossaries uploaded relevant for risk assessment, hazards etc under WP5 channel.
WP4	Ivan	No news
WP6	Inna	Meeting with all the CS –presentation of the tools. Planned bilateral meetings with each CS-the CS need to select the tool by the end of Feb 24 (investment bundle). March 2024 further work for data availability and roadmap. NOTE: **To investigate where to report this activity for the 1st Review.** Collaboration with WP3/WP4 for the data availability needed, so as not to ask the CS twice about them. New person joining from ICAT (Oihana)
WP7	Sonia	Natasha/Sadika working. No news.

[December 18, 2023]

General announcements:

- Reminder about the deadline for the CS descriptions: Dec 22
- Request for emailing lists deadline tomorrow Dec 19

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	Meeting in person in Chalkis last Tuesday, discussing about the roadmap and the stakeholder long list and also about data collection. Regular meetings every 2 weeks (online).
DS#2: Vacaresti Natural Park (Romania)	Ciprian	Last Friday meeting DS and FL, working on the description of the CS (almost ready). Regular meetings every 2 weeks, larger meeting every month with all. Next meeting in January on the site(both DC and FL teams). Continuing meetings with stakeholders-meeting with the National Water Company (''Romanian waters''), Bucharest-Ilfov basin.
FL#2: Bucharest Children World (Romania)	Ciprian	See above
DS#3: Zemgale Region (Latvia)	Ingrida	F2F meeting last Wednesday, working on the CS description offline. Discussion about the strategy on info exchange-email update weekly-meeting every 2 weeks. F2F meetings also to be organised less frequently. Meetings include also FL#3.
FL#3: Lithuania	Ingrida	See above
DS#4: Canary Islands (Spain)	Noelia	Internal meeting last Friday, finishing the description. Regular meetings set up every week. Collecting geographical info and from projects about modelling.
FL#4: Baleares (Spain)	Celso	Participating in the meeting with DS#4.
DS#5: Blue Horizon Limburg (Belgium)	Miguel (Univ of Brussels)	Meeting last Friday, discussion about the details of the CS, meetings set up every 2 weeks, working on the detailed description and the tasks, also permits etc that may be used. Modelling: UB will work on the groundwater modelling.
DS#6: Vienne River (France)	Justine	Admin stuff work, meeting with FL#6 to finalise the description, next meeting on Thursday-regular meetings every 2 weeks.
FL#6: Grand Est (France)	Leo	Nothing to add.
DS#7: Tromsø (Norway)		Not present
FL#1: Iceland	Anna	Discussion about reversing FL and DS, ongoing discussion.
DS#8: Venice lagoon (Italy)	Sebastiano	Working offline for the description, last Friday in person meeting at the Uni, with all and professors at the Uni. Managing the issues

		about the site for testing, working also on the contact lists.
Communication from other WPs		
WP1	Sonia	No other message
WP2	Alexandra	Bilateral meetings with ICAT (WP6), Internal meeting WP2-all tasks progressing, on time. Finalised the deadlines for T2.2 (internal review). Bilateral meetings with all the CS to find the most suitable CS for citizen science-to select 4 sites in total (in progress). Questionnaire to be available to all, in case its needed.
WP3	Jesus	Tomorrow webinar for the climate scenario. All welcome-link available in Teams and the calendar. Asking all the CS to give "specific" answers to the description, not vague info.
WP4	Ivan	Still waiting for input from the descriptions. Info needed for the data management plan. Thinking about accommodating existing models-details needed.
WP6	Amanda	Organising the bilateral calls with each CS. Info (at least a definition) about the financial tools to be available to all, if needed. Recordings and presentation are available under WP6 files (Teams). WP6 was asked to prepare a preliminary table about the tools and which CS is going to test which tool.
WP7	Natasha	Specific meeting with WP6 to link two tasks. In January all the CS will receive a survey about the strategy and vision related to WP7. End of January website to go online.

