PHUSICOS

According to nature

Deliverable 7.1

Web-based tool – module I (Inventory of NBSs)

Work Package 7 – Product innovation to develop an evidence-base and data platform

Deliverable Work Package Leader:
BRGM

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Project information

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Project coordinator:	Norwegian Geotechnical Institute, (NGI project no.: 20180404)

Project partners:

Summary

PHUSICOS focus on demonstrating the effectiveness of nature-based solutions (NBSs) and the benefits to use them for small and frequent events in rural and mountainous areas.

To do so, WP7 “Product Innovation” establishes a comprehensive state-of-the-art evidence-base and platform. Implemented NBSs related to extreme hydro-meteorological events in rural and mountainous landscapes are accessible though this open-source database management system, where semantic, documentary, photographic and cartographic information are stored.

This deliverable presents the first proposed characteristics of the structure for the platform.

Contents

1 Introduction

1.1 General context

WP7 “Product Innovation” establishes a comprehensive state-of-the-art evidence-base and platform concerning NBSs related to extreme hydro-meteorological events in rural and mountainous landscapes. Task 7.1 which is related to the present deliverable has created an inventory of NBSs, based on an open-source database management system, where semantic, documentary, photographic and cartographic informations are stored. The purpose of this WP is to give an overview of implemented NBSs in rural areas. The inventory is built with collecting an extensive amount of existing knowledge and local examples already documented in project databases such as Climate-ADAPT, Oppla or others. Data on local NBSs specific for rural areas are quite scarce, we have thus extended the inventory to examples of NBS aiming at reducing hydro-meteorological risks in urban areas and that could be transferred to rural areas. This inventory will then be completed by the partners and eventually in a last step by the stakeholders (during the workshop organized within the project), with the current NBSs that have already been deployed or implemented on the project Demo cases (WP2).

The web-based tool consists in 5 modules:

I. a module including all data relative to demonstration sites or concept case sites useful for the project, including both antecedent data or data produced by the project. These gathered data include the technical information on the existing or future NBS and the technical inputs concerning the hazard and risk, such as: Digital Elevation Model, land use, geological, meteorological, hydraulic, hydrogeological, geophysical, geotechnical data and maps, temporal series, hazard and risk maps;
II. a module which gathers all NBS and therefore provides an evaluation and a ranking list of existing solutions according to a multi-criteria scenario builder. In this module is also possible to submit a new NBS;
III. a 'Scenario builder with stakeholders' module, which provides to the stakeholders the differences between NBS scenarios and the relative risk reduction for each case study site,
IV. a module for modelling impacts on test sites;
V. a communication module dedicated to large communication all over the project.

The present deliverable aims at presenting the web-based tool – module I: Inventory of NBSs, its structure and provisional content.

1.2 Conception of the tool

Use case analysis

Before any development starts, we had to specify the users and the actions they can do in the future application.

3 types of users have been identified:

- **End user**: he can apply for an account and contribute to the database by submitting a new NBS through the filling of a questionnaire; he can also access to the modules II and III (see description of the modules in 1.1)
- **Consortium member**, having the rights of end user plus the ability to accept and publish submitted NBS and accept new users; he also has the rights to access to the module I) and IV) (see description of the modules in 1.1)
- **Administrator**: he implements all functionalities based on the Consortium members` suggestions.

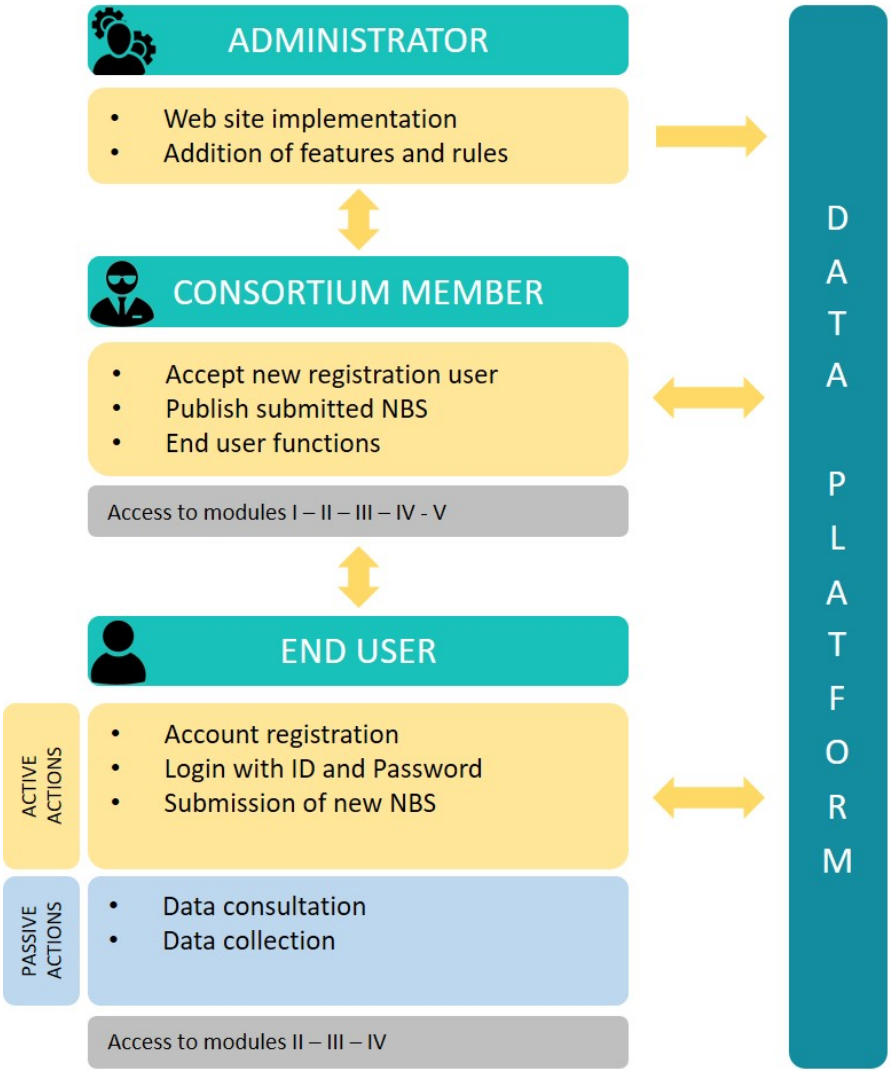

Figure 1: Use case model for PHUSICOS

The NBS itself need to be precisely defined (because all metadata used to search information depend on it). This is done in chapter 1.4.

To respond to PHUSICOS objectives, the database hosting the inventory of NBSs, should respond to the following criteria:

- The structure has to be exhaustive enough to describe, characterize and evaluate the proposed NBS;
- Each NBS needs to be characterized by a set of parameters (metadata) allowing quick searching and filtering;
- Each NBS needs to be described by a number of criteria to understand the framework it applies to: the thematic context and respective scale of implementation, etc.

