



PHUSICOS

According to nature

Deliverable 7.2

Web-based tool – module 2 (Existing web-based platforms for NBS analysis)

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

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BRGM

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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 through this open-source database management system, where semantic, documentary, photographic and cartographic information are stored.

The present deliverable presents an analysis of 12 existing web-platforms for NBS and the PHUSICOS platform itself; composed of 3 different interfaces: the database, the map and the “add a solution” interfaces. It also analyses the 46 NBS actions already stored in the database and presents the proposed adapted methodology for the evaluation of literature NBS within PHUSICOS platform. Indeed the assessment method proposed for PHUSICOS demonstrator sites cannot realistically be applied to all literature case studies.

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1 INTRODUCTION

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. The work package is divided into three tasks, where each task is an essential step in the overall development goals for WP7.

Task 7.1 focused on collecting information on all NBSs related to DRR associated with extreme hydro-meteorological events in mountain landscapes. The results of this task are reported in Deliverable D7.1, and as additional NBS cases are identified these will be added to the database.

Task 7.2 has reviewed the existing data platform and propose a framework for NBS evaluation based on D4.1 (Autuori et al., 2019): Comprehensive Framework for NBS Assessment. This deliverable is related to this task.

Task 7.3 will co-develop with stakeholders the web-based tool for demonstrating and maintaining data for NBSs. This will be presented later in deliverable D7.3.

The evidence base and platform will be composed of 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 concern 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 collected NBS and which provides therefore 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 primarily describes work related to module II: Existing web-based platforms for NBSs analysis. Specifically;

- a) an analysis of existing NBS databases
- b) an overview of the PHUSICOS platform in its current state of development
- c) an adaptation of the Comprehensive Framework for NBS Assessment as a simplified, qualitative assessment tool appropriate for implementation in the PHUSICOS platform
- d) conclusions and recommendations for further implementation and development of the PHUSICOS platform.

2 Analyses of NBS databases

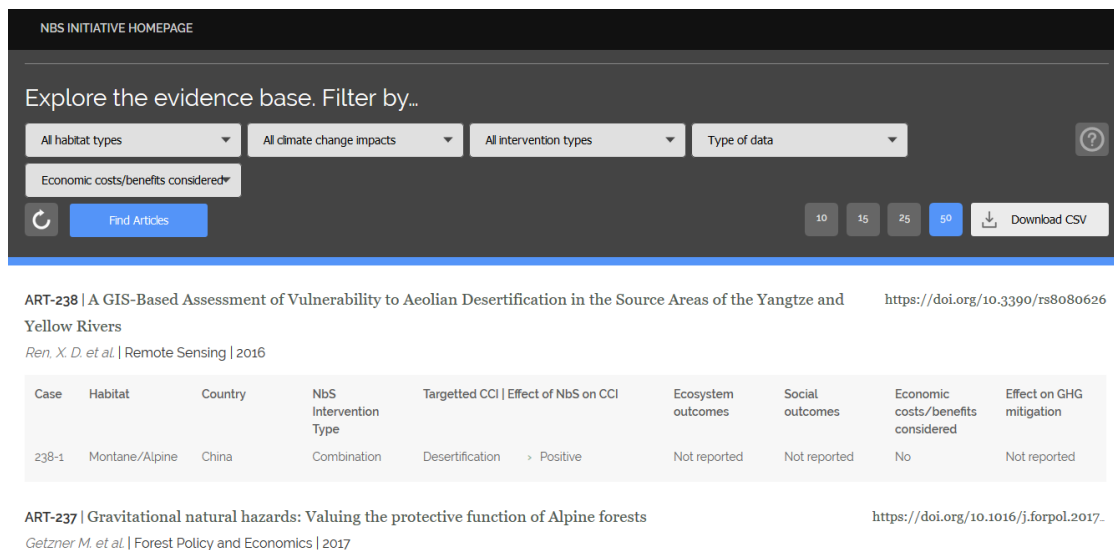
There are many platforms dedicated to NBS or including NBS solutions. Autuori et al. (2019) have proposed a first review. In this report, we are particularly interested in platforms with NBS databases or proposing special services. The NAIAD and RECONNECT websites are therefore not part of this specific review but they are presented in Autuori et al. (2019) and Baills et al. (2018).

2.1 Common features implemented in NBS databases

Most of the reviewed databases present common features such as key word search, filter search, heat maps or map views.

2.1.1 Filter search

The filter searches propose a set of basic filters to search into the database of articles, projects and/or NBS cases (Figure 1). Different filters are proposed according to the platform considered (see section 2.3 for more detail). Data may be directly hosted by the concerned platform or the reader may be redirected to original hosting website for full detail access.



The screenshot shows the 'NBS INITIATIVE HOMEPAGE' with a search interface. The main heading is 'Explore the evidence base. Filter by...'. There are four dropdown menus: 'All habitat types', 'All climate change impacts', 'All intervention types', and 'Type of data'. Below these is a search button 'Find Articles' and a 'Download CSV' button. A table of results is shown below, with columns for Case, Habitat, Country, NbS Intervention Type, Targetted CCI | Effect of Nbs on CCI, Ecosystem outcomes, Social outcomes, Economic costs/benefits considered, and Effect on GHG mitigation.

Case	Habitat	Country	NbS Intervention Type	Targetted CCI Effect of Nbs on CCI	Ecosystem outcomes	Social outcomes	Economic costs/benefits considered	Effect on GHG mitigation
238-1	Montane/Alpine	China	Combination	Desertification > Positive	Not reported	Not reported	No	Not reported

Figure 1: Filter search (fine case search panel) of the Nature-based Solutions Evidence Platform

2.1.2 Map views

The map views (Figure 2) allows to browse cases according to geographic criteria.

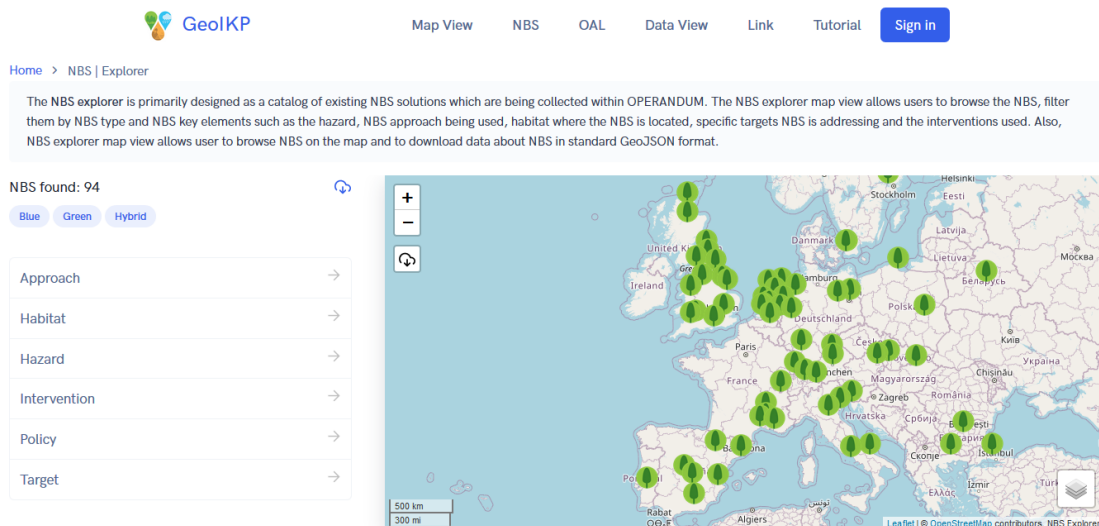


Figure 2: Example of map view, GeoKP

2.1.3 Heat maps

The heat maps show the number of individual cases based on a number of category filters (Figure 3) and usually allows to consult the cases.

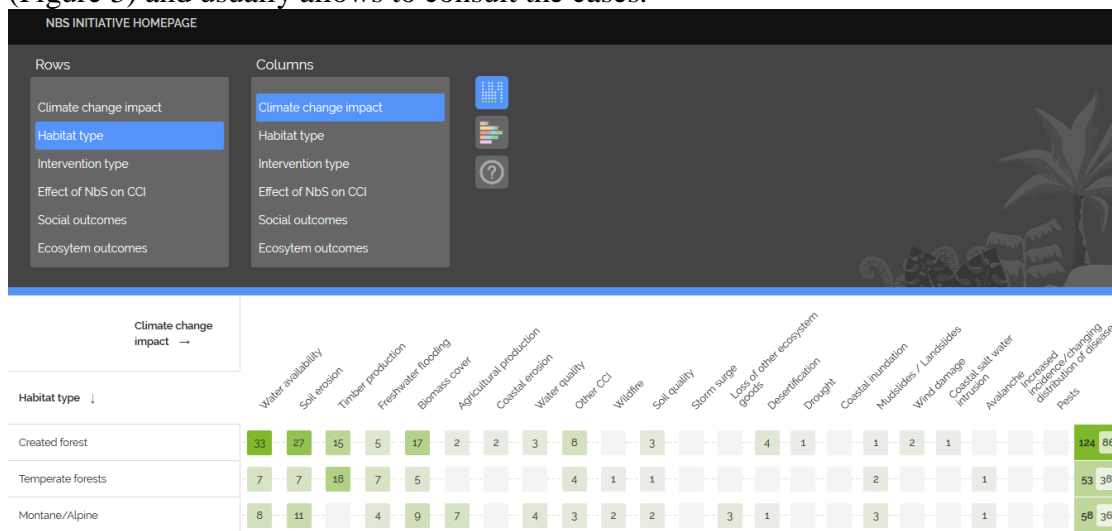


Figure 3: Heat map of the Nature-based Solutions Evidence Platform

In this example, when clicking on the number of cases (for example 11 cases concerning soil erosion in Montane/Alpine habitat), the list of results are displayed (Figure 4).

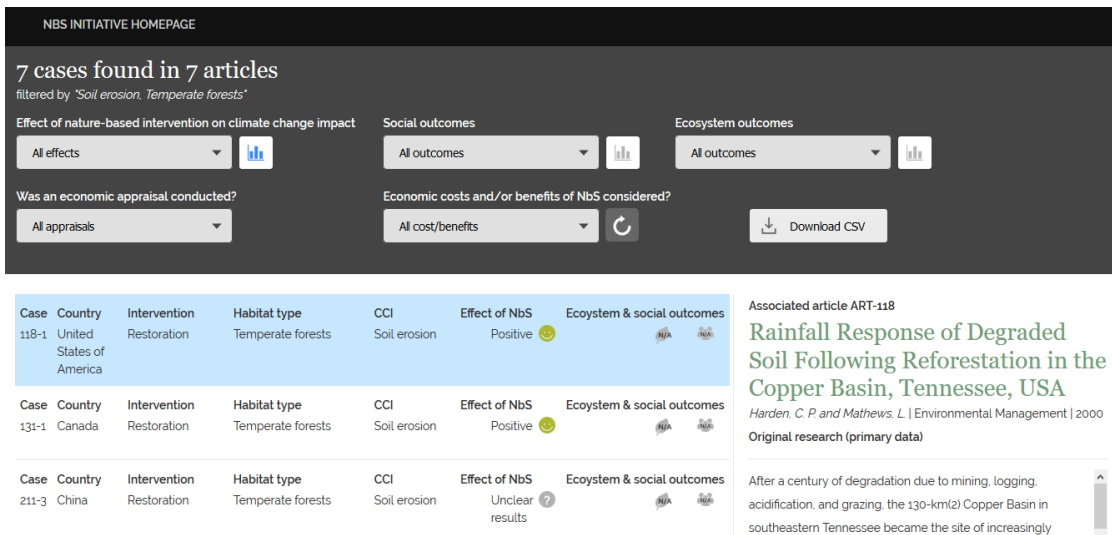


Figure 4: Display of results (erosion cases for montane/alpine habitats) on the Nature-based Solutions Evidence Platform

2.2 Review of selected existing database

2.2.1 Nature-based Solutions Evidence Platform

The Nature-based Solutions Evidence Platform is one of the two platforms proposed by the Nature-Based Solutions Initiative (Figure 5). It is held by the University of Oxford and is available at <https://www.naturebasedsolutionsevidence.info/>



Figure 5: Evidence platform welcome page

The overall objective of this platform is to “consolidate and facilitate access to the large dispersed evidence-base on the effectiveness of NBS for addressing climatic impacts on

people and economic sectors, and thereby support global efforts to design and implement robust targets for nature in climate change and development policy”.