[January 8, 2024]

General announcements:

- All CS have filled the 1st version of the description except CS#7 (special case)

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	Team meeting on Wednesday-discussion about next deliverables and published material (relevant).
DS#2: Vacaresti Natural Park (Romania)	Ciprian	No news. Meeting planned for Thursday. There are gaps (out of D5.1)-Internal for CS#2
FL#2: Bucharest Children World (Romania)	Ciprian	Covered by DS#2(same area, same initial activities, NbS might be different).
DS#3: Zemgale Region (Latvia)	Ingrida	Meeting planned for Jan 18, participants from the industrial stakeholders about the options for the construction of the wetland-2 sites to erect and test one of them (treated waste water). Scheduled meeting with WP6.
FL#3: Lithuania	Ingrida	No news- Suggestion to follow the WP6 meeting.
DS#4: Canary Islands (Spain)	Rafael	F2F meeting with Lalaguna city council. Working on the flood park-commissioned the project (300K-12 months) to design. Collecting info about historical events. Contact with the person responsible for managing the protecting area. Meeting planned for Friday (including FL#4).
FL#4: Baleares (Spain)	Celso	No news. Planning a meeting with the stakeholders.
DS#5: Blue Horizon Limburg (Belgium)		Not present
DS#6: Vienne River (France)	Justine	Buing equipment for monitoring. Preparing for the meeting with WP2/WP6 on Thursday
FL#6: Grand Est (France)	Leo	No news-contacting the stakeholders.
DS#7: Tromsø (Norway)		Not present
FL#1: Iceland	Anna	Local partner confirmed. Preparing the change in the text. Meeting with UNEXE (Mehdi)
DS#8: Venice lagoon (Italy)	Sebastiano	Working on the monitoring and evaluation plan. Issue with the work area (it was sold)-working on criteria to select other sites (2) in the area. Wednesday meeting with experts (THETIS) about the monitoring. Meeting of all the partners on Friday for the selection of the new sites. Monitoring planned also for a site where the “traditional” rigid design is going on (for comparison).
Communication from other WPs		
WP1		Not present
WP2	Alexandra	T2.1 Continuing with the long list-most CS progressing. T2.2: Plan to upload the guidelines

		by the end of the week and present them by the end of Jan. Start working in Feb. T2.3: EWE concluded the selection of the relevant CS for citizen science. The 4 relevant DS or FL to be announced soon. T2.4: Maturity assessment ongoing to decide how to shape the meetings with each of them (for all the CS).
WP3	Jesus	Planning to analyse the info from D5.1. On Dec 19 we had the webinar for the climate projections with ARSINOE experts (Ralf and Martin). T3.2: Bilateral meeting with NTUA(Sandra and Stratis)-presented the structure of D3.2-progressing. Also the ARSINOE approach will be used for ICARIA.
WP4	Ivan	No news. Preparing the Deliverable D1.3-Data Management Plan-reviewing D5.1. D1.3 to be uploaded next week (deadline M6).
WP6	Amanda	Planned meetings-1st meeting with CS#6 (DS and FL) this week. Next meetings in the week of the 15th and 22nd of January 2024. All the CS to look at the presentation of the Investment Bundle Tools to refresh your memory. Presentation is online (under WP6 – meetings – 11th of December). Please email questions **before** the meeting.
WP7		Not present.