1.3 Structure

1.3.1 Web interface and first access

The PHUSICOS database is accessible directly through a temporary web portal http://phusicos.brgm-rec.fr/en. It will be shortly moved to the definitive web portal http://phusicos.brgm.fr/en and will be accessible via the project website. The portal is available in English.

An open source CMS (Content Management System) website was used, including a filer to store documents and a map server to bring ergonomic and powerful access.

A user account is needed to login and accessible through self-registration (Figure 2). After selecting a username and entering a valid e-mail address, you will receive a welcome message with further instructions to personalize your account.

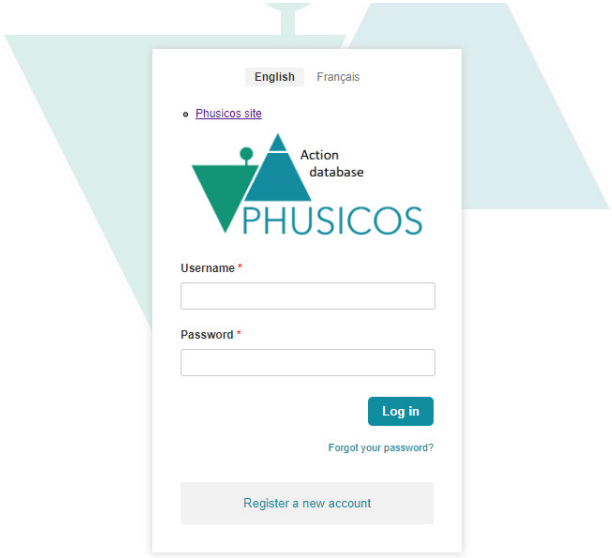

Figure 2: Web interface and window for the first access

Once the account is created, the user is able to access and use the database. There are two different interfaces: the map view interface (see 2.3.2) and the second interface (see 2.3.3).

1.3.2 The map view: the default interface

The main interface is structured in 4 blocks (Figure 3):

- Block 1: A home page logo allowing you to return to the homepage after having explored individual actions.
- Block 2: A setting section, enabling to consult your drafts or log out.
- Block 3: Allowing you to choose your PHUSICOS interface.
- Block 4: A main block, showing on the map all already implemented NBS in the database. This block is sub-divided into 5 parts:
    - Part 1: A toolbar that allows you to zoom in or out; move the zoomed in map and display information on NBS (Figure 44);
    - Part 2: this toolbar allows the user to print the actual map or to search for a specific location (Figure 8);
    - Part 3: Allowing the user to select layers of information (Figure 9).

It has to be noted that all information indicated in Parts 1, 2 and 3 are currently in French. This will be corrected as soon as possible.