As presented on the home page of the platform, the tool allows different actions:

1. Explore evidence on how effective different nature-based interventions are for addressing climate change impacts,
2. Compare social, economic, and environmental effects of different nature-based interventions
3. Filter by region, country, biome, or type of outcome
4. Generate maps, graphs and download data, and
5. Link the evidence to Nationally Determined Contributions.

The tool proposes both empirical evidence and modelling/scenario evidence. The empirical evidence is divided in 4 main parts: the basic article search, the heat map, the fine case search and the global map search. The global map search allows to browse cases according to geographic criteria.

Some evaluations of the cases are displayed and three kind of outcomes are reported:

- Effects on climate change impacts
- Social outcomes
- Ecosystem outcomes

They can be measured, observed, or ex-ante modelled outcomes from original articles.

The platform gathers 203 scientific articles and 303 cases.

2.2.2 Natural Hazards – Nature-based Solutions

The natural hazards – nature-based solutions platform is held by the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR), and Deltares. It is available at <https://naturebasedsolutions.org/> (Figure 6).

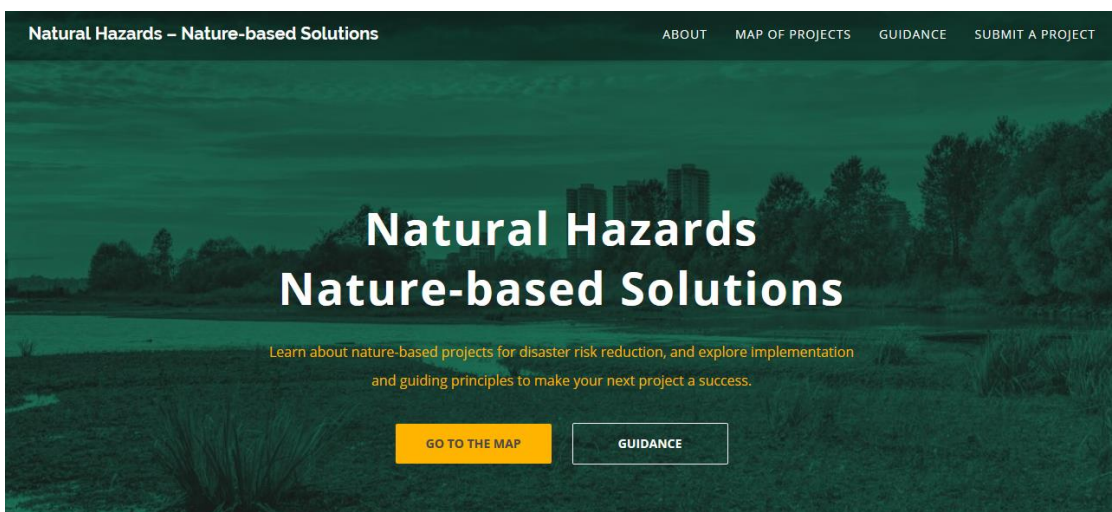


Figure 6: Natural Hazard - Nature-based solutions home page

This platform gathers example of “projects, investments, guidance and studies making use of nature to reduce the risks associated with natural hazards”.

The platform gathers 186 entries around the world. The platform also enables users to submit new project for entry in the database. This is possible through a form.

It is possible to browse these entries thanks to the map interface (Figure 7) or through filter search (Figure 8).

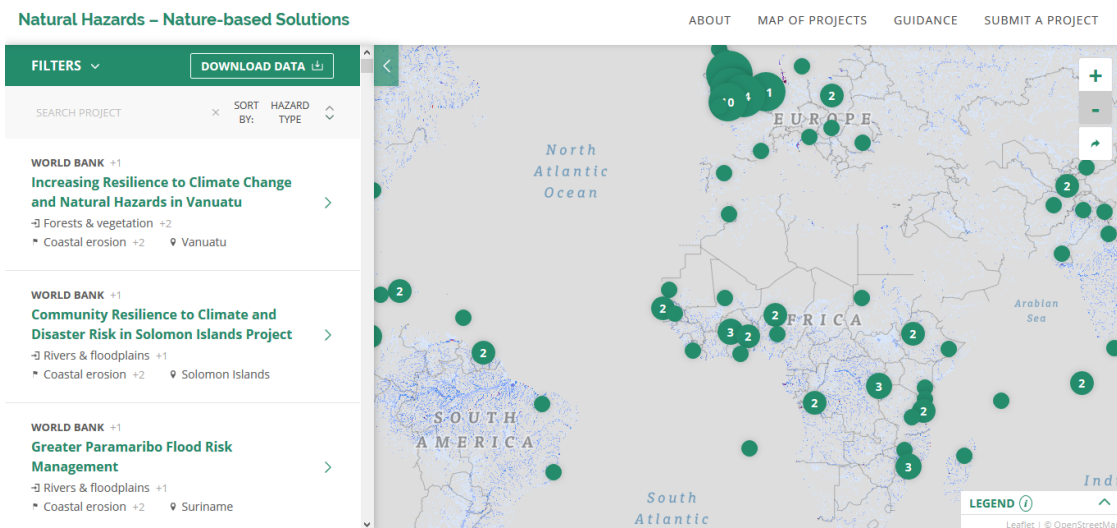


Figure 7: Map interface

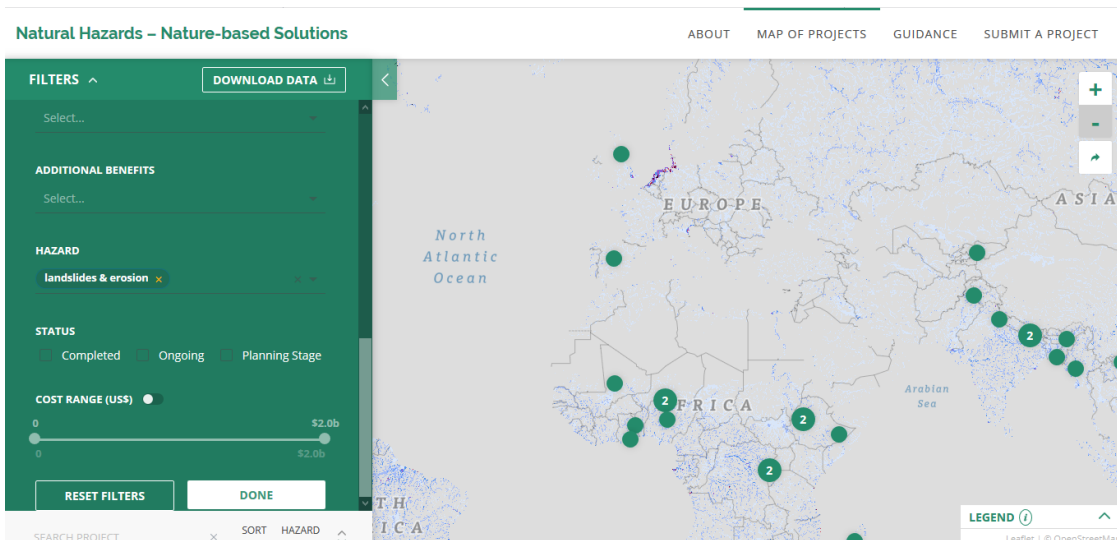


Figure 8: Filter search

2.2.3 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” 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.
- “Oppla community” is a networking system to interact with other members around the world, it is accessible to everyone.

The Oppla platform gathers 292 case studies around the world, currently the date reflects cases on 4 continents: Europe, Asia, Africa and America (Figure 9).

The screenshot shows the Oppla website interface. At the top left is the Oppla logo. To its right are social media icons for email, Twitter, LinkedIn, and YouTube, followed by a search bar with the placeholder text 'enter search terms:'. Below the search bar are buttons for 'ASK' and 'JOIN / LOG IN'. The navigation menu includes 'ABOUT', 'MARKETPLACE', 'COMMUNITY', 'CASE STUDIES' (which is underlined), 'ASK OPPLA', and 'CONTACTS'. The main content area is titled 'Case studies' and shows 'Displaying 1 - 292 of 292'. A world map is displayed with several pins, each containing a number representing the count of case studies in that region. The numbers are: North America (5), South America (15), Europe (211), Africa (2), Asia (32), and Australia (2). On the right side, there is a 'SEARCH' section with a search bar, a 'Scale' dropdown menu, and a 'Type' dropdown menu. Below these are 'APPLY' and 'RESET' buttons. Underneath the search filters, there are two sections: 'NBS City Case Studies' and 'Nature-based solutions in Brazil'. At the bottom left, a featured case study is shown with the title 'Rotterdam - NBS for building a waterproof city'. The text below the title reads: 'Rotterdam aims to be 100 % climate-proof by 2025. This is the goal expressed in the city's climate change adaptation programme. This means that by 2025'. A small image of a building is visible to the right of the text.

Figure 9: Oppla case studies page (<https://www.oppla.eu/>)

2.2.4 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 (NBS). This platform allows online dialogue, knowledge repository and networking. The ThinkNature platform (<https://platform.think-nature.eu/home>) has different parts:

- The “NBS project” tab gathers NBS Projects, Sites & Platforms
- The “Case Studies” tab gathers example of NBS around the world (Figure 10)
- The “Resources” tab is a knowledge repository, a Hub for online resources on NBS state-of-the-art practise
- Other tabs concerns ThinkNature events: Bucharest and Paris Forums, interviews, summer school and webinars.



Figure 10: Think Nature NBS 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.

2.2.5 GeoKP platform (OPERANDUM project)

The Geospatial Information Knowledge Platform is developed by the H2020 OPERANDUM project (Figure 11).

The NBS explorer (map or table view allow to browse 94 literature solutions) and also the related policies. A dedicated section “OAL” for open-air laboratories provides detailed information on OPERANDUM open-air laboratories activities. A tab of the main menu also links to a crowdsourcing module that gathers 302 cases.

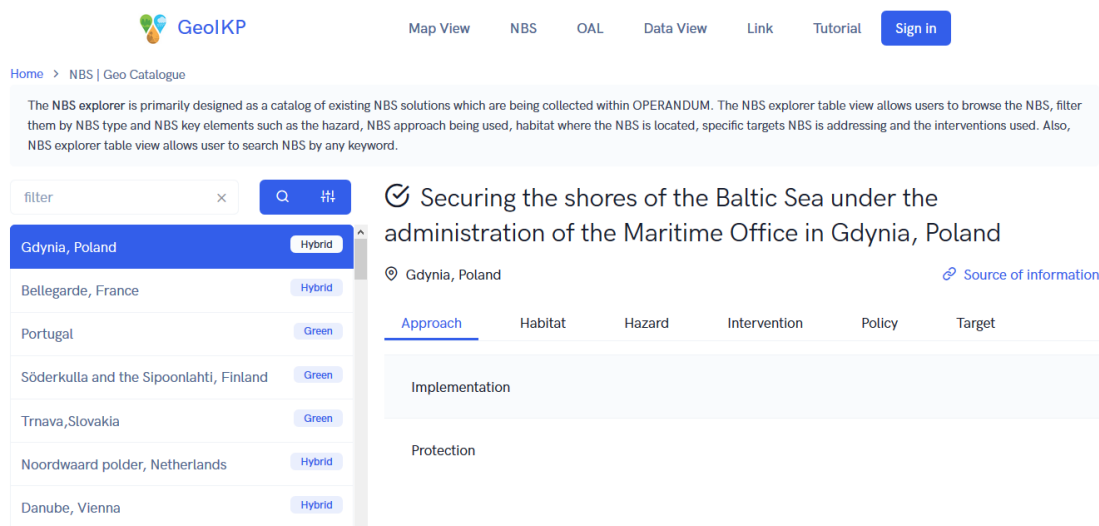


Figure 11: GeoKP geo catalog

2.2.6 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 (Figure 12) 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.