[January 15, 2024]

General announcements:

- EUT: The draft of the Data Management Plan is online (EUT to put the link). Need to review it. Deadline for checking/ changes: **31 January.** D1.3 NATALIE Data Managment Plan .docx

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	Work for WP2 (Transformation Lab material), also in preparation for the meeting with WP6/WP2 for CS#1. Stakeholder long list almost ready. Preparing Fact Sheet about NBS intervention in the local region, for the local community (in Greek and in English). Could be added to the website (need to be in touch with WP7, also they could help with the design).
DS#2: Vacaresti Natural Park (Romania)	Dan and Ciprian	Internal meeting last week. Working on the transformation lab assessment (WP2). Continuing to contact the stakeholders.
FL#2: Bucharest Children World (Romania)	Ciprian	Meeting with DS#2/FL#2 next week. Plan to visit in situ this week, together with the local partner(s) that might be involved.
DS#3: Zemgale Region (Latvia)	Ingrida	Meeting with national stakeholders (details with BEF)on Jan 9, intro to NATALIE, cooperation agreed. Planning meetings with all the partners in Latvia involved and also with some stakeholders. In situ visit this week. Meeting scheduled with WP6
FL#3: Lithuania	Ingrida	Informed about the stakeholder template and they will start filling it.
DS#4: Canary Islands (Spain)	Noelia	Internal meeting on Friday-Finishing the transformation lab document, to be sent to WP2. Preparing for the meeting with WP6/WP2 next Wednesday. Discussing about the GA next October (14-16/10/2024)
FL#4: Baleares (Spain)	Celso	Working with DS#4 and doing the same. Meeting with local authorities in Minorca for the best location for infiltration.
DS#5: Blue Horizon Limburg (Belgium)	Miguel	Working on site selection, also about the equipment. Working on the modelling part. Internal meeting this Friday.
DS#6: Vienne River (France)	Justine	Meeting with WP2/WP6 about the transformative lab, now working on the questions from the lab to select the tool. Internal meeting planned for monitoring (WP5) and communication strategy (WP7) (7 or 8/02/24)
FL#6: Grand Est (France)	Leo	Meeting with WP2/WP6 together with DS#6. Continuing to contact stakeholders.

DS#7: Tromsø (Norway)	Katalin	See below. Ask also about the platform (UiT). Ongoing discussion about the need to contact stakeholders.
FL#1: Iceland	Anna	Iceland need to be CS leader, working on the description. Need to start the long list of stakeholders for WP2.
DS#8: Venice lagoon (Italy)	Sebastiano	Last Friday, all day visit to the potential new sites. Two sites remain to be visited. Working on the long list. Bilateral meeting planned with WP2/WP6 this week.
Communication from other WPs		
WP1	Sonia	Asking FL whether they want to change the numbering to match with the DS-answer no. Overlap detected between WP2 and WP6 by CS. Asking the CS whether they need an additional tool for contacting the WPs. Answer: TBD, waiting for answer by the CS. To contact Sonia informally call her on Skype or Teams.
WP2	Alexandra	Internal meeting took place. Working on all the tasks in parallel. Focusing on the methodology for T2.1. Organising bilateral meetings with the CS, together with WP6
WP3	Beniamino	Weekly meetings with WP4 continuing.Need to discuss the changes to the common meetings, now that WP4 is starting. Working on the assessment, collecting info. Contact with ARSINOE for scenario building too.
WP4	Ivan	See above, also NTUA participating in the meeting wth WP3.
WP6	Amanda	Next week to discuss internally how to work with WP2. Bilateral calls with 6 case studies together with WP2.
WP7		Not present.

29-01-2024

General announcements:

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	Finalised list with data and document concerning fire control actions. Also, for WP2 – T2.2. started creating list of NDC (national determined contributions) and policy documents at regional level and national levels. For WP6 – 2 tools have been selected – meeting with WP6 leaders to be planned to discuss the timeline for implementation.
DS#2: Vacaresti Natural Park (Romania)	Dan and Ciprian	Internal meeting planned for 02-02-2024. Will be scheduling meeting with FL next week.
FL#2: Bucharest Children World (Romania)	Dan and Vlad	Started with work plan for the follower case study.
DS#3: Zemgale Region (Latvia)	Ingrida	Meeting on 25th of January with Latvian implementers team. Meeting on 26th of Jan with follower to plan implementation together and prioritise task. In person meeting with site visits to be planned in spring.
FL#3: Lithuania	Ingrida	See above.
DS#4: Canary Islands (Spain)	Noelia & Rafael	Internal meeting held last Friday. Started on T2.2. Meeting with engineers for flood park. World Wetland Day (02-02-2024) to be celebrated at CS with citizen science activities (bird watching, …).
FL#4: Baleares (Spain)	Celso	See above. Focus on T2.2.
DS#5: Blue Horizon Limburg (Belgium)	Miguel	2 scenarios with research ASR being investigated for implementation. Modelling for the scenarios has been started. (variations – location of infiltration well, volumes to be injected, water quality). Next meeting on 16-02.
DS#6: Vienne River (France)	Leo	No news to report. Tools for WP6 (2 tools) selected.
FL#6: Grand Est (France)	Leo	Link established with National Spaces and Conservatory (with specialist group on Wetlands (both FL5 and DS6). 2 meetings with stakeholders this week – regional coordinator of Life Artisan and with regional office of the CDCB. And one tool from wP6 selected as being appropriate for FL5.
FL#1: Tromsø (Norway)	Katalin	See below
DS#7: Iceland	Anna	Project internal meeting scheduled for 30-01-2024 to take decision on DS – FL redivision. No news to report – still working on definition of case and contacting stakeholders.

		CS has weekly meetings to discuss the work to be done.
DS#8: Venice lagoon (Italy)	Sebastiano	Meeting with team last week – new site for testing selected. Survey to start with digital elevation model etc to start this week. Procure to acquire the land to start this week (stakeholders to be informed – local municipality and famers association to inform them about the land acquisition). Tool for WP6 selected.
Communication from other WPs		
WP1	Sonia	Nothing to report.
WP2	Alexandra	Conducted bilateral meetings with WP6 – focussing on the overlaps. Creating a common plan w.r. activities with case studies. Meeting to develop methodology for the TLs (transformative labs) – working on all WP2 tasks.
WP3	Jesus	Working on NBS tool specifications. Analysing the survey of the CS (D5.1 draft) – focus on addressing the gaps seen in this survey. To be discussed in WP3 meeting on 30-01-2024 -> to be followed with feedback in next WP5 meeting.
WP4	Ivan	Nothing news to report.
WP6	Amanda	Bilateral calls with all CS completed. Internal WP discussion planned next week to discuss the outcomes – final list of interventions to be decided and timelines for implementation to be developed with the CSs.
WP7	Sadika	Meeting WP7 on 29-01-2024. To start working with the CS in helping them how to communicate about the work in the CSs. Action log will be made available to all.

[February 5, 2024]

General announcements:

- QA for D5.1: we need a reviewer for this deliverable that is not involved in the case studies. Sonia will review.
- DS#7: Iceland (only). No Follower FL. Changed from now on in the text below. Leading partner MATIS

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	Internal meeting about fire risks, including action plan. To ask all the local authorities about permissions. Meeting with UTH about the hydrological model. Discussion scheduled with WP6 for actions. Working with WP2 for 2.1 and 2.2. Modelling actions arranged.
DS#2: Vacaresti Natural Park (Romania)	Ciprian and Dan	Internal meeting Feb 2, final decision about stakeholder mapping, also with NL partner about the implementation. Working on the missing data together with Field Factors. Meeting with a smaller group of stakeholders March 20 (also with the FL). Working on T2.2. No experience in modelling-support needed by WP3 (Jesus). Site visit (every 2 weeks monitoring)
FL#2: Bucharest Children World (Romania)	Dan and Vlad	General plan for implementation. Study until September. Design Sept-Dec 2023-link with architects. Implementation to start in the spring 2025. See above for the meeting with stakeholders.
DS#3: Zemgale Region (Latvia)	Ingrida	Planning the procedure for selecting the pilot sites (2 sites to be selected industrial and domestic respectively). Approaching municipalities, and collecting background data for the constructed wetlands. Meeting planned for next week with Latvian partners. Implementing Tassk for WP2. Meeting on transformation Labs (T2.4) last week. Modelling: LBTU to help, to follow also the meetings for WP3.
FL#3: Lithuania	Ingrida	Information collected about filling the form for the transformation labs. Working on the stakeholder list.
DS#4: Canary Islands (Spain)	Noelia & Rafael	Completed the documents for WP7. Participated in the World Wetlands day (Feb 2)-the project presented there. Long list finished (WP2), stakeholders to be divided by island. Collecting info for the 3 cases (AQUA), starting to create the model for the 3 islands. Planning the geohydrological tests too.