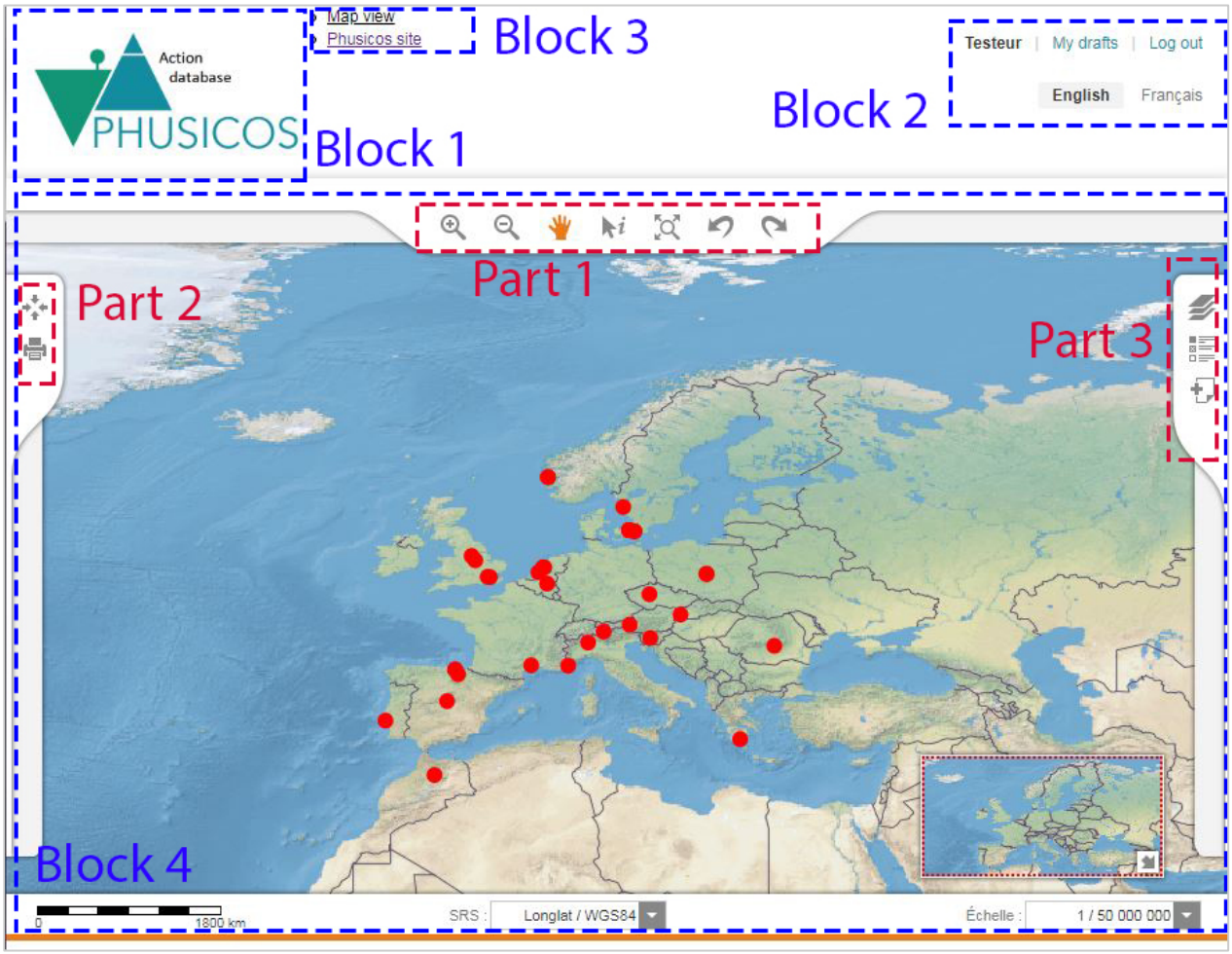

Figure 3: The map interface of the PHUSICOS platform

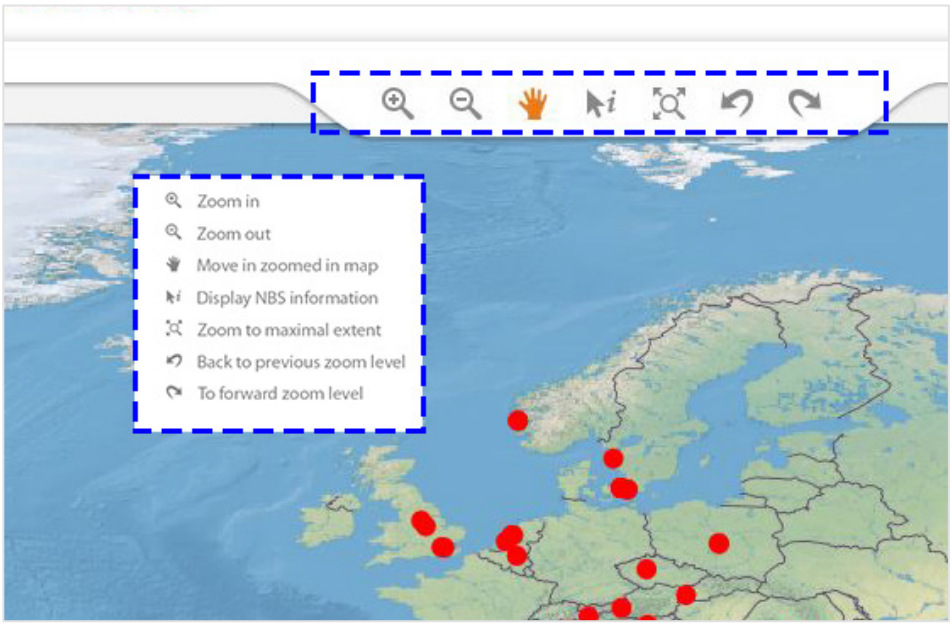

Figure 4: "Part1" Toolbox of the map interface of the PHUSICOS platform. Possible actions for zooming or displaying NBS information

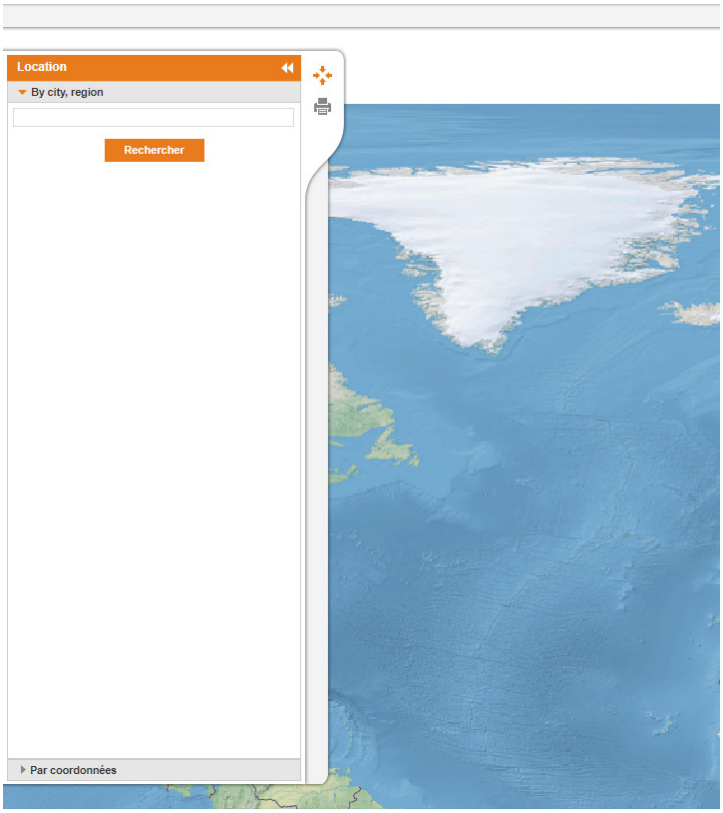

Figure 5: "Part2" Toolbox of the map interface of the PHUSICOS platform. Selection of a specific location.

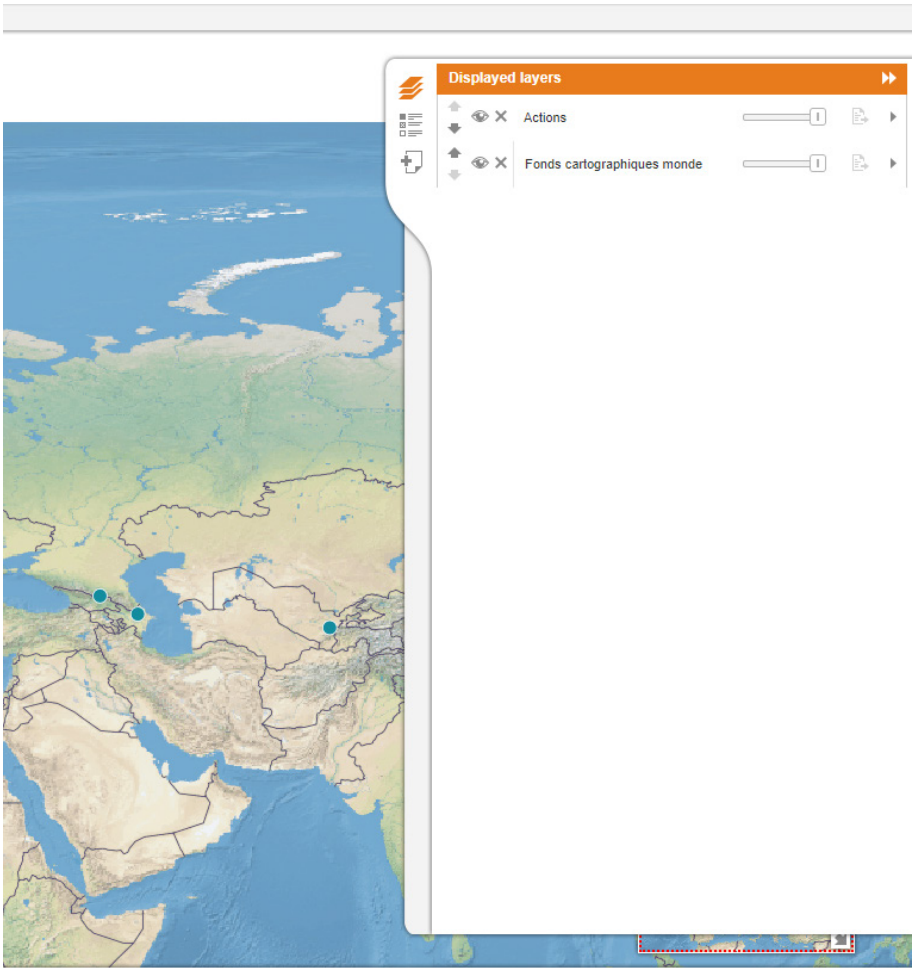

Figure 6: "Part3" Toolbox of the map interface of the PHUSICOS platform. Layers information

Access to the NBS pages is possible though the Toolbox (Figure 3, Part 1 and Figure 4). Once the "information arrow" is selected, the user can click on the red point on the map. This action will open a small window with the title of the action(s) in this location and the link to access the complete description (Figure 7).