The platform gathers:

- 40 adaptation options
- 103 case studies
- 149 guidance
- 39 indicators
- 172 information portals
- 110 organizations
- 932 publications and reports
- 598 research and knowledge
- 78 tools
- 5 videos

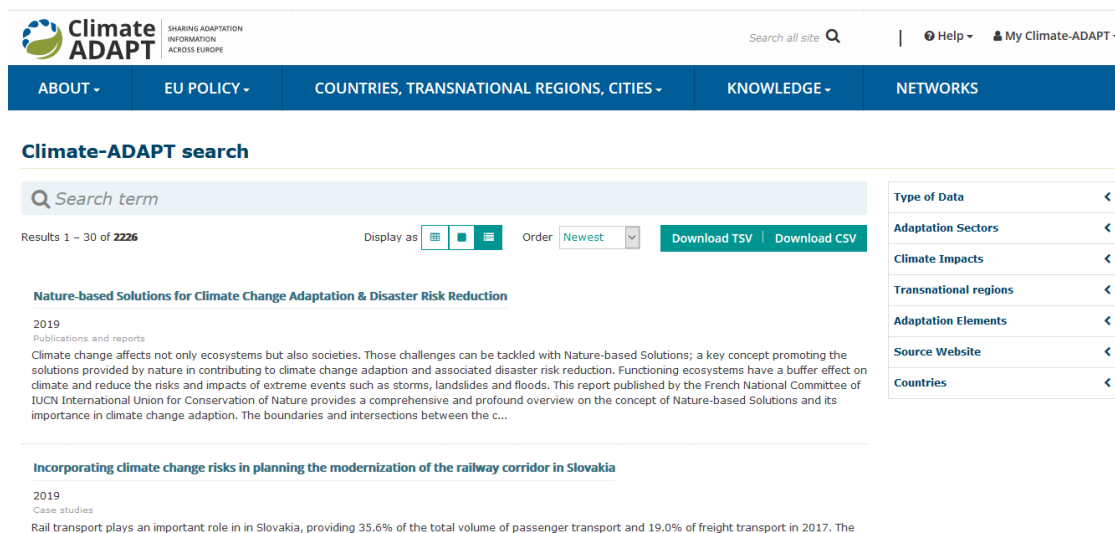


Figure 12: Climate-ADAPT database

2.2.7 Urban Nature Atlas

Urban Nature Atlas (<https://naturvation.eu/atlas>) contains almost 1000 examples of Nature-Based Solutions from across 100 European cities (Figure 13).

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.



Figure 13: Urban Nature Atlas

2.2.8 PreventionWeb

PreventionWeb (<http://www.preventionweb.net>) is a knowledge center managed by the UN Office for Disaster Risk Reduction (UNISDR). It gathers documents, publications and news (Figure 14). It is not dedicated to NBS but include documents of interest.

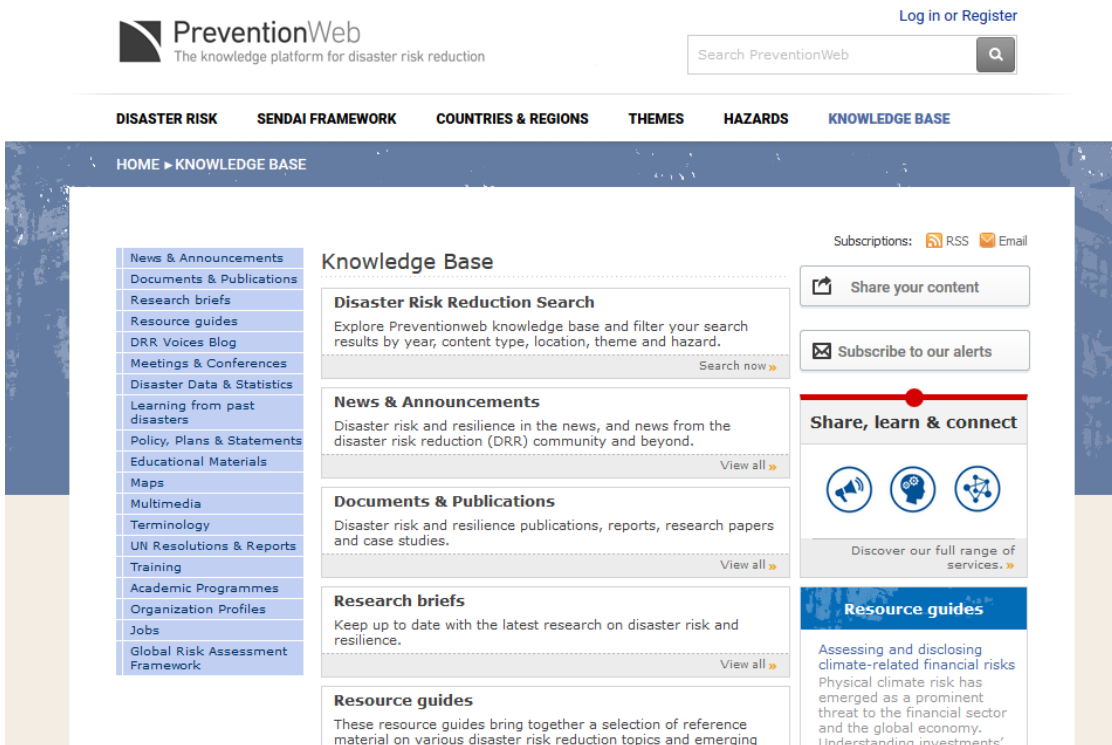


Figure 14: Prevention Web Knowledge Base

2.2.9 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 (Figure 15). 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 systematic 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).

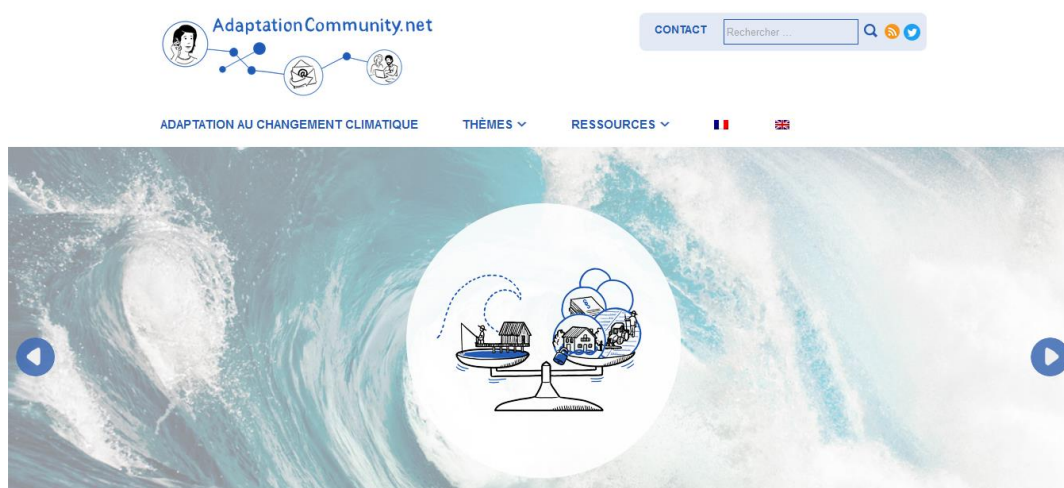


Figure 15: AdaptationCommunity.net Home page

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 16).

Ecosystem	Examples of EbA Measures	Ecosystem services addressed (Environmental Benefits)	Climate drivers addressed (Adaptation Benefits)	Socio-Economic Benefits
Mountain	Alpine ecosystem restoration such as the conservation or sustainable management of grasslands	<ul style="list-style-type: none"> ◦ Erosion prevention & fertility maintenance ◦ Water provision ◦ Food provision ◦ Maintenance of genetic diversity ◦ Habitats for species ◦ Medicinal resources provision ◦ Recreation 	<ul style="list-style-type: none"> ◦ Extreme temperatures ◦ Extreme precipitation ◦ Flooding ◦ Drought ◦ Warming trend 	<ul style="list-style-type: none"> ◦ 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 16: Example of potential Ecosystem-based adaptation measures relevant for a Mountain ecosystem as presented on AdaptationCommunity.net)

2.2.10 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 (Figure 17), these communities are represented through portals. As PANORAMA evolves, we welcome additional themes and new partners.”

This portal gathers 102 Ecosystem-based solutions.

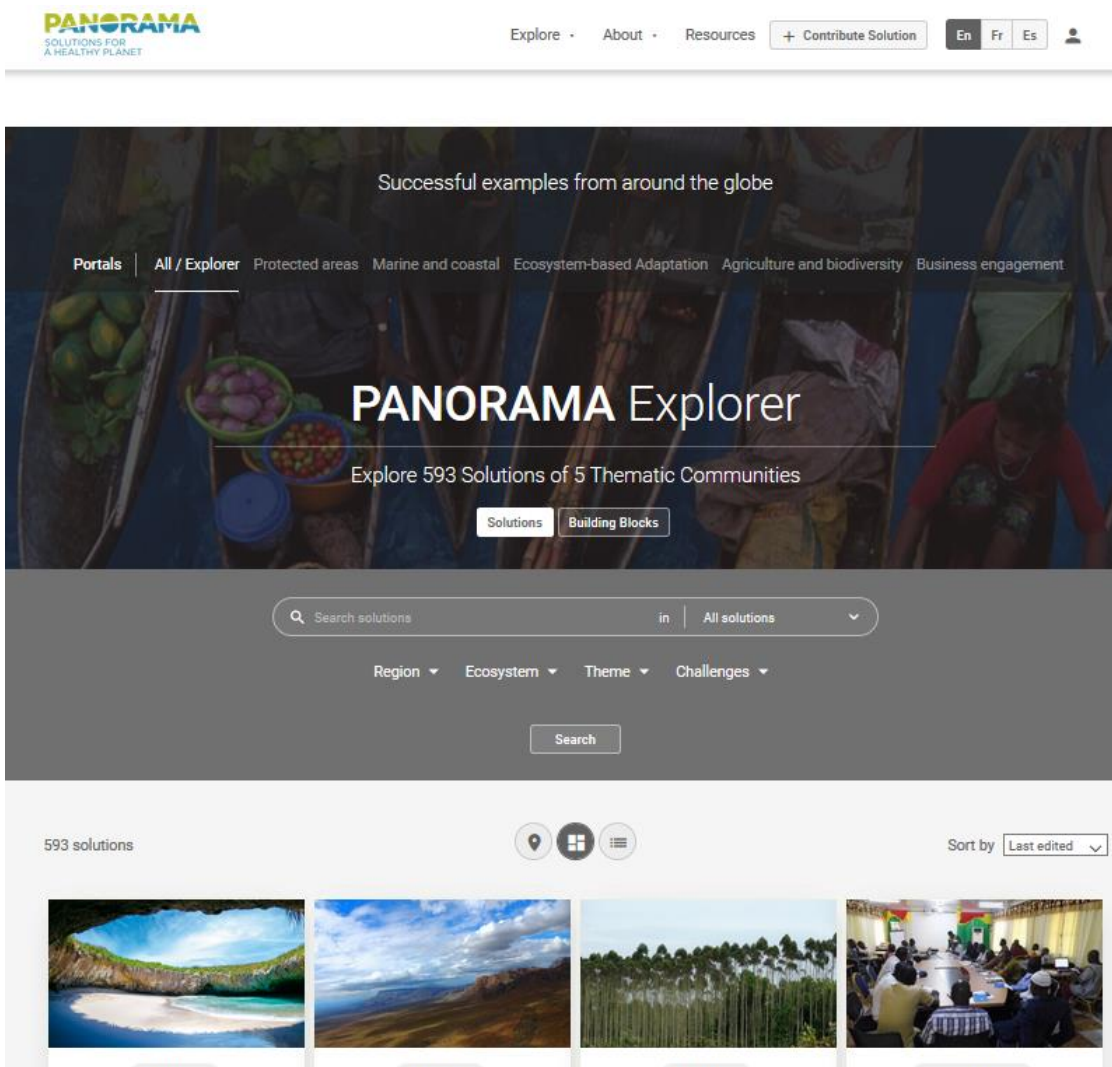


Figure 17: PANORAMA explorer welcome page

2.2.11 C40 Cities

C40 networks aims at connecting city practitioners and Mayors around the world to enable stronger collective climate action (Figure 18). In addition, C40 provides services to member cities organized across a series of Programme areas such as for example “Inclusive Climate Action”, “Low-Carbon Districts Forum” and so on.

