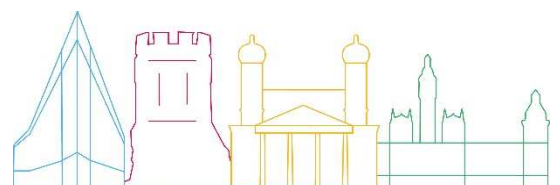




D6.1 ARCH Resilience Measures Inventory

User guide



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Table of contents

Table of contents.....	3
1. Introduction	5
2. What is the Resilience Measure Inventory?	5
3. What is the RMI for?.....	5
4. How to navigate and use the Inventory	6
4.1. Description of the tool format and technical requirements of use.....	6
4.2. The inventory structure & sequence	6
4.2.1. Step 1: Overview of the two sections of inventory	11
4.2.2. Step 2: Search the inventory and arrive at a short list of measures.....	13
4.2.3. Step 3: Compare specific features.....	20
4.2.4. Step 4: Download factsheets	22
4.3. Other functions.....	23
5. Use cases of the resilience measure inventory	25
5.1. Use Case 1: social resilience in an agricultural community.....	25
5.2. Use Case 2: Flood management	28
5.3. Use case 3: Early warning systems	31
6. References.....	¡Error! Marcador no definido.

List of Abbreviations

Abbreviation	Meaning
ARCH	Advancing Resilience of historic areas against Climate-related and other Hazards
EU	European Union
IPCC	Intergovernmental Panel on Climate Change
RAD	Resilience Assessment Dashboard
RMI	Resilience Measure Inventory
SECAP	Sustainable Energy and Climate Action Plan

1. Introduction

The ARCH project (Advancing Resilience of historic areas against Climate-related and other Hazards) aims to enhance the resilience of areas of historic and cultural value to climate change-related and other hazards. One its objectives is to identify which measures are suitable to build/improve the resilience of historic areas. In line with this objective, the Resilience Measure Inventory (RMI) has been developed.

2. What is the Resilience Measure Inventory?

It is a detailed list of measures to build local heritage resilience presented in a web-based format tool, Microsoft Power BI, to increase the user-friendliness.

3. What is the RMI for?

The aim of the RMI is to assist city administrators, heritage managers and related stakeholders to identify measures to strengthen the resilience of their heritage and consequently the whole city/municipality. The focus of the inventory is on (i) heritage building & structures as well as (2) cultural heritage landscapes with focus on agricultural heritage, to cover the scope of all Foundation cities. However, the RMI also provides resilience measures at urban scale. Urban resilience measures while not necessarily suitable for heritage areas, can nonetheless be considered for implementation in their vicinity *e.g.* to minimize impacts of extreme heat & heatwaves and flooding.

The inventory allows practitioners:

- To browse and compare measures for inclusion in a climate adaptation plan, a heritage management plan, or other action plan or strategy,
- To develop a preliminary portfolio of feasible measures¹. The RMI may be helpful in conjunction with vulnerability and risk analyses as well as resilience assessments.

These measures may be used:

- To identify previously unknown measures
- To gather more information about known measures
- To support SECAP development in the framework of the EU Covenant of Mayors (aiding the selection of appropriate measures for inclusion in the SECAP)

¹ To fine-tune the portfolio and develop a corresponding action plan, the preliminary portfolio should be complemented with additional context-specific knowledge and information *e.g.* feasibility, acceptability, alignment with other policy etc. This information may be available in the ARCH Hub or tools, come from local stakeholder knowledge and/or other sources (*e.g.* other relevant EU Projects). This finetuning may be done by other means such as prioritization exercises (*e.g.* multicriteria analysis, benefit-cost analysis) *e.g.* supported by tools as the CLIMACT-Prio tool and the FEMA Benefit-Cost Analysis (BCA) Toolkit 6.0 for multicriteria decision analysis and benefit-cost analysis, respectively.

4. How to navigate and use the Inventory

This section contains a short manual of the ARCH RMI tool. It describes the structure of the tool, the functionalities present within the tool and the logical steps for using the RMI with the intention of helping end-users to navigate through the inventory and achieve its objectives.

4.1. Description of the tool format and technical requirements of use

The RMI tool is a web-based application built on Microsoft Power BI. Thus, there exist some technical requirements for the optimal performance of the tool that must be fulfilled by the users.

At the time of writing this document, according to Microsoft's information²:

“Power BI is designed to work with any of the supported browsers listed below. However, performance varies depending on the browser you choose. If you use Internet Explorer in particular, you may experience poorer performance, therefore it is strongly recommended to use a more modern browser than Internet Explorer, such as Microsoft Edge. If performance is still not acceptable, try other supported modern browsers to see if they provide better results for the Power BI solution.