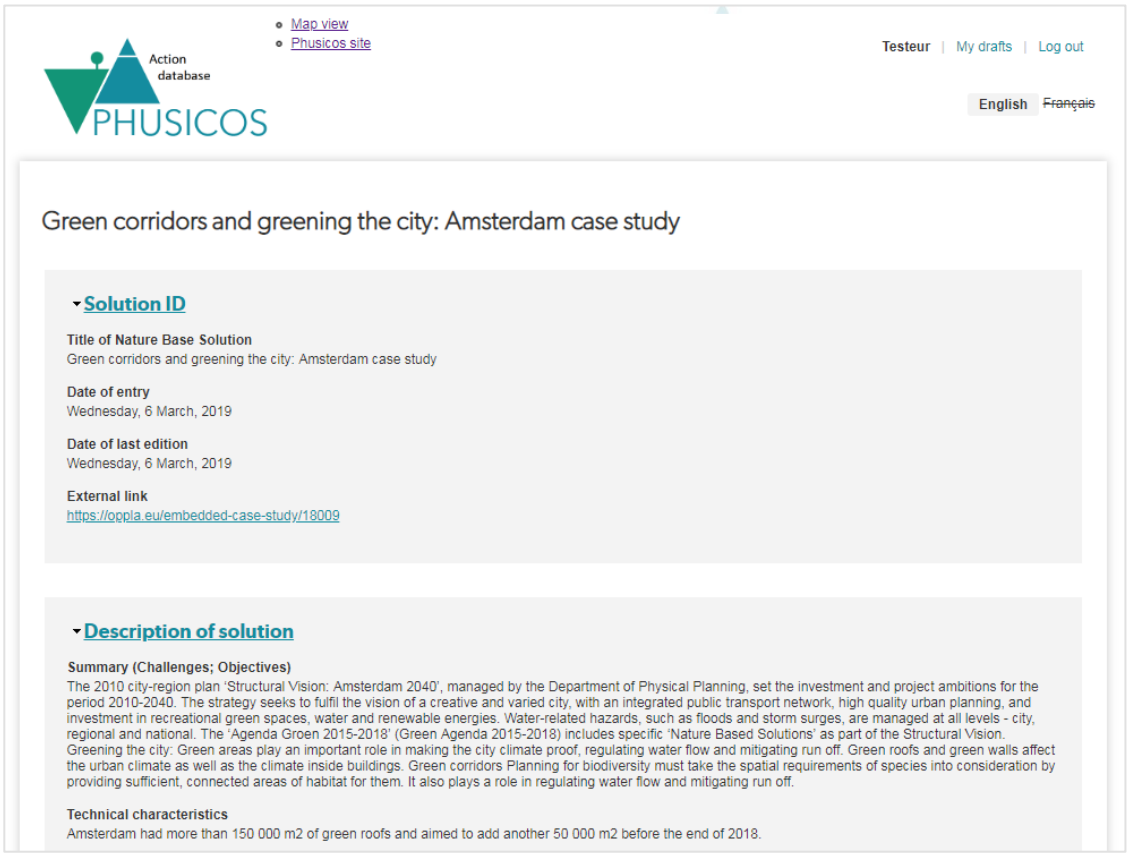

Figure 7: Example of NBS description page

1.3.3 The second interface

The second interface is structured in 6 main blocks (Figure 9):

- Block 1: A home page logo allowing you to return to the homepage after having explored individual actions.
- Block 2: A setting section to choose the interface you want to work with.
- Block 3: A setting section, enabling to consult your drafts or log out.
- Block 4: A filter body where you may select certain criteria to filter specific NBS fulfilling the search criteria.
- Block 5: A main block, listing the already entered NBS with their respective title, the thematic context and a short descriptive of the action.
- Block 6: An "Add a solution" button that will lead you to the specific page to fill in detailed information on the NBS to add. Once all available information on the NBS are entered in the portal, the contributor is able to either submit the questionnaire immediately or save a draft to modify and/or submit it later.