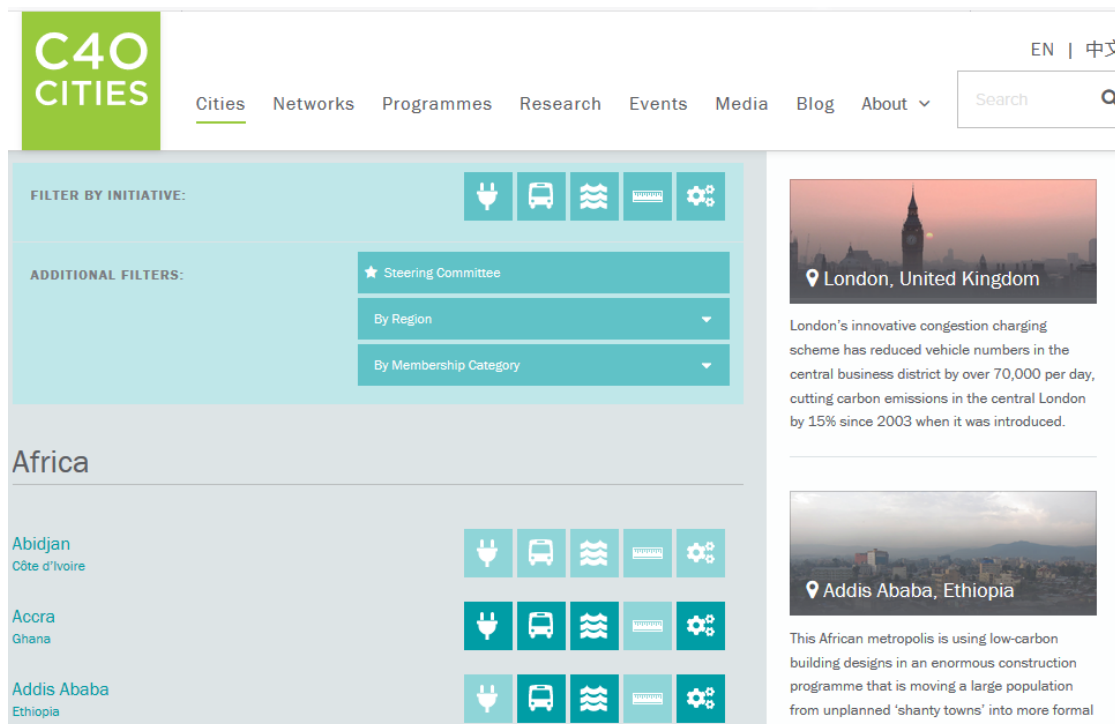


Figure 18: C40 cities webpage

2.2.12 Equator Initiative

The Equator initiative (<https://www.equatorinitiative.org/>, Figure 19) brings together the United Nations, governments, civil society, businesses and grassroots organizations to recognize and advance local sustainable development solutions for people, nature and resilient communities. It aims to:

- Recognize the success of local and indigenous initiatives
- Create opportunities and platforms to share knowledge and good practice
- Inform policy to foster an enabling environment for local and indigenous community action
- Develop the capacity of local and indigenous initiatives to scale-up their impact.

	Citizen involved in monitoring								x				
Display	Heat map	x								x		x	
	Map view	x	x	x	x	x			x				
Data	NBS only	x	x	x	x	x			x			x	
	Number of Case studies	303	186	292	112	94	106					134	721
Sources of data	Articles	x						x	x				
	Projects		x	x	x	x	x	x	x				x
Download data		Csv	Csv							Csv and Tsv			
Languages	English	x	x	x	x	x	x	x	x		x	x	x
	French										x	x	x
	Arabic												x
	Chinese											x	x
	Spanish										x		x
	Indonesian												x
	Portuguese												x
	Russian												x
Submit an entry and/or crowdsourcing			x				x					x	
Other feature	Projects and platforms catalogue					x		x					
	Annual prize												x
	e-learning										x		x
	Blog											x	x
	Forum				x								x
	FAQ				x				x				
	marketplace				x								
	e-library										x	x	x
	Multimedia centre					x					x	x	x
		Methodology								x			
	Results								x				
	webinar										x		

Table 2: Metadata used in the different databases

		NBS evidence platform	Natural-hazard NBS	Oppla	ThinkNature	GeoKP	Climate-Adapt	Urban Nature Atlas	Prevention web	AdaptationCommunity	Panorama	C40 cities	Equatorinitiative
Description	Title	x	x	x	x	x	x	x	x		x		x
	Summary	x	x		x			x			x		x
	Objectives			x	x	x							
	Implementation activities				x	x		x					
	NBS action		x	x	x	x							
	Type of data (qualitative, quantitative, ...)	x											
	Category (green, grey, ...)						x	x					
Dates	Date of publication / last edition			x			x				x		
	Date of project / NBS implementation		x		x								
	Project duration / Implementation time / Life time						x	x					x
	Location (coordinates and/or description)			x	x	x		x			x		x
	City /area population							x					
Domain	Intervention (habitat created, restauration, combination)	x	x			x							
	Ecosystem concerned										x		x
	Theme (adaptation, DRR, ...) / Type of action / Keyword			x	x		x				x		x
	Hazard addressed / Climate impacts	x	x				x	x			x		
	Habitat	x											
Evaluation	Effects of NBS / NBS benefits	x			x								
	Ecosystem and social outcomes	x											
	Comparative effectiveness of intervention?	x											
	Report effect GHG mitigation?	x											
	Non-experimental evaluation done?	x								x			

3 PHUSICOS database and prototype platform

The PHUSICOS database is innovative in that it is focused on NBS of interest for hydro-meteorological events in mountains and rural areas. This database was compiled under Task 7.1 and is based on cases extracted from various NBS databases and platforms. The database will be augmented by the addition of new cases as these are discovered in the literature or on other platforms.

The PHUSICOS platform will provide access as well as tools to access this database. The platform will be fully developed under task 7.3, but currently is present in a prototype form providing access to the PHUSICOS database.

The PHUSICOS platform is accessible directly through a web portal (<http://phusicos.brgm.fr/en>) and is also accessible via the project website (<https://phusicos.eu/>). The portal is available in English. Currently a user account is needed to login and is accessible through self-registration (Figure 22), but eventually, read-only will be accessible to everyone and an account will be required only to contribute to enrich the database by submitting new solutions.

The database is implemented based on Baills et al. (2020b) in an open source CMS (Content Management System) website. The system supports file storage to for documents and a map server to provide geo-referenced access to the cases in the database.

Users access the database via two interfaces: map based and via a searchable database.

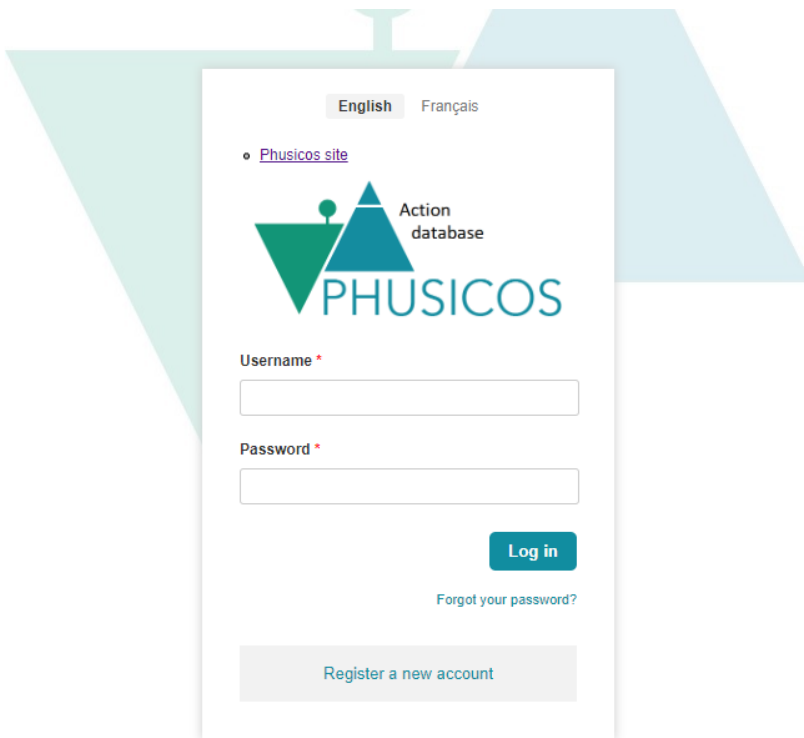


Figure 22: Log in interface

3.1 The map view: the default interface

The main interface is structured in 4 blocks (Figure 23)

- 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 24)
 - Part 2: this toolbar allows the user to print the actual map or to search for a specific location (Figure 25)
 - Part 3: Allowing the user to select layers of information (Figure 26)

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.