Power BI supports these browsers on all platforms on which they are available:

- *“Microsoft Edge Chromium*
- *Internet Explorer 11. Some advanced features, such as lineage view, are not supported in Internet Explorer. See Data Lineage (preview release) for more information.*
- *As of August 17, 2021, Microsoft 365 applications and services, including Power BI, will no longer be supported in Internet Explorer 11 (IE 11). For more information, see this Microsoft 365 blog post.*
- *Latest version of Chrome for desktop*
- *Latest version of Safari Mac*
- *Latest version of Firefox for desktop. Firefox may change the fonts used in Power BI”*

4.2. The inventory structure & sequence

The welcome page to the RMI is the landing page and presents the essence of the inventory in one sentence (Figure 1).

² <https://docs.microsoft.com/es-es/power-bi/fundamentals/power-bi-browsers>

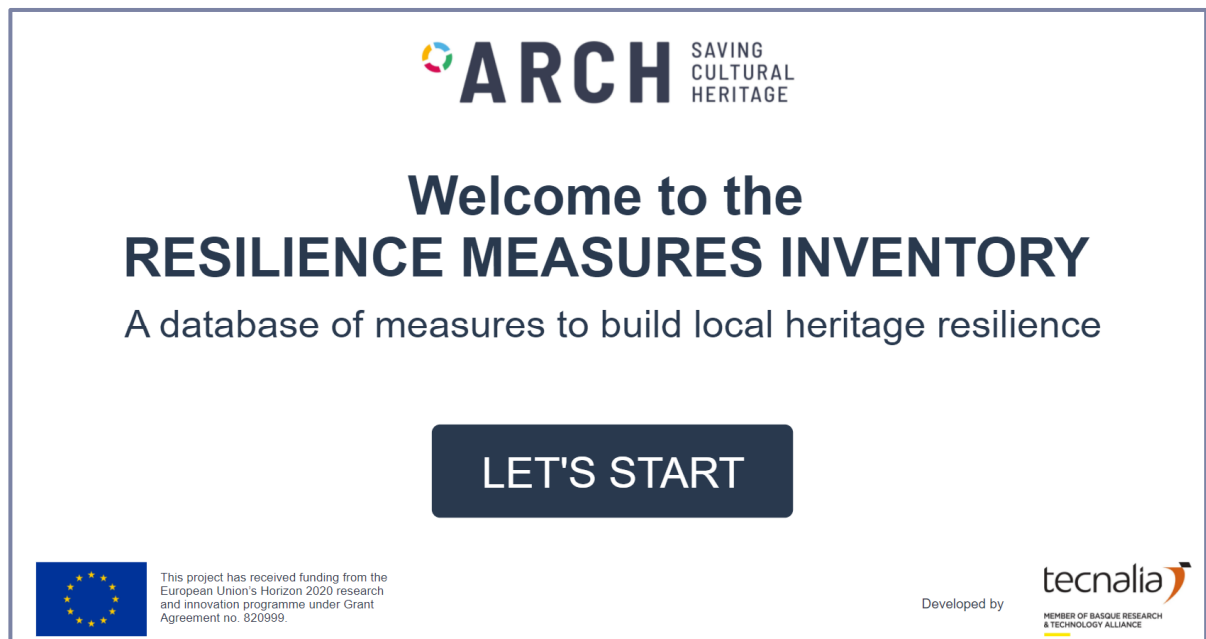


Figure 1. Landing page to the RMI

Click on the “Let’s start” button to arrive to the main page (Figure 2).