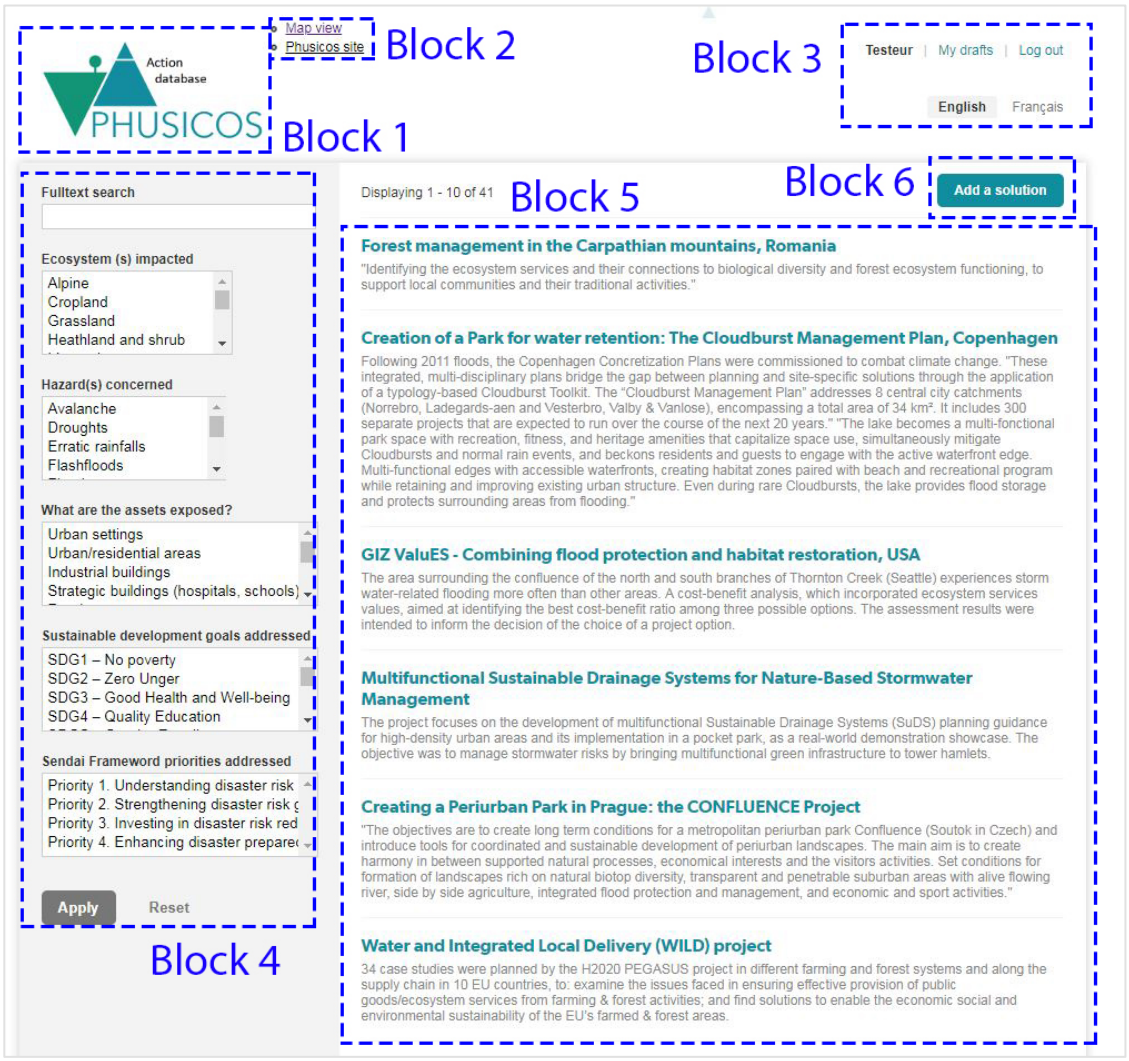

Figure 8: Detail of the second interface (It enables to add new NBS to the database and to search by keywords among NBS already entered in the platform)

All submitted NBS is validated by a member of the PHUSICOS team before being published on the portal (see consortium member in Figure 1).

Each published NBS is accessible for visualization in detail by clicking on the title. An evaluation part will added to the database and will use a combination of metadata (see 1.4).

1.4 Proposed metadata for NBS

Following there is a list of metadata proposed for the structuration of the information. It has evolved during the first year of PHUSICOS thanks to the feedbacks from PHUSICOS partners:

- Solution ID

    - Title of NBS
    - Date of entry
    - Date of last edition
    - External link
- Description of the solution
    - Summary (Challenges; Objectives) of NBS
    - Technical characteristics
    - Success and limiting factors / lessons learnt
    - Location Longitude
    - Location Latitude
    - Comment on location
- Keywords
    - Ecosystem(s) impacted
    - Hazard(s) concerned
    - Other theme(s)
    - Other keyword
- Exposition
    - What are the assets exposed?
    - Is there population exposed?
- Activity
    - Are there jobs created in the nature-based sector?
    - Are there new employments in tourism sector, sport activities or recreational activites?
    - Are there new activities in the tourism sector, sport activities or recreational activites?
    - Are there new/traditional activities that increased?
- International classification
    - Sustainable development goals addressed
    - Sendai Frameword priorities addressed
- Actors
    - Who are the beneficiaries of the action
    - Contact person
    - Organizations involved in the implementation of the action
- Temporal aspects
    - Design life time of the action
    - Implementation time of the action
- Financial aspects
    - Action costs
    - Avoided costs / added value for co-benefits
    - Maintenance costs
    - Replacement costs
    - Payback period
    - Financing source
    - Comment
- Others
    - Participatory approaches/ community involvement

- Is it possible to transpose this action in different a different context?
- Pictures/videos
- Links
- References

2 Content of the database for inventory of NBSs

To feed the database with the inventory, existing platforms have been reviewed to extract existing NBSs related to extreme hydro-meteorological events in rural and mountainous landscapes. Several solutions are dedicated to Disaster Risk Reduction (DRR) in urban areas. Although they are not completely in the heart of PHUSICOS subject, they were anyway included in the platform because these NBS could be considered as possible solutions to apply in smaller and mountainous urban areas. In addition to the existing platform inventory, a literature review has been started to enrich the database. The database will keep on being enriched all along the project.

Eight platforms were identified and a first inventory of NBSs of interest for PHUSICOS was realized. For the eight platforms, all interesting content has been listed in the following sections to keep trace, however only content indicated in bold below can be found in the PHUSICOS platform.

In addition, general content was not included if detail about specific NBS was not provided; a special section of the PHUSICOS platform will be created to host such interesting content.

2.1 Oppla

Oppla (http://www.oppla.eu) is an open platform, which aims at responding to needs of different actors from science, policy and practice. Oppla offers three different services: “Ask Oppla”, “Oppla Maketplace” and “Oppla Community”. “Ask Oppla” is a crowd-sourced enquiry service; it is a forum where members of Oppla community can interact. “Oppla Marketplace” is knowledge database gathering all kind of useful resources (Consultancy, Dataset, Document, Event, Guidance, Software, and Training); it is also completed by a repository of Case Studies. Finally, “Oppla community” is a networking system to interact with other members around the world.

The Oppla platform gathers 182 case studies around the world on 4 continents (Figure 9): Europe, Asia, Africa and America.

Figure 9: Map of Oppla case studies (https://www.oppla.eu/)

16 out of the 182 case studies enter in the scope of PHUSICOS: extreme hydro-meteorological events in the rural and mountainous landscapes (see Table 1: Case studies of interest

Table 1: Case studies of interest in Oppla platform

ID	Oppla case study reference and link
ADDED IN PHUSICOS DATABASE	
Cloudburst Management Plan, Copenhagen	18017
Forest management in the Carpathian mountains, Romania	
Nature-Based Stormwater Management	17562
CONFLUENCE Project: Creating a Periurban Park in Prague	18911
Riparian Forest Restoration and River Bank Protection, Evrotas River, Greece	18366
Bilbao - NBS for dealing with extreme temperature and rainfall events	link
Brague DEMO: Flash flood and wildfire hazards in a Mediterranean catchment	18475
Yanweizhou Wetland Park- A resilient landscape, Jinhua	18018
Integration of ecosystem services in the planning of a flood control area in Stevoort, Belgium	17255
Constructed wetlands as a multipurpose green infrastructure in Gorla Maggiore, Italy	17252
Water Retention Reservoir – Podutik	17577
Adaptation of Bratislava city to Climate Change	19033
Nature-Based Stormwater Management	17562
Lisbon: Nature-based Solutions (NBS) Enhancing Resilience through Urban Regeneration	17285
Amsterdam - NBS for greening the city and increasing resilience	18009
NOT ADDED IN PHUSICOS DATABASE	
All eyes on the future; Matching regional supply of and demand for mountain ecosystem services in the Swiss Alps (Will be added to the “information” part of PHUSICOS portal)	17275

2.2 ThinkNature

The objective of the H2020 ThinkNature (https://www.think-nature.eu/) project is the development of a platform that supports the understanding and the promotion of Nature-Based Solutions (NBSS). This platform allows online dialogue, knowledge repository and networking. The ThinkNature platform gathers a list of 67 case studies around the world (see Figure 10). All the ThinkNature case studies seen are extracted from the Oppla platform and thus listed above.

Figure 10: Location of ThinkNature case studies (https://www.think-nature.eu/)

ThinkNature provides other tools including: a game to play for simulating the role of the mayor of a city facing different challenges to be addressed with NBS; a questionnaire on barriers and drivers for the implementation of NBS; webinars to attend on different topics related to NBS.