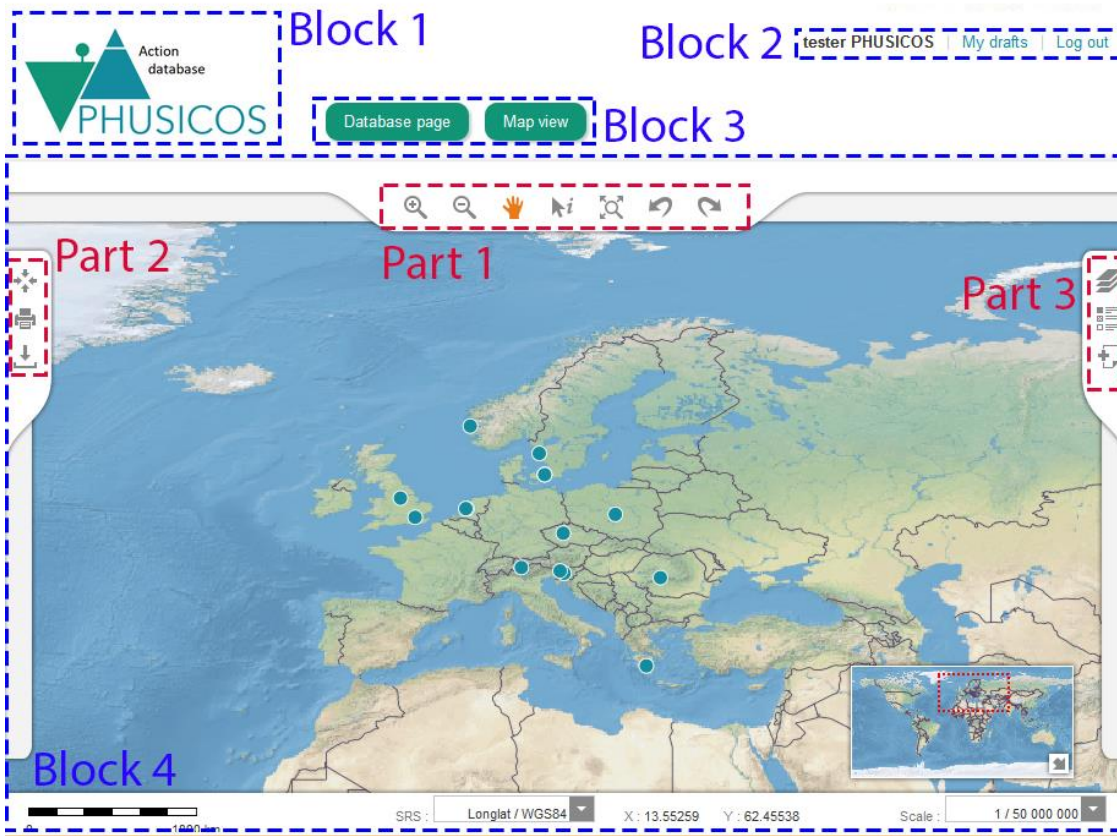


Figure 23: The map interface of the PHUSICOS platform

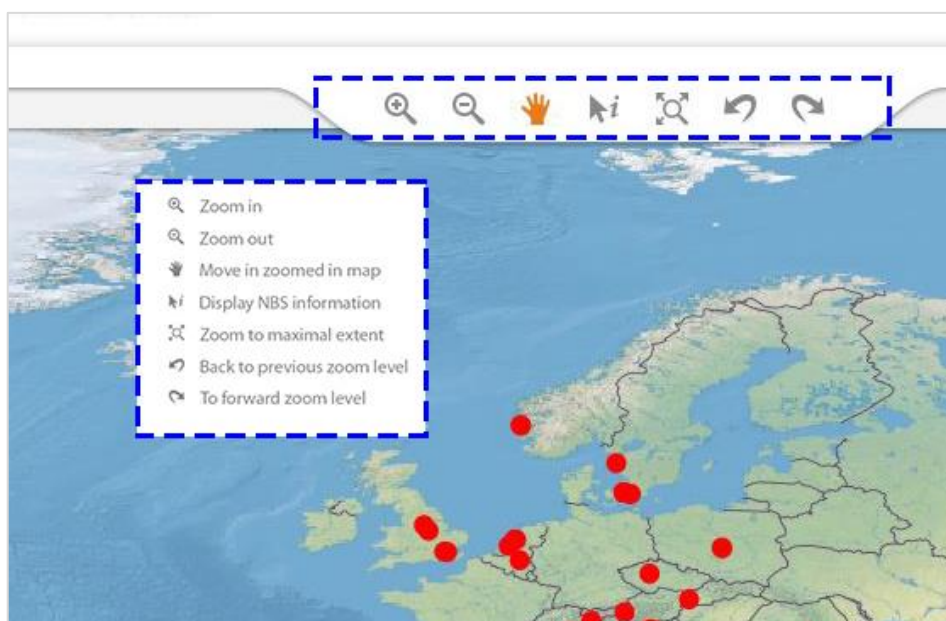


Figure 24: "Part1" Toolbox of the map interface of the PHUSICOS platform. Possible actions for zooming or displaying NBS information

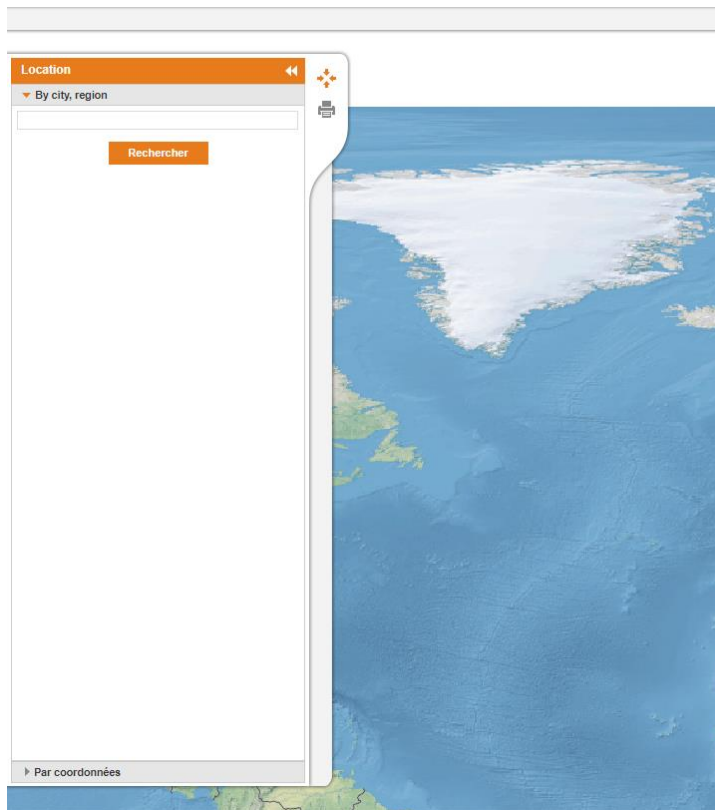


Figure 25: "Part2" Toolbox of the map interface of the PHUSICOS platform. Selection of a specific location

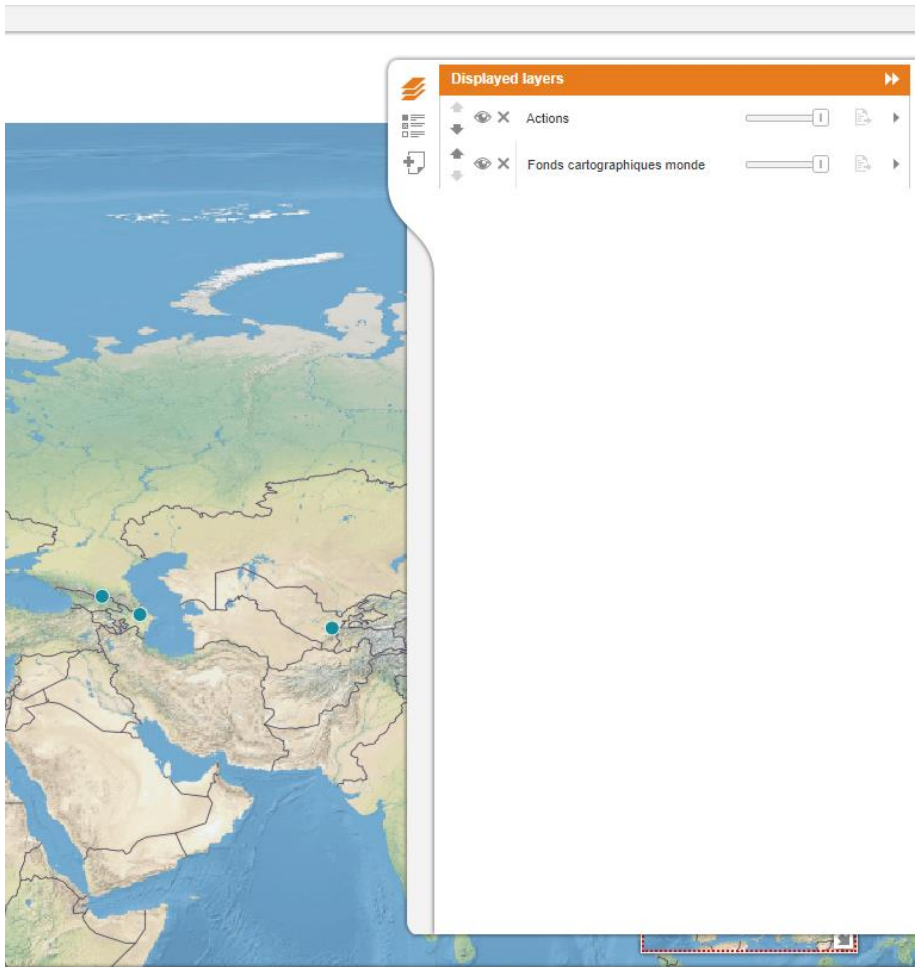


Figure 26: "Part3" Toolbox of the map interface of the PHUSICOS platform. Layers information

Access to the NBS pages is possible through the Toolbox (Figure 23, Part 1 and Figure 24). 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 27).

The screenshot shows the PHUSICOS Action database interface. At the top left is the logo with the text 'Action database' and 'PHUSICOS'. To the right are links for 'Map view' and 'Phusicos site'. Further right are user links: 'Testeur | My drafts | Log out'. At the bottom right are language options: 'English' and 'Français'.

The main content area is titled 'Green corridors and greening the city: Amsterdam case study'. It contains two main sections:

- Solution ID**
 - Title of Nature Base Solution:** Green corridors and greening the city: Amsterdam case study
 - Date of entry:** Wednesday, 6 March, 2019
 - Date of last edition:** Wednesday, 6 March, 2019
 - External link:** <https://oopla.eu/embedded-case-study/18009>
- Description of solution**
 - Summary (Challenges; Objectives):** The 2010 city-region plan 'Structural Vision: Amsterdam 2040', managed by the Department of Physical Planning, set the investment and project ambitions for the period 2010-2040. The strategy seeks to fulfil the vision of a creative and varied city, with an integrated public transport network, high quality urban planning, and investment in recreational green spaces, water and renewable energies. Water-related hazards, such as floods and storm surges, are managed at all levels - city, regional and national. The 'Agenda Groen 2015-2018' (Green Agenda 2015-2018) includes specific 'Nature Based Solutions' as part of the Structural Vision. Greening the city: Green areas play an important role in making the city climate proof, regulating water flow and mitigating run off. Green roofs and green walls affect the urban climate as well as the climate inside buildings. Green corridors Planning for biodiversity must take the spatial requirements of species into consideration by providing sufficient, connected areas of habitat for them. It also plays a role in regulating water flow and mitigating run off.
 - Technical characteristics:** Amsterdam had more than 150 000 m2 of green roofs and aimed to add another 50 000 m2 before the end of 2018.

Figure 27: Example of NBS description page

3.2 The database interface

The second interface is structured in 6 main blocks (Figure 28):

- 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.

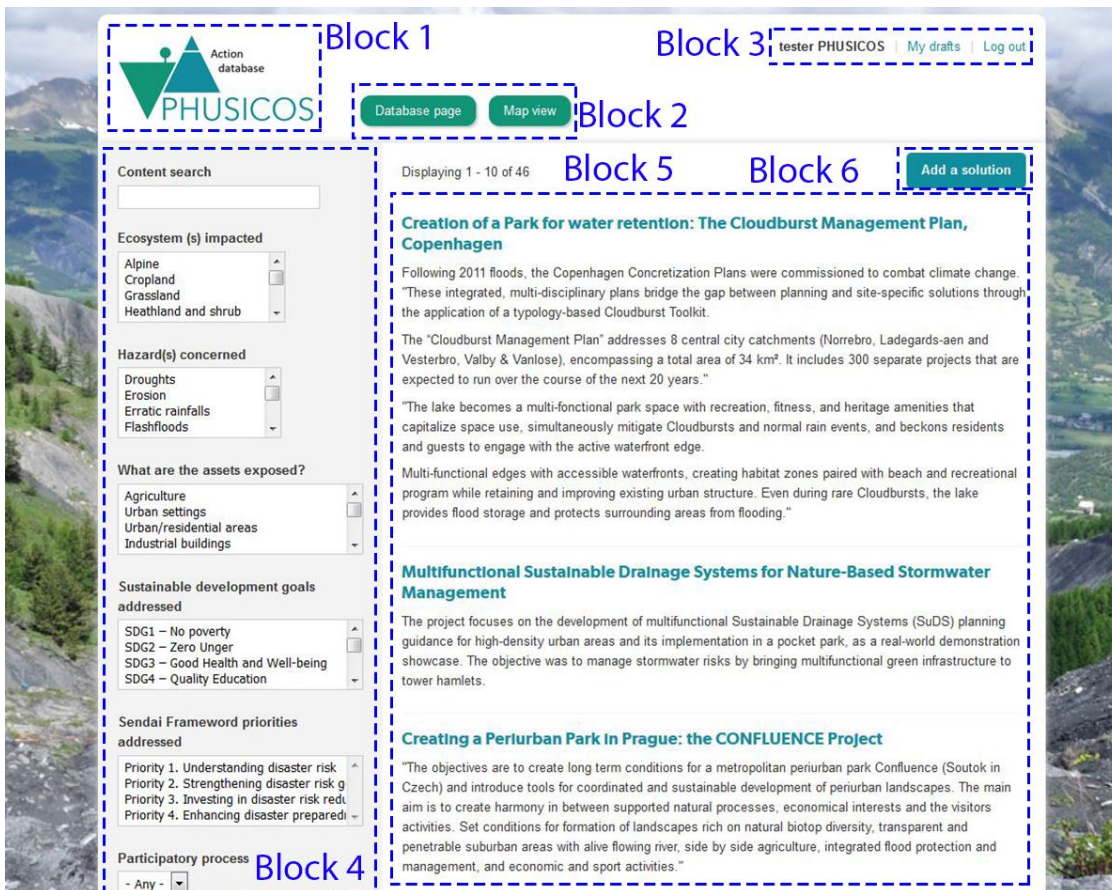


Figure 28: Detail of the second interface that enable to add new NBS to the database and to search by keywords among NBS already entered in the platform.