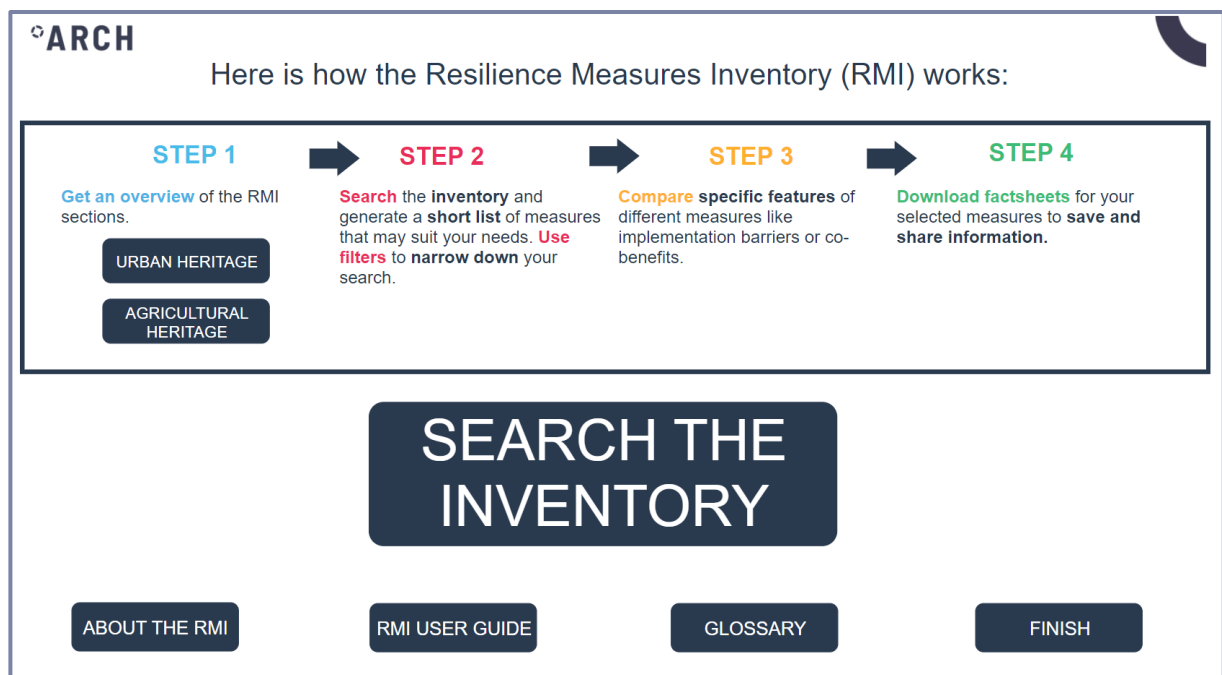


Figure 2. RMI main page

The overall RMI structure is described in Figure 3.

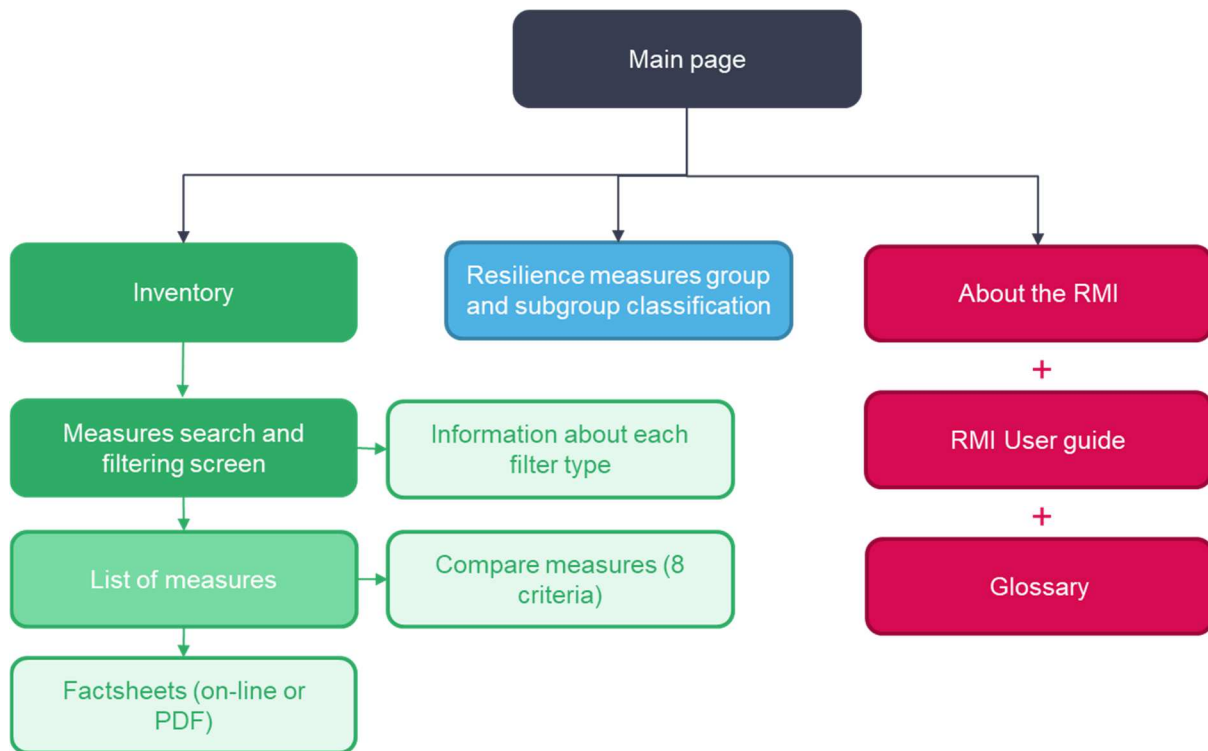


Figure 3. RMI content map of the main page

Use the different buttons to further explore the RMI as shown in Figure 4 to Figure 6.

Being a web-based tool the introductory information to the RMI is summarised under the **“About the RMI”** button (Figure 4). However, more information about the purpose and scope of the RMI can be found in Sections 2 and 3 of this report, respectively.