2.3 NAIAD

The NAIAD (http://naiad2020.eu/) project aims at developing concrete Nature Based Solutions (NBS) approaches in response to flood and drought risks at 9 demo sites across EU. It delivers replicable methods for its implementation, and works on development of financial instruments and novel business models in support of their implementation.

There are 9 demo cases in the NAIAD project. At present the 6 demo in bold have been added to the database but will need to be updated as soon as results will be available.

- **The city of Copenhagen – Denmark**
  - Green and blue infrastructure in Copenhagen
  - Lessen the risk for urban flooding
  - Anticipated Natural Assurance Scheme based on green an blue infrastructural solutions
- **The city of Lodz – Poland**

  - NBS: detection, delineation & restoration of river sources; re-establishing of wetlands; rebuilding of forest cover for microclimate regulation
  - Measures: retention ponds and infiltration basins, tree trenches, infiltration ditches, microclimate regulation, groundwater & river recharge, green roofs, squares & street trees for climate regulation, flood protection & biodiversity stepping stones; biofilters and sedimentary ponds for improvement of water quality.
- **The City of Rotterdam – Netherlands**
  - Bioretention
  - Biofiltration
  - Aquifer Storage and Recovery
- Medina del Campo aquifer – Spain
  - Structural NBS: Managed aquifer recharge, Change of crops, Agricultural soil conservation, Water re-use, Afforestation and Small dams and retention areas.
  - Non-structural NBS: Increase awareness and environmental education, Regulatory fees and improving users' organization.
- **Lez Mediterranean basin – France**
  - Explore whether karst water resources management is a potential NBS to reduce flood risks.
  - Other classical Nature Based Solutions like natural retention basins, sludge, green roofs as well as alternative farming practices will also be investigated
- **La Brague basin – France**
  - Optimized forest management with adapted protection structures is assumed to improve torrential flood mitigation.
  - Both population and economy benefit from them.
  - Natural Assurance Scheme are to be defined.
- **Thames basin – UK**
  - Potential interventions include urban green infrastructure and SUDS and upstream rural land management coupled with grey infrastructure
  - Urban GI and SUDS will have co-benefits for recreational ecosystem services and pollution/sewer overflow management.
  - Rural GI will have co-benefits for biodiversity, nature based tourism and other ecosystem services
  - Schemes would likely involve green/grey investments associated with green bonds, working with Thames Basin partner Global Garden Ltd. Also reductions in insurance policy costs for farmers upstream of London, who can increase water storage on their land and regulatory storage loss offset and banking by infrastructure and housing developers.
- Lower Danube basin – Romania

  - A range of biological, ecological, forest and water bodies green management solutions;
  - The goal of these activities will focus on developing green solutions for natural hazards prevention after a collective stakeholder identification of the problems;
  - As an example: the continuous durable development of a green Danube while ensuring a safe and continuous navigation on the Danube river.
- Glinscica catchment – Slovenia

2.4 The European Climate Adaptation Platform (CLIM-ADAPT)

Climate-ADAPT (http://climate-adapt.eea.europa.eu) aims to help users to access and share data and information on:

- Expected climate change in Europe;
- Current and future vulnerability of regions and sectors;
- EU, national and transnational adaptation strategies and actions;
- Adaptation case studies and potential adaptation options;
- Tools that support adaptation planning.

Climate-ADAPT organizes information under the following main entry points:

- Adaptation information (Observations and scenarios, Vulnerabilities and risks Adaptation measures, National adaptation strategies, Research projects);
- EU sector policies (Agriculture and forestry, Biodiversity, Coastal areas, Disaster risk reduction, Financial, Health, Infrastructure, Marine and fisheries, Water management);
- Transnational regions, Countries and Urban areas;
- Tools (Adaptation Support Tool, Case Study Search Tool, Map Viewer).

The platform includes a database that contains quality-checked information with adaptation options, case studies, guidance, indicators, information portals, mayors Adapt city profiles, Organizations, Publication and Reports, research and knowledge projects and tools. Adaptation options, case studies and publication & reports of interest for PHUSICOS are listed below:

Adaptation options

The following pages will be added to the future "information" section of the PHUSICOS platform but application examples of these adaptation options are already included in the platform through cases studies listed in Table 2.

- Rehabilitation and restoration of rivers (2015, https://climate-adapt.eea.europa.eu/metadata/adaptation-options/rehabilitation-and-restoration-of-rivers)

- Adaptive management of natural habitats (2015, https://climate-adapt.eea.europa.eu/metadata/adaptation-options/adaptive-management-of-natural-habitats)
- Restoring floodplains would improve state of water, ecosystems and climate protection in Europe (https://climate-adapt.eea.europa.eu/news-archive/restoring-floodplains-would-improve-state-of-water-ecosystems-and-climate-protection-in-europe)
- Green spaces and corridors in urban areas (2015, https://climate-adapt.eea.europa.eu/metadata/adaptation-options/green-spaces-and-corridors-in-urban-areas)
- Water sensitive forest management (2015, https://climate-adapt.eea.europa.eu/metadata/adaptation-options/water-sensitive-forest-management)

Table 2: Case studies of interest in the CLIM-ADAPT platform

ID	Date and link
ADDED IN PHUSICOS DATABASE	
Nature-based measures against rockfalls over forests in the Engadin Region, Switzerland	2018
The refurbishment of Gomeznarro park in Madrid focused on storm water retention	2014
Urban river restoration: a sustainable strategy for storm-water management in Lodz, Poland	2014
Urban storm water management in Augustenborg, Malmö	2014
Flood protection in the Upper Vistula river basin: grey and green measures implemented in the Sandomierz area	2018
Restoration of the Oka River's upper estuary, part of the Urdaibai Biosphere Reserve	2018
Implementation of the Vitoria-Gasteiz Green Urban Infrastructure Strategy	2018

Publications and Reports

- Ecosystem-based adaptation: Question-based guidance for assessing effectiveness (2017, https://climate-adapt.eea.europa.eu/metadata/publications/ecosystem-based-adaptation-question-based-guidance-for-assessing-effectiveness)
- An impact evaluation framework to support planning and evaluation of nature-based solutions projects (2017, https://climate-adapt.eea.europa.eu/metadata/publications/an-impact-evaluation-framework-to-support-planning-and-evaluation-of-nature-based-solutions-projects)
- Nature-based solutions to address climate change (2016, https://climate-adapt.eea.europa.eu/metadata/publications/nature-based-solutions-to-address-climate-change)
- Exploring nature-based solutions - The role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards (2015, https://climate-adapt.eea.europa.eu/metadata/publications/exploring-nature-based-solutions-the-role-of-green-infrastructure-in-mitigating-the-impacts-of-weather-and-climate-change-related-natural-hazards)

2.5 Urban Nature Atlas

Urban Nature Atlas (https://naturvation.eu/atlas) contains almost 1000 examples of Nature-Based Solutions from across 100 European cities.