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.

3.3 Add a solution interface

Adding a solution is available through a nine-part form.

The form includes fields concerning:

- Solution ID
- Description of the solution
- Exposition
- Activity
- International classification
- Actors
- Temporal aspects
- Financial aspects
- Others (participatory approaches, possibility to transpose the action, ...)

All submitted NBS are validated by a member of the PHUSICOS team before being published on the portal.

4 Structuring the data in the PHUSICOS database: typology

The PHUSICOS database currently gathers 46 entries and will be enriched in the coming weeks. To characterize and sort these 46 solutions, we have created 30 fields (boolean) within the following categories:

- The nature of impacted ecosystems,
- The hazard concerned,
- The other themes treated by the NBS,
- The type of exposed assets.

4.1 Nature of impacted ecosystems

The Nature of impacted ecosystem gathers 8 Fields: Mountains, Rivers, Wetland, Urban, Grassland, Woodland, Cropland, and Heathland.

Table 3 and Figure 29 show the dominant ecosystems impacted are urban (35.1%) followed by woodlands (17.6%) and rivers (13.5%) and mountains (13.5%).

Table 3: Repartition of impacted ecosystems

Ecosystem	Number	Percentage
Urban	26	35.1
Woodland	13	17.6
Mountains	10	13.5
Rivers	10	13.5
Wetlands	7	9.5
Grassland	5	6.8
Heathland	2	2.7
Cropland	1	1.4

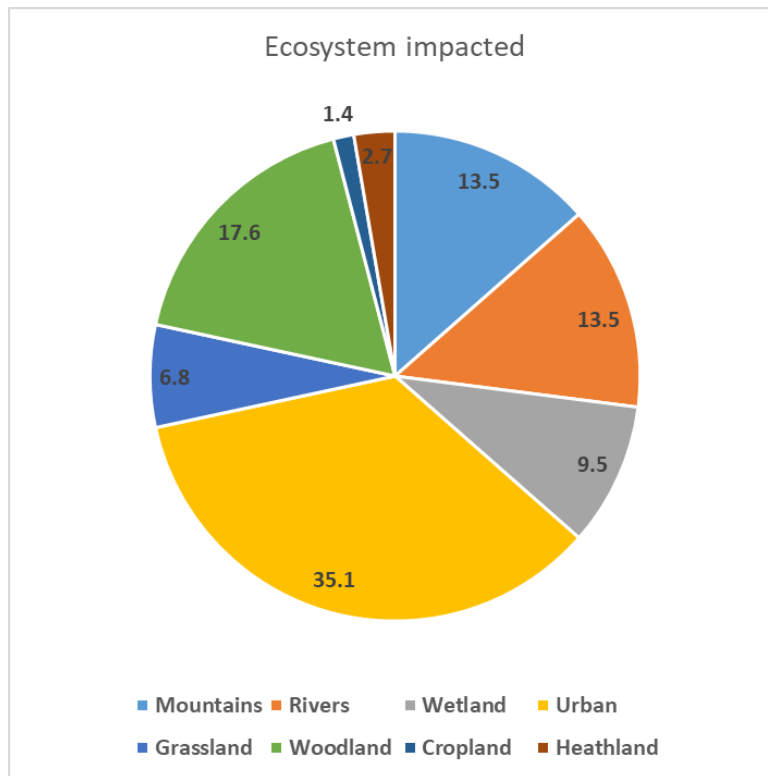


Figure 29 : Percentage of NBS by type of impacted ecosystem

4.2 Hazard concerned

Within the database, there are 10 fields corresponding to the hazard concerned: Floods, Flash floods, Rainfalls, Landslides, Rock falls, Debris flows, Snow avalanche, Erosion, Heat waves, Droughts.

Floods are the largely dominant hazard treated by NBS (42.7%) followed by rainfalls (12%) while landslides, rock fall & debris flows recover together 18% of the cases (Table 4 and Figure 30). The others hazards represent only few percentage each ones (from 5.3% for snow avalanche to 2.7% for Droughts).

Table 4: Repartition of hazards concerned

Hazard	Number	Percentage
Floods	32	42.7
Rainfalls	9	12.0
Landslides	6	8.0
Rock falls	6	8.0
Debris flows	6	8.0
Snow avalanche	4	5.3
Erosion	4	5.3
Flash floods	3	4.0
Heat waves	3	4.0
Droughts	2	2.7

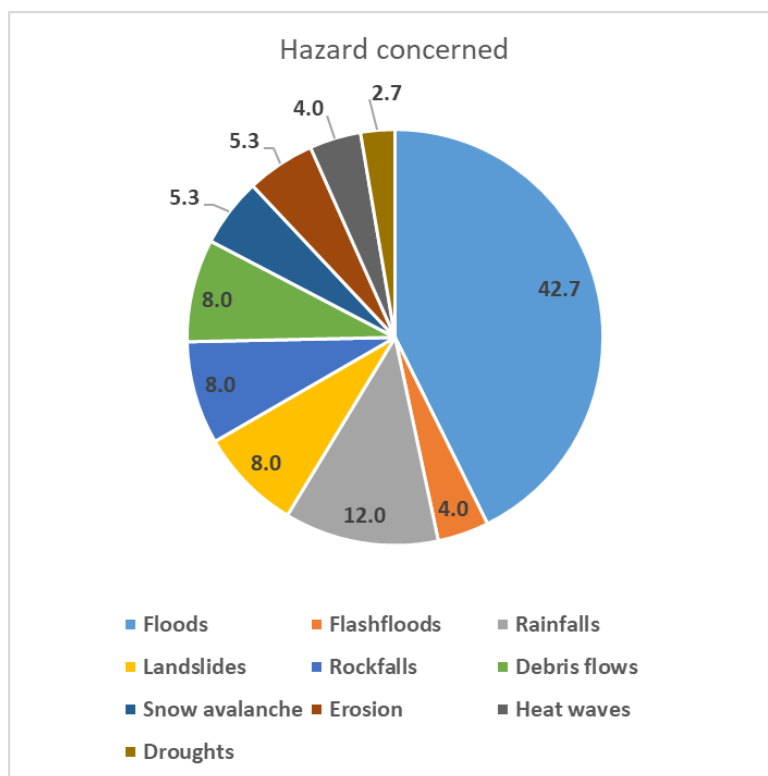


Figure 30: Percentage of NBS by hazard concerned

4.3 Other themes treated by the NBS

The other themes treated by the NBS gather 7 fields: Ecosystem conservation, Restoration, Biodiversity, Recreational activities, Landscape & cultural, local community involvement, Climate Adaptation.

Human well-being is mainly treated on a recreational perspective and is the dominant subject (31.8%). Climate adaptation is the second theme treated by NBS (25%) followed closely by the ecosystem conservation preoccupation. Landscape & cultural preservation is a question for 11.4% of the NBS while environmental restoration, biodiversity are theme rarely treated by NBS (Table 5 and Figure 31). The local community involvement is treated by only 12 NBS.

Table 5: Repartition of other themes treated by the NBS

Other	Number	Percentage
Recreational activities	14	31.8
Climate Adaptation	11	25.0
Ecosystem conservation	9	20.5
Landscape & cultural	5	11.4
Restoration	2	4.5
Biodiversity	2	4.5
Local community involvement	1	2.3

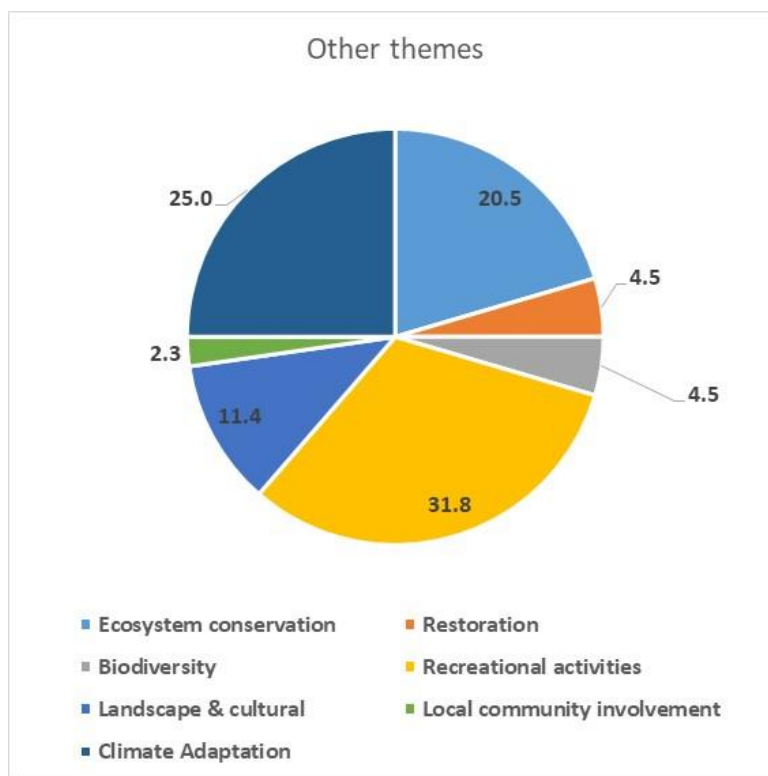


Figure 31: Percentage of NBS by other themes

4.4 Type of exposed assets

Five fields correspond to the type of exposed assets: Urban, Residential, Roads, Agriculture, and Natural.

The Urban asset is largely dominant followed by Residential. These two categories represent together 79.1% of assets while Roads, Natural environment and agricultural assets are represented in a few percentage of NBS (Table 6 and Figure 32).

Table 6: Repartition of the type of exposed assets

Type of asset	Number	Percentage
Urban	19	44.2
Residential	15	34.9
Roads	4	9.3
Natural	4	9.3
Agriculture	1	2.3

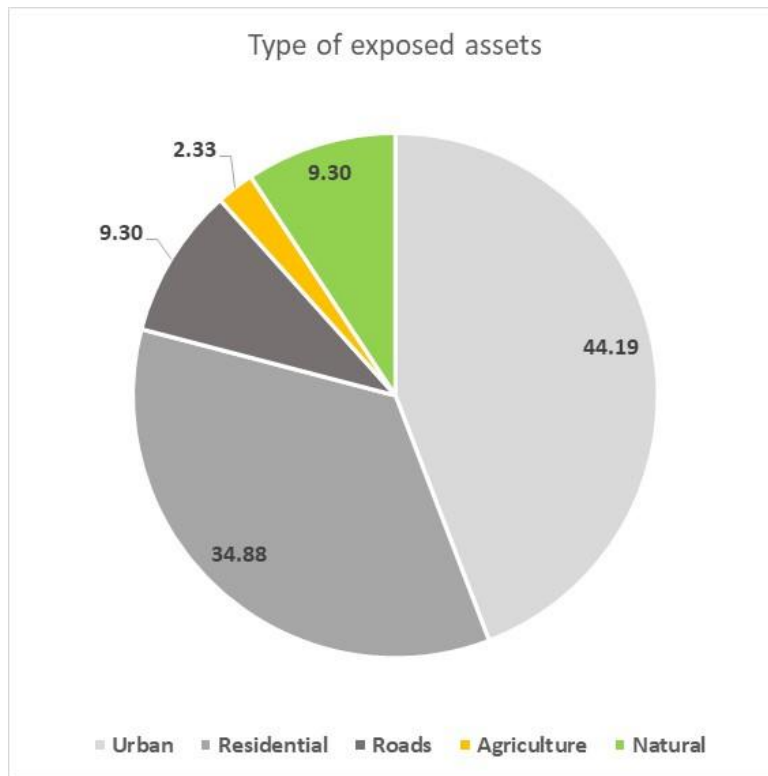


Figure 32: Percentage of NBS by type of exposed assets

5 Tools/methods for comparative assessment of NBSs

PHUSICOS designed a comprehensive framework for assessment of NBSs in context of natural hazard risk mitigation and ecosystem services monitoring (Autuori et al., 2019). This framework will be implemented in the PHUSICOS platform to assess the NBS implemented at demonstrator sites, but NBS collected and stored in the platform cannot be evaluated with this detailed framework due to a lack of data.