FL#4: Baleares (Spain)	Celso	Completing the documents for WP7. Meeting with the General Director of Water Resources about the location of recharging pond.
DS#5: Blue Horizon Limburg (Belgium)	Miguel	Working on evaluating scenarios and locations. Planning the modelling. Modelling ok internally, no support needed.
DS#6: Vienne River (France)	Justine	Working for the documents for WP7, developing communication plan. Internal meeting next Wednesday. No experience in modelling. Support needed. Need to talk to WP3.
FL#6: Grand Est (France)	Leo	Contacting stakeholders, completing the documents for WP7. No experience with modelling – no sure yet what modelling needed in the case. To be taking part in meetings with WP3.
DS#7: Iceland	Anna	Meeting agreed on the changes. Preparing the description. No gaps in modelling needs.
DS#8: Venice lagoon (Italy)	Sebastiano	Actions for land acquisition process started. Survey focussed on these aspects completed by consortium. Preliminary design document to start this process completed. Also started with procurement of required equipment (drone etc.). Setting up modelling environment – list with information shared with consortium. University completed long list of stakeholders.
Communication from other WPs		
WP1	Sonia	Nothing specific for the CS this week.
WP2	Alexandra	Today's meeting – long list on stakeholders – deadline closed. Feedback to CSs to be provide this week. Conducted bilateral meetings with CS3 and CS5 for TL maturity assessment. Announced 3 sites that will implement Citizen Science – CS4, CS2 (DS and FL) and CS6 (DS). CS2 – considers DS and FL as one close CS. Fourth site for Citizen Science to be announced later.
WP3	Jesus	Analysed the survey – follow up questions for some CSs – bilateral meetings with all CS to be scheduled in February to clarify. (Lydia – suggestion – focus on the CS that need the most help – check notes of this meeting). Excel table with experience in modelling for all partners has been shared – not completed yet by all partners – please fill it in the coming days.
WP4	Ivan	Not present.
WP6	Oihana	Bi weekly meeting held. Implementation of instruments discussed – one more week needed to come to conclusion. Kick off meeting with all CSs to be scheduled before mid-March. Meetings with WP2 to be scheduled to coordinate.

WP7	Natasha	First WP7 meeting last Monday. Survey on profiles of target audience sent to all partners – please complete – by February 14. Website live expected end of February – due to delays. (initially end of December) Social media activity is good, communication focussing on these channels at the moment.

[February 12, 2024]

General announcements:

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Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	Prepared documents for WP7, and updated stakeholder list for WP2 based on feedback.
DS#2: Vacaresti Natural Park (Romania)	Ciprian	Finished filling first concept of template for DS and FL for project partner Field Factors. Meeting on 12-02 to discuss whether more is needed. This will provide input for technological design of project steps to be taken. Ivan – would like to have access to the template to see how/if to integrate into the data management plan. Pls share when ready. WP2 – meeting with main group of stakeholders on March 20 – WP2 not certain this action is desirable. Meeting with WP2 on 13-02 to discuss. WP2 thinks it is too early are common frameworks for use in the project are not yet ready. Georgia (WP2) – adds – need to make sure meeting is aligned with objectives of WP2/project and prevent stakeholder fatigue.
FL#2: Bucharest Children World (Romania)	Dan and Vlad	See above.
DS#3: Zemgale Region (Latvia)	Ingrida	Preparing procedure for selection of pilot sites. Meeting planned with demo site implementors on 15-02. Also addressing key stakeholders in Zemgale region – considered as focus group meeting – need to meet with implementers when it fits their schedule. Scheduled meeting with WP3 (29-02) to discuss modelling work for the Case Study. Questions D51 to be answered.
FL#3: Lithuania	Ingrida	Busy with completing stakeholder list.
DS#4: Canary Islands (Spain)	Rafael	Weekly meeting last Friday. Las palomas – geohydrological drilling – getting permits in the works. Some question whether permits can be obtained – process is slow. Preliminary design of constructed wetlands completed. Drillings to study infiltration in

		application. Quality of the water to be supplied to the wetland being analysed. Meeting with person that will do design and construction of the flood park.
FL#4: Baleares (Spain)	Celso	Meeting with general director of water resources and water agency about the infiltration ponds. Best place for recharging points discussed. Reaction – they are happy with project and might pay for the construction. Best location – being investigated.
DS#5: Blue Horizon Limburg (Belgium)	Mina	Model being prepared – has now been run for several scenarios. First results to be discussed in internal team meeting this Friday.
DS#6: Vienne River (France)	Justine	Last week internal meeting about communication plan – now being prepared. Meeting with WP2 and FL concerning the transformative labs. Idea identified that would fit DS and FL. Focus on social acceptance of the NBS. Possible link with EWE work in the CS being investigated.
FL#6: Grand Est (France)	Leo	See above. Meeting with Grand D'Est region this afternoon. Stakeholder list updated.
DS#7: Iceland	Anna	No new developments. Working this week to complete all task now urgent. Stakeholder list has been uploaded. Meeting with UIT and UNEXE being planned. Municipalities (main stakeholder) meeting still to be held. Delay due to flue epidemic.
DS#8: Venice lagoon (Italy)	Sebastiano	Updated description of the CS in the Deliverable concept. Field visit to make first survey of new site done (to start land acquisition process). Investigation where to implement the NBS. In parallel working on monitoring plan and identification of parallel site for monitoring traditional approach. Contacting the major stakeholders around the new site (municipality, …).
Communication from other WPs		

WP1	Sonia	Email to all partners to be sent with regards to amendment: • First letter – no need to check, FYI only • Annexes – check whether changes you require are included correctly. Check list with the changes in the beginning of the annexes. Also check the effort table with the person month distribution (annex 2). • Partners will get 2 weeks for checking. (Friday 23th of February)
WP2	Georgia	Finalising stakeholders long lists that all CS have developed. Feedback to be provided. Next week meeting between WP2 and all CS to provide instructions. Citizen science sites still under discussion. Selection for site 4 – pending – depend on ability to monitor before and after the intervention. Discussing with Iceland on being the fourth site ongoing. Developing transformation labs plan for all CS and aligning with other activities in the project. (2.4, 2.5, 2.6).
WP3	Beniamino	Working on first draft of D3.1 and D3.2. Main issues from analysis of data from CS identified and scheduling bilateral meetings with individual case studies to discuss where needed. Preliminary conclusion – partners cover most expertise needed, perhaps some additional expertise for impact models (environmental, economic) might be needed. Being looked into.
WP4	Ivan	Starting with design of knowledge booster. Discussion to be sought with CSs once further developed.
WP6	Amanda	No new updates.
WP7	Sadika	WP7 survey – mail with answers to all questions received and reminders to be shared with all CS later this week. CS to be contacted on materials to be translated into local languages. Template with general information and proposed translation to be provided. IF there are any request for materials -> please send to WP7.