The Urban Nature Atlas is a product from the H2020 NATURVATION project. The project assesses what nature-based solutions can achieve in cities, examines how innovation is taking place, and works with communities and stakeholders to develop the knowledge and tools required to realize the potential of nature-based solutions for meeting urban sustainability goals.

Many examples of the Urban Nature Atlas concerns nature-based solution for rainwater management (see Table 3).

Table 3: Case studies of interest in the Urban Nature Atlas

ID	Links
ADDED IN PHUSICOS DATABASE	
Rain gardens in Kviberg , Göteborg, Sweden	Link
Retrofit Rain Garden Project, Greater Nottingham, United Kingdom	Link
Rain Garden on City Island, Amsterdam, Netherlands	Link
Historical rain gardens at the Great Mosque of Cordoba, Córdoba, Spain	Link
Love Square - urban ecogarden, Sheffield, United Kingdom	Link
Lovstien Nature Trail, Bergen, Norway	Link
NOT ADDED IN PHUSICOS DATABASE	
Revitalization of rain drainage system in Gdynia Chylonia, Gdynia, Poland	Link
Green roofs in Hamburg, Hamburg, Germany)	Link
OMAU Building and Ecological Cover , Málaga, Spain	Link
Campus of the University of Bialystok, Białystok, Poland	Link
Sustainable water management in Bryggen, Bergen, Norway	Link
Living Wall at Saltersgate Junior School Doncaster , Doncaster, United Kingdom	Link
Leeds Greenhouse, Leeds, United Kingdom	Link
Shagree project (green roofs), Bari, Italy	Link
EcoMembrana, Málaga, Spain	Link
Grey to Green project, Sheffield, United Kingdom	Link
Resilience building at Royal Botanic Garden Edinburgh, Edinburgh, United Kingdom	Link
Green Network Hamburg, Hamburg, Germany	Link

2.6 PreventionWeb

PreventionWeb (http://www.preventionweb.net) is a knowledge center managed by the UN Office for Disaster Risk Reduction (UNISDR). The documents, publications and news of high interest for the PHUSICOS project are listed below:

Documents & Reports

- Ecosystem-based adaptation from mountains to oceans: How people adapt to climate change by using nature (https://www.preventionweb.net/publications/view/60537)
- Ecosystem-based adaptation: A handbook for EbA in mountain, dryland and coastal ecosystems (https://www.preventionweb.net/publications/view/61423)
- Generating multiple benefits from ecosystem-based adaptation in mountain ecosystems (https://www.preventionweb.net/publications/view/47898)
- Introduction to ecosystem-based adaptation: a nature-based response to climate change (https://www.preventionweb.net/publications/view/47879)
- The ecosystem-based disaster risk reduction case study and exercise source book (https://www.preventionweb.net/publications/view/54582)
- Ecosystem-based disaster risk reduction in Japan (https://www.preventionweb.net/files/48400_ecodrr.pdf)
- The role of environmental management and eco-engineering in disaster risk reduction and climate change adaptation (https://www.preventionweb.net/files/4148_emecoengindrrcca1.pdf)
- Ecosystems, Livelihoods and Disasters An integrated approach to disaster risk management (https://www.preventionweb.net/files/568_10050.pdf)
- Exploring nature-based solutions. The role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards (https://www.preventionweb.net/publications/view/46560)

Publications including case studies

- **Assessing the interaction between mountain forests and snow avalanches at Nevados de Chillán, Chile and its implications for ecosystem-based disaster risk reduction** (https://www.preventionweb.net/publications/view/57930)
- **Strengthening urban resilience through nature: The potential of ecosystem-based measures for reduction of landslide risk in Rio de Janeiro** (https://www.preventionweb.net/publications/view/58723)

News

- Seven reasons to embrace nature-based disaster risk reduction (https://www.preventionweb.net/news/view/60331)
- Managing the perfect storm: How healthy ecosystems increase resilience (https://www.preventionweb.net/news/view/61572)
- Looking upstream to manage flood risk: A Pakistan example (https://www.preventionweb.net/news/view/52516)

2.7 AdaptationCommunity.net

"AdaptationCommunity.net was developed for the interested public and adaptation experts to provide information on applying approaches, methods and tools that facilitate the planning and implementation of adaptation action. Furthermore, enhancing knowledge and sharing experience is the key to successful adaptation strategies. Therefore this platform offers a wealth of information, webinars and trainings on eight key topics:

- Climate Information & Services assess the expected changes in climatic conditions to support adaptive management and decision-making.
- Vulnerability / Risk Assessment helps to identify the nature and degree to which climate change may harm a country, region, sector or community.
- Mainstreaming & NAP: Mainstreaming is the systematical inclusion of climate risk and adaptation considerations in decision-making and planning processes. National Adaptation Planning (NAP) is a process that is designed to support all developing countries in achieving their medium- and long-term adaptation needs.
- NAP & NDC: The national adaptation plan (NAP) process can help translating NDC adaptation goals into action.
- Ecosystem-based Adaptation (EbA) is the sustainable use and conservation of ecosystems and biodiversity as part of an overall adaptation strategy.
- Despite mitigation and adaptation measures, negative impacts that affect human and natural systems are expected to occur and intensify over time. Comprehensive climate risk management is an approach to avert, minimize and address Loss and Damage.
- Climate change has severe effects on the private sector, which pose not only risk for companies but present opportunities as well. Developing strategies to create growth and increase societal resilience is part of the Private Sector Adaptation.
- Monitoring and Evaluation (M&E) helps keeping track of the implementation of adaptation measures and evaluating their effectiveness and outcomes." (Extracted from AdaptationCommunity.net).

The AdaptationCommunity.net gathers 34 publications on Ecosystem-based adaptation. It also lists examples of potential Ecosystem-based adaptation measures for different domains (see Figure 11: Examples of potential Ecosystem-based adaptation measures (AdaptationCommunity.net)).