This chapter develops the general assessment framework which was developed in WP4, and the adaptation of this framework to assess all the NBS stored in the platform.

5.1 Comprehensive framework for NBS assessment (PHUSICOS WP4)

PHUSICOS WP4 verifies the performance of an NBS in the management of the risk process (Task 4.1), their environmental and socio-economic co-benefit, as well as their effectiveness in comparison/integration with grey solutions and other risk reduction measures (Task 4.5).

The identification of NBSs Performance Indicators (PI) is based on a hierarchical structure consisting of ambits, criterion and sub-criterion. The purpose of the NBS defines the ambits and the criterion (Table 7). In the task 4.1, each criterion is represented by one or more sub-criterion that can be described by a metric, a typology, a direction, a type of source, etc.

Table 7 : Purpose and resulting ambits and criteria

Purpose	Ambit	Criteria
Verify NBSs performances and their effectiveness with respect to Risk Reduction;	Risk Reduction	Hazard
		Exposure
		Vulnerability
Assess the technical and economic feasibility aspects	Technical & Feasibility Aspects	Technical Feasibility
		Economic Feasibility (affordability)
		Water
Assess the beneficial role of NBSs on the environment	Environment	Soil
		Vegetation
		Landscape (Green Infrastructure)
		Biodiversity
		Quality of Life
Identify positive co-benefits and potentially undesirable side-effects from the societal point of view	Society	Community Involvement and Governance
		Landscape and Heritage
		Revitalization of Marginal Areas
Assess the effects of the NBSs on the local economy	Local Economy	Local Economy Reinforcement

The methodology of analysis and assessment of NBS proposed in the D 4.1 is based on a Multi-Criteria-Analysis (MCA) of the metrics. This approach offers the possibility to accurately evaluate and compare different scenarios for a same NBS site and in theory to compare different NBS sites.

The NBS sites included in the PHUSICOS database are diverse in aspects: complexity, physical and human environments, approaches followed (modelling, data acquisition...), maturity and duration of implementation etc. Implementing the comprehensive framework requires specific data for metrics and characteristics. However, these metrics are not readily available (or do not exist) for the NBS cases that have been identified through the in-depth literature review and study of the available NBS databases. These cases were realized for various reasons and under various premises, and the metrics we require now were not necessarily relevant for those cases.

Moreover, the quantitative approach proposed in the 4.1 needs a deep knowledge of the site, and stakeholder engagement is necessary to define the appropriate weights for the performance indicators, criterion and ambits. Finally, the MCA is interesting when run for different solutions on the same site, but is not suited for the quantitative comparison of different solutions implemented at different sites and involving different sets of stakeholders.

In consequence, it is not realistic and desirable to perform the detailed assessment on the 46 sites included in the PHUSICOS database. For those sites we propose a simplified assessment framework.

5.2 Simplified Qualitative approach for NBS assessment

The proposed approach aims to assess qualitatively the effect of NBS at the criteria level (third column of Table 7) thanks to explicit assessment available in the original studies. The idea is not to perform an expert judgement assessment for all criteria - indeed we would lack data and knowledge of the site - but rather to rely on the assessment performed during the implementation of the NBS at the sites. For example, as it is proposed by the Nature Based Initiative on their platform for 3 criteria (Figure 33).













Case	Country	Intervention	Habitat type	CCI	Effect of NbS	Ecosystem & social outcomes
033-1	Ethiopia	Combination	Montane/Alpine	Soil erosion	Mixed results 	 
076-1	China	Restoration	Montane/Alpine	Soil erosion	Positive 	 
104-1	Kenya	Restoration	Montane/Alpine	Soil erosion	Positive 	 
132-1	China	Protection	Tropical and subtropical forests Montane/Alpine	Soil erosion	Positive 	 

Figure 33: The Nature Based Solution Initiative platform assesses NBS regarding their effect on climate change impacts, ecosystem and social outcomes (<https://www.naturebasedsolutionsevidence.info/evidence-tool/>).

Indeed, the criteria level is sufficiently general to be analysed for all the PHUSICOS NBS whatever the type of work, the realized approaches, the problematic or the spatial or temporal scale. Moreover, a unique metric cannot be assigned at the level of the criteria but a qualitative analysis of the result obtained for each criterion can be realized. It is a matter of giving a qualitative value of the incidence of the NBS on each criterion:

- "+" if the NBS have a positive impact on the criterion,
- "-" if the NBS have a negative impact on the criterion,
- "+/-" if the NBS have an ambiguous impact either in function of the case at which it is applied or in function of the effect on the sub-criterion (positive for one but negative for another),
- "0" if the NBS have no impact,
- "?" if the impact is unknown,
- "NA" when the criterion assessment is not applicable or irrelevant.

Once all criteria of all NBS are assigned, it is possible to sort the NBS in function of the assessment of one or several criteria (positive: "+", negative: "-", neutral: "0" or unknown: "?"). This classification was used by Baills et al. (2020a) and is very similar and coherent with categories used by the University of Oxford (see Table 8). The main

difference is that PHUSICOS will use 6 categories when the University of Oxford uses 5. Indeed, Oxford classification defines the unclear category as “when the authors do not derive an explicit conclusion as to whether the NbS intervention has either negative, positive, or neutral outcomes as per the above definitions”, which corresponds to the “?” category in PHUSICOS classification, but it doesn’t have any category for “neutral” outcomes.

Table 8: Comparison between Oxford classification (<https://www.naturebasedsolutionsevidence.info/>) and the PHUSICOS classification

<i>Oxford Classification</i>	<i>PHUSICOS Classification</i>
Positive	+
Negative	-
Mixed	+/-
	0
Unclear	?
Not applicable	NA

This classification allows to refine the search among NBS and to list good examples of NBS regarding to stakeholders priorities. Indeed, a stakeholder can identify its priority criteria (for example “soil”, “water” and “quality of life”) and select NBS that score “+” for those criteria. It can also be used to identify the NBS that fulfil positively the higher number of criteria.

It could be aggregated for a multicriteria analysis in order to sort the different NBS of the database, but it seems that comparing different NBS applied at different sites in different countries is sensitive.

5.3 Definition of assessment criterion

5.3.1 Criteria for the Risk reduction ambit

The following tables present the approach to assess each criterion within the Risk reduction ambit. See Table 9 - Table 11.

Table 9: Definition of assessment values for the hazard criterion

Hazard	Value	Signification
Whatever the type of hazard concerned within the PHUSICOS project (flood, debris flows, landslides...), this assessment focus on the effect of NBS on the Hazard level	+	The NBS and correlative actions reduce the hazard level i.e. lowering the water height or current velocity for flooding, stabilizing the landslide etc.
	-	The NBS and correlative actions are negative in term of reduction of hazard level i.e. increasing the hazard level
	+/-	The NBS and correlative actions are positive or negative in term of reduction of hazard level depending on the context or specific locations, or it is positive for one of the concerned hazards but negative for another

0	The NBS and correlative actions have no effect on the hazard level or the magnitude of the effect is too tiny to be detected
?	The effect of the NBS and correlative actions on the hazard level is unknown
NA	The criterion assessment is not applicable or irrelevant

Table 10: Definition of assessment values for the exposure criterion

Exposure	Value	Signification
The exposure to hazard are specific to each asset. Thus, the exposure of people, building, strategic buildings and plants may be modified by the NBS	+	The NBS and correlative actions reduce the asset exposure level i.e. lowering the exposure of population, building, networks to hazard etc.
	-	The NBS and correlative actions increase the asset exposure i.e. lowering the exposure of population, building, networks to hazard etc.
	+/-	The NBS and correlative actions that have ambiguous effect on the asset exposure depending on the context or specific locations.
	0	The NBS and correlative actions have no effect on the asset exposure or the magnitude of the effect is too tiny to be detected.
	?	The effect of the NBS and correlative actions on the exposure of asset is unknown
	NA	The criterion assessment is not applicable or irrelevant

Table 11: Definition of assessment values for the vulnerability criterion

Vulnerability	Value	Signification
It is “the capacity to resist to the damaging effects of a hazard or to respond when a disaster occurs”. Vulnerability varies significantly over time (UNISDR Terminology, 2009; Autuori et al., 2019).	+	The NBS and correlative actions reduce the asset vulnerability i.e. lowering the vulnerability of population, building, networks, ecosystem, etc. to hazard..
	-	The NBS and correlative actions increase the asset vulnerability i.e. increasing the vulnerability of population, building, networks, ecosystem, etc. to hazard..
	+/-	The NBS that have ambiguous effect on the asset vulnerability depending on the context or specific locations (in some areas the effect is positive while negative in other locations).
	0	The NBS and correlative actions have no effect on the asset vulnerability or the magnitude of the effect is too tiny to be detected
	?	The effect of the NBS and correlative actions on the vulnerability of asset is unknown
	NA	The criterion assessment is not applicable or irrelevant

5.3.2 Technical & Feasibility ambit

The following tables present the approach to assess each criterion within the Technical & Feasibility ambit. See Table 12-Table 13.

Table 12: Definition of assessment values for the technical feasibility criterion

Technical Feasibility	Value	Signification
Technical feasibility is the complete study of the project in terms of input, processes, output, fields, programs and procedures. It includes various perspectives, e.g. technical, social, legal, financial, market, and organizational. The technical feasibility study should consider the coherence of materials and techniques used (do they cause negative impacts or not).	+	The material and techniques used are coherent.
	-	The material and techniques are not coherent and cause negative impacts.
	+/-	The material and techniques used are ambiguous.
	0	/
	?	The coherence of methods and materials is unknown
	NA	The criterion assessment is not applicable or irrelevant

Table 13: Definition of assessment values for the economic feasibility criterion

Economic Feasibility	Value	Signification
Economy feasibility deals with cost-benefits aspects (initial costs, maintenance costs, replacement costs, avoided costs, payback period.	+	The NBS and correlative actions have a positive cost-benefits assessment
	-	The NBS and correlative actions have a negative cost-benefits assessment
	+/-	The cost benefits assessment is ambiguous.
	0	/
	?	The cost benefits assessment is unknown
	NA	The criterion assessment is not applicable or irrelevant

5.3.3 Environment

The following tables present the approach to assess each criterion within the Environment ambit. See Table 14-Table 18.