[February 19, 2024]

General announcements:

- Joep: Almost all the material for D5.1 is in.
- Sonia: Renumbering the FL, to match the CS number (because FL#1 is not there anymore)

Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	River delimitation map found (2023), also possibly hydrological study connected-asking for digital data. Internal meeting today (T2.2) about an internal list on national/regional policies (existing). Working on the stakeholder short list. Progress on the rest next week (after a CS#1 meeting).
DS#2: Vacaresti Natural Park (Romania)	Ciprian	Monday meeting with technology providers (FF) to co-design the solutions, meeting with WP2 to organise the first support group meeting (March 20) to check about solutions. Meeting with WP3 about modelling. FF in Romania towards the end of March arriving for 1st field visit.
FL#2: Bucharest Children World (Romania)	Ciprian	See above-they are following the meetings.
DS#3: Zemgale Region (Latvia)	Ingrida	Selection of pilot sites ongoing-Feb 15 internal meeting (preparation)-updated by the end of February. Planning a focus group meeting on March 26 about the pilot sites.
FL#3: Lithuania	Ingrida	Working on WP2 activities about the stakeholders.
DS#4: Canary Islands (Spain)	Noelia & Rafael	Working on WP2 activities (T2.2 documents)-not much info existing, but collecting whatever exists. Finishing the mappings for the long list.
FL#4: Baleares (Spain)	Celso	Working on WP2 activities (T2.2 documents)
DS#5: Blue Horizon Limburg (Belgium)	Marylidia	Meeting last Friday with all teh CS#5 partners, working on the selection of the site. New local model needed. Cost 1st estimation presented (alo about modelling).
DS#6: Vienne River (France)	Justine	Offers received about the equipment-working on selection. Also ongoing preparation of contract for video.
FL#6: Grand Est (France)	Leo	Meeting with CEREMA to promote NBS.
DS#7: Iceland	Anna	Weekly meeting every Monday-finalising the CS#7 description. Not completed, to finish tomorrow. Meeting with UNEXE and UiT.
DS#8: Venice lagoon (Italy)	Sebastiano	Draft of the monitoring plan prepared, dicuss on Wednesday with the Uni. Working also on T2.2 document.

Communication from other WPs		
WP1	Sonia	Questions to the Case Studies about specific issues about the amendment. All the partners with >15% other costs to check what is written in the GA for possible amendments (if needed).
WP2	Alexandra/Georgia	T2.2- Collecting EU documents on policies. Each CS collecting at national/regional level.
WP3	Jesus	Meeting with CS#2, meeting this week with CS#6 and then with CS#3 about the modelling. Drafting D3.1. To start discussing about KPIs.
WP4	Ivan	No news. Meeting with CS#2.
WP6	Oianna	Bi-monthly internal meeting about the tools and coordinating the work with the CS.
WP7	Sadika	Prepared the visual material for communication. Next meeting March 13. If anyone cannot attend, then send email about their needs. Website: internal meetings to get it live (end of February).

[DATE]

General announcements:

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Case Study	Main Reporting partner	Update on activities
DS#1: Lelantine Plain (Greece)	Giannis	
DS#2: Vacaresti Natural Park (Romania)	Dan and Ciprian	
FL#2: Bucharest Children World (Romania)	Dan and Vlad	
DS#3: Zemgale Region (Latvia)	Ingrida	
FL#3: Lithuania	Ingrida	
DS#4: Canary Islands (Spain)	Noelia & Rafael	
FL#4: Baleares (Spain)	Celso	
DS#5: Blue Horizon Limburg (Belgium)	Miguel	
DS#6: Vienne River (France)	Justine	
FL#6: Grand Est (France)	Leo	
DS#7: Iceland	Anna	
DS#8: Venice lagoon (Italy)	Sebastiano	
Communication from other WPs		
WP1	Sonia	
WP2	Alexandra	
WP3	Jesus	
WP4	Ivan	
WP6	Amanda	
WP7	Sadika	

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Funded by the European Union

Project funded by

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