Ecosystem	Examples of EbA Measures	Ecosystem services addressed (Environmental Benefits)	Climate drivers addressed (Adaptation Benefits)	Socio-Economic Benefits
Coast	Mangrove (re-) forestation and coastal habitat conservation	◦ Erosion prevention & fertility ◦ Extreme events buffering ◦ Carbon sequestration ◦ Food provision ◦ Habitats for species ◦ Raw material provision	◦ Damaging cyclones ◦ Storm surge ◦ Flooding ◦ Sea level rise and coastal erosion	◦ Economic diversification and income generation (fisheries, tourism) ◦ Maintenance costs reduction ◦ Allows maintenance by local communities ◦ Increased participation and ownership ◦ Supports grey infrastructure maintenance (e.g. dykes) ◦ Maintenance/increase of agricultural productivity ◦ Health contribution (reduced number of casualties and injuries)
Rivers	Vegetative erosion control for river banks by using bamboo fences or gabions in combination with strips of grass, bushes or trees are planted along the riverbank.	◦ Extreme events buffering ◦ Fresh water provision ◦ Erosion prevention & fertility ◦ Habitats for species ◦ Raw material provision	◦ Flooding ◦ Drought ◦ Extreme precipitation	◦ Maintenance costs reduction ◦ Maintenance/increase of agricultural productivity ◦ Allows maintenance by local communities ◦ Increased participation and ownership

Urban Areas	Green spaces such as parks, green belts and eco-corridors in and around cities	◦ Climate regulation ◦ Extreme events buffering ◦ Fresh water provision ◦ Habitats for species ◦ Aesthetic appreciation and inspiration for culture ◦ Recreation	◦ Extreme temperatures ◦ Extreme precipitation ◦ Flooding ◦ Warming trend	◦ Increased life quality ◦ Health contribution
Agro-ecosystems	Soil and water conservation (SWC) technologies such as grass-strips on contour, hedges, mulching, filter and diversion dams and plant wind breaks	◦ Erosion prevention & fertility maintenance ◦ Water provision ◦ Food provision ◦ Extreme events buffering ◦ Raw material provision ◦ Maintenance of genetic diversity	◦ Drought ◦ Extreme precipitation ◦ Damaging cyclones ◦ Warming trend	◦ Maintenance/increase of agricultural productivity ◦ Increased food security ◦ Maintenance costs reduction
Forests	Close to nature forest management by using a diversity of adapted tree species (e.g. community based forest management)	◦ Extreme events buffering ◦ Erosion prevention & fertility maintenance ◦ Raw material provision ◦ Water provision ◦ Food provision ◦ Carbon Sequestration ◦ Maintenance of genetic diversity ◦ Climate regulation ◦ Habitats for species ◦ Medicinal resources provision ◦ Recreation	◦ Flooding ◦ Damaging cyclones ◦ Drought ◦ Extreme precipitation ◦ Warming trend	◦ Economic diversification and income generation ◦ Maintenance/increase of agricultural productivity ◦ Supports or complements expensive grey infrastructure measures (e.g. for preventing landslides)

Mountain	Alpine ecosystem restoration such as the conservation or sustainable management of grasslands	◦ Erosion prevention & fertility maintenance ◦ Water provision ◦ Food provision ◦ Maintenance of genetic diversity ◦ Habitats for species ◦ Medicinal resources provision ◦ Recreation	◦ Extreme temperatures ◦ Extreme precipitation ◦ Flooding ◦ Drought ◦ Warming trend	◦ Economic diversification and income generation (e.g. tourism) ◦ Maintenance/increase of agricultural productivity ◦ Supports or complements expensive grey infrastructure measures (e.g. for preventing landslides) ◦ Health contribution (reduced number of casualties and injuries caused by landslides)

Figure 11: Examples of potential Ecosystem-based adaptation measures (AdaptationCommunity.net)

2.8 PANORAMA – Solutions for a Healthy Planet

"PANORAMA – Solutions for a Healthy Planet is a partnership initiative to document and promote examples of inspiring, replicable solutions across a range of conservation and sustainable development topics, enabling cross-sectoral learning and inspiration.

PANORAMA allows practitioners to share and reflect on their experiences, to increase recognition for successful work, and to learn with their peers how similar challenges have been addressed around the globe.

Different thematic disciplines and communities contribute to PANORAMA. On the web platform, these communities are represented through portals. As PANORAMA evolves, we welcome additional themes and new partners."

This portal gathers 102 Ecosystem-based solutions. 9 of them were selected as interested for the PHUSICOS project (Table 4).

Table 4: Case Studies of interest in Panorama

ID	Links
ADDED IN PHUSICOS DATABASE	
Ecosystem-based erosion control in Azerbaijan	Link
Isar-Plan: Improving flood protection and recreational opportunities by redesigning the Isar	Link
NOT ADDED IN PHUSICOS DATABASE	
Ecosystem-based flood and drought management in river basins	Link
Storm water management and urban regeneration in Malmö (already in Oppla)	Link
Mayesbrook river restoration project	Link
Dartmoor Mires Restoration Project	Link
Flood Management and Ecological Improvement - The Creation of Lake Phoenix	Link
Integrative Forest Management	Link
Green-blue climate corridor Kamen - Disconnection of rainwater from sewage systems to prevent urban flooding	Link

2.9 RECONECT project

The RECONECT project (http://www.reconect.eu) aims at rapidly enhancing "the European reference framework on Nature-Based Solutions (NBS) for hydro-meteorological risk reduction by demonstrating, referencing, upscaling and exploiting large-scale NBS in rural and natural areas.

The RECONECT Demonstrators are examples of large scale Nature-Based Solutions for hydro-meteorological risk reduction which can provide proof-of-concept for their upscaling and replication."

The project will study 10 case studies, 4 Demonstrator cases Type A which are large scale Nature-Based Solutions to be fully created and validated during the RECONECT project lifetime, and 6 Demonstrator cases Type B which are existing Nature-Based Solutions to be monitored, evaluated and validated by RECONECT. Solutions will be added to the platform as soon as results are available.

Demonstrator cases type A:

- Elbe Estuary, Germany (http://www.reconect.eu/network-of-cases/elbe-estuary/)
- Seden Strand, Odense, Denmark (http://www.reconect.eu/network-of-cases/seden-strand-odense/)
- Tordera River Basin, Catalonia (http://www.reconect.eu/network-of-cases/tordera-river-basin/)
- Portofino Natural Park, Italy (http://www.reconect.eu/network-of-cases/portofino-natural-park/)

Demonstrator cases type B:

- IJssel River Basin, the Netherlands (http://www.reconect.eu/network-of-cases/ijssel-river-basin/)
- Inn River Basin, Austria (http://www.reconect.eu/network-of-cases/inn-river-basin/)
- Greater Aarhus, Denmark (http://www.reconect.eu/network-of-cases/greater-aarhus/)
- Thur River Basin, Switzerland (http://www.reconect.eu/network-of-cases/thur-river-basin/)
- Var River Basin, France (http://www.reconect.eu/network-of-cases/var-river-basin/)
- Les Boucholeurs, France (http://www.reconect.eu/network-of-cases/les-boucholeurs/)

3 Integrating content from existing platforms

The PHUSICOS portal could not integrate automatically the targeted content of existing platforms. The interesting NBS were thus added by hand to the PHUSICOS platform.

4 Conclusions

D7.1 provides a generic structure to collect NBSs. It has been currently fed with more than 40 NBS in relation with extreme hydro-meteorological events in urban context, rural or mountainous landscape. Although they are not completely in the heart of PHUSICOS subject; NBSs for disaster risk reduction in urban areas were included in the platform because they may be applied in smaller and mountainous urban areas. Existing databases are rich in terms of urban context and the PHUSICOS consortium will have to work on adding examples of NBS applied in the specific context of rural landscapes.

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