Table 14: Definition of assessment values for the water criterion

Water	Value	Signification
Water can be impacted by the NBS. The effect can be quantitative or/and qualitative. For example, the NBS can affect the infiltration/runoff ratio and thus have effect on groundwater recharge. In this case, it is a quantitative effect. Another example can be the fine sediment trapping by NBS during flood with direct effect on the water quality (turbidity) of the river.	+	The NBS and correlative actions have positive impact on water: e.g. the increase of the infiltration and a reduction of the runoff have positive impact on groundwater resource
	-	The NBS and correlative actions have negative impact on water e.g. by lowering of the groundwater level or by increasing the suspended matter in river
	+/-	The NBS that have ambiguous effect on water e.g. a positive impact on water quality but a negative impact in term of quantity.
	0	The NBS and correlative actions have no effect on the water or the magnitude of the effect is too tiny to be detected
	?	The effect of the NBS and correlative actions on the water is unknown
	NA	The criterion assessment is not applicable or irrelevant

Table 15: Definition of assessment values for the soil criterion

Soil	Value	Signification
The effects of NBS on soils can be various and affect directly its presence and thickness and/or its quality. The effect can be linked to the control of processes like erosion by NBS or in relation with environmental changes inducing modification of the soil quality (reforestation...).	+	The NBS and correlative actions have positive impact on the soil: e.g. Some mountainous NBS reduce significantly the soil erosion.
	-	The NBS and correlative actions have negative impact on soil.
	+/-	The NBS that have ambiguous effect on soil, e.g. a positive effect on erosion but a negative impact on soil fertility
	0	The NBS and correlative actions have no effect on the soil or the magnitude of the effect is too tiny to be detected. E.g. a NBS which not take care of soil
	?	The effect of the NBS and correlative actions on the soil is unknown
	NA	The criterion assessment is not applicable or irrelevant

Table 16: Definition of assessment values for the vegetation criterion

Vegetation	Value	Signification
Vegetation is an important element regarding the impact of hydro-meteorological events.	+	The NBS and correlative actions have positive impact on the vegetation: e.g. Some NBS increase significantly the vegetation cover and other vegetation characteristics.
	-	The NBS and correlative actions have negative impact on vegetation. E.g. reduction of density, loss of diversity, etc.
	+/-	The NBS that have ambiguous impact on vegetation, e.g. a positive impact on the vegetation cover but a loss of vegetal diversity.
	0	The NBS and correlative actions have no effect on the vegetation or the magnitude of the effect is too tiny to be detected
	?	The effect of the NBS and correlative actions on the vegetation is unknown
	NA	The criterion assessment is not applicable or irrelevant

Table 17: Definition of assessment values for the landscape (green infrastructure) criterion

Landscape	Value	Signification
The landscape is here related to the Green Infrastructure concept and concerns e connectivity and the mosaic diversity.	+	The NBS and correlative actions have positive impact on landscape connectivity and the mosaic diversity
	-	The NBS and correlative actions have negative impact on landscape connectivity and the mosaic diversity
	+/-	The NBS and correlative actions have ambiguous impact on landscape connectivity and the mosaic diversity
	0	The NBS and correlative actions have no impact on landscape connectivity and the mosaic diversity
	?	The NBS and correlative actions have unknown impact on landscape connectivity and the mosaic diversity
	NA	The criterion assessment is not applicable or irrelevant

Table 18: Definition of assessment values for the biodiversity criterion

Biodiversity	Value	Signification
This criteria includes functional diversity, forest habitat fragmentation or protected areas.	+	The NBS and correlative actions have positive impact on the biodiversity. E.g. The NBS is favourable to the increase of diversity (animal and vegetal)
	-	The NBS and correlative actions have negative impact on the biodiversity in reducing the diversity and abundance of functional groups.
	+/-	The NBS that have ambiguous effect on diversity depending on the sub-criterion: e.g; an increase of vegetal biodiversity but with an increasing fragmentation of the forest habitat.
	0	The NBS and correlative actions have no effect on the biodiversity or the magnitude of the effect is too tiny to be detected
	?	The effect of the NBS and correlative actions on the biodiversity is unknown.
	NA	The criterion assessment is not applicable or irrelevant

5.3.4 Society

The following tables present the approach to assess each criterion within the Society ambit. See Table 19-Table 21.

Table 19: Definition of assessment values for the quality of life criterion

Quality of life	Value	Signification
The Quality of Life criteria includes leisure and connection increase or social justice.	+	The NBS and correlative actions have positive impact on the quality of life, e.g. NBS that promotes recreational areas, increase visitor etc.
	-	The NBS and correlative actions have negative impact on the quality of life, e.g. NBS that does not allow the circulation of visitors
	+/-	The NBS that have ambiguous effect on the Quality of life; e.g. NBS that promotes recreational areas, increase visitors etc. but which is not accessible for people with disabilities.
	0	The NBS and correlative actions have no effect on the quality of life.
	?	The effect of the NBS and correlative actions on the quality of life is unknown.
	NA	The criterion assessment is not applicable or irrelevant

Table 20: Definition of assessment values for the community involvement and governance criterion

Community Involvement and Governance	Value	Signification
This criteria focuses on participatory processes and partnership.	+	The NBS and correlative actions have positive impact on the community involvement and governance. E.g. A NBS involving citizens and decision-makers together in its management
	-	The NBS and correlative actions have negative impact on the community involvement and governance. E.g. An NBS that does not involve citizens, even though they are the main applicants and beneficiaries of the NBS.
	+/-	The NBS that have ambiguous effect on the Quality of life. E.g. An NBS involving citizens but not the stakeholders in charge of the area
	0	The NBS and correlative actions have no effect on the community involvement and governance
	?	The effect of the NBS and correlative actions on the community involvement and governance is unknown.
	NA	The criterion assessment is not applicable or irrelevant

Table 21: Definition of assessment values for the landscape and heritage criterion

Landscape and Heritage	Value	Signification
This criteria takes into account traditional identity, heritage accessibility and landscape perception.	+	The NBS and correlative actions have positive impact on the landscape and heritage. E.g. An NBS that preserves cultural sites and promotes the organization of traditional events on the site.
	-	The NBS and correlative actions have negative impact on the landscape and heritage. E.g. An NBS that destroy cultural sites in order to reduce the hazard and exposure.
	+/-	The NBS that have ambiguous effect on the landscape and heritage criterion. E.g. The NBS is carried out at the expense of an archaeological site.
	0	The NBS and correlative actions have no effect on the landscape and heritage
	?	The effect of the NBS and correlative actions on the landscape and heritage criterion.
	NA	The criterion assessment is not applicable or irrelevant

5.3.5 Local Economy

The following tables present the approach to assess each criterion within the Local Economy ambit. See Table 22-Table 23.

Table 22: Definition of assessment values for the revitalization of marginal areas criterion

Revitalization of Marginal Areas	Value	Signification
This criteria relies on the promotion of socio-economic development of marginal areas.	+	The NBS and correlative actions have positive impact on the revitalization of marginal areas. E.g. The NBS promotes jobs creation for the construction and maintenance of the NBS, create new activities and employment in the tourism sector.
	-	The NBS and correlative actions have negative impact on the revitalization of marginal areas. E.g. The NBS occupies a space that is no longer available for a pre-existing activity incompatible with the NBS creating unemployment
	+/-	The NBS that have ambiguous effect on the revitalization of marginal areas. E.g. A mixt between the two previous categories
	0	The NBS and correlative actions have no effect on the revitalization of marginal areas. The NBS have no impact on the local economic sector.
	?	The effect of the NBS and correlative actions on the revitalization of marginal areas is unknown.
	NA	The criterion assessment is not applicable or irrelevant

Table 23: Definition of assessment values for the local economy reinforcement criterion

Local Economy Reinforcement	Value	Signification
This criteria is based on new areas for traditional resources (agriculture, livestock, fishing, forest, etc.) and the enhancement of local socio-economic activities.	+	The NBS and correlative actions have positive impact on the local economy reinforcement. E.g. NBSs create new opportunities in traditional activities by making available new "natural" areas that were not previously compatible with them.
	-	The NBS and correlative actions have negative impact on the local economy reinforcement. E.g. The NBS deprives farmers of areas previously devoted to their activities
	+/-	The NBS that have ambiguous effect on the local economy reinforcement. E.g. The forestation linked to an NBS in areas previously devoted to pasture could be perceived as well as positive as negative depending on the concerned person.
	0	The NBS and correlative actions have no effect on the local economy reinforcement.
	?	The effect of the NBS and correlative actions on the local economy reinforcement is unknown
	NA	The criterion assessment is not applicable or irrelevant

5.4 Examples of assessment

In order to test the methodology presented in §0, a temporary Access database has been created to easily perform the assessment of the NBS (Figure 34).

N°:

Risk reduction

Hazard

Exposure

Vulnerability

Environment

Water

Soil

Vegetation

Landscape

Biodiversity

Society

Quality of Life

Community Involvm

Landscape Heritage

Feasibility

Technical Feasibility

Economic Feasibility

Economy

Revitalization

Local_Economy

Short comment (255 char,

NBS Typology

Completed
 Validated

Figure 34: Assessment of Lovstien Nature Trail, Bergen, Norway (ID: 507, <http://phusicos.brgm-rec.fr/fiche-solution/507>)

Four examples of assessment have been run on different examples (Table 24):

- Lovstien Nature Trail, Bergen, Norway (ID 507)
- Tree planting counters landslides and erosion in Kazbegi, Georgia (ID 516)
- Reforestation and land use change as drivers for a decrease of avalanche damage in mid-latitude mountains, Spain (ID 517)
- Reforestation of mountain slope in Davos, Switzerland (ID 520)

Table 24: Examples of assessments

		507	516	517	520
Risk reduction	Hazard	+	+	+	+
	Exposure	?	?	+	NA
	Vulnerability	?	?	NA	+
Feasibility	Technical	?	?	?	?
	Economic	?	?	?	+
Environment	Water	+	?	NA	+
	Soil	NA	?	+	NA
	Vegetation	?	+	+	+
	Landscape	NA	NA	NA	NA
	Biodiversity	+	+	?	?
Society	Quality of life	+	+	+	+

	Community involvement	+	+	?	+
	Landscape heritage	+	+	0	?
Economy	Revitalization	?	?	0	?
	Local economy	?	?	0	?

For those four examples, a majority of ambits and half of the criteria could be assessed (Table 25). The ambits that were the most difficult to assess are the “Local economy” ambit and the “Technical & Feasibility Aspects” ambit. On the contrary, “Risk Reduction”, “Environment” and “Society” ambits could be assessed for the four NBS cases.

Table 25: Synthesis of assessment examples

	Case ID:	507	516	517	520
Number of “+” assessments		6	8	5	7
Number of “-” assessments		0	0	0	0
Number of “+/-” assessments		0	0	0	0
Number of “0” assessments		0	0	3	0
Number of “N/A” assessments		2	1	3	3
Number of “?” assessments		7	6	4	5
Total number of criteria assessed		6	8	8	7
Total number of ambits assessed		3	4	4	4

The number of criteria and ambits assessed together with the number of “?” provide an indication of assessment quality. The more criteria and ambits are assessed and the less “?” is given, the better it is and the more precise is the assessment. Thus the assessment of case 517 is from better quality than the others. On the contrary, case 507 collects 7 “?” out of 14 criteria which indicates that impact of the NBS on half of the criteria is uncertain.

Even so, the case 517 collects less “+” than the other cases and have positive impact on 5 criteria and is neutral regarding 3 other criteria while 3 more criteria are not applicable. It is then the weaker regarding positive outcomes if we consider the whole criteria, but it is still one of the two best solutions if only consider Risk reduction.

Based on those four examples, the proposed simplified framework seems to be suitable for the assessment of the literature NBS from the database.

As next step, the assessment will be performed for all NBS actions and implemented in the platform.

6 Conclusion

6.1 Summary

D7.2 presents different NBS existing platforms and describes the PHUSICOS platform together with the 46 NBS actions already stored in the database. Existing databases are rich in terms of urban context and the main innovation of the PHUSICOS platform is to gather NBS suitable for extreme hydro-meteorological events in 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.

The comprehensive assessment framework from WP4 was reviewed. While this approach is useful and appropriate for assessing various NBS types for a given location, it is not appropriate to comparatively assess NBS implementations for different sites addressing diverse hazards for differing groups of stakeholders.

To address this, a simplified assessment framework is defined to allow a quantitative assessment of NBS cases collected from the literature.

6.2 Recommendations for task 7.3

Next steps in task 7.3 will involve the stakeholders. It will require a strong cooperation with WP3. Cooperation with some existing platforms should also be intended to strengthen the platform.

The possibility of integrating a heat map to the PHUSICOS platform should be considered as it provide interesting information. In addition a need section should be added to the platform to store “information” on NBS.

Regarding the Living Labs, a reflexion should be carried with stakeholders to decide whether the details of the living labs should be store on the same format as the literature NBS or if they should be treated separately as it is done within the OPERANDUM GeoKP.

In addition the simplified qualitative approach will be submitted to the stakeholders and implemented in the PHUSICOS platform within Task 7.3 together with the detailed assessment framework for Living Labs.

7 References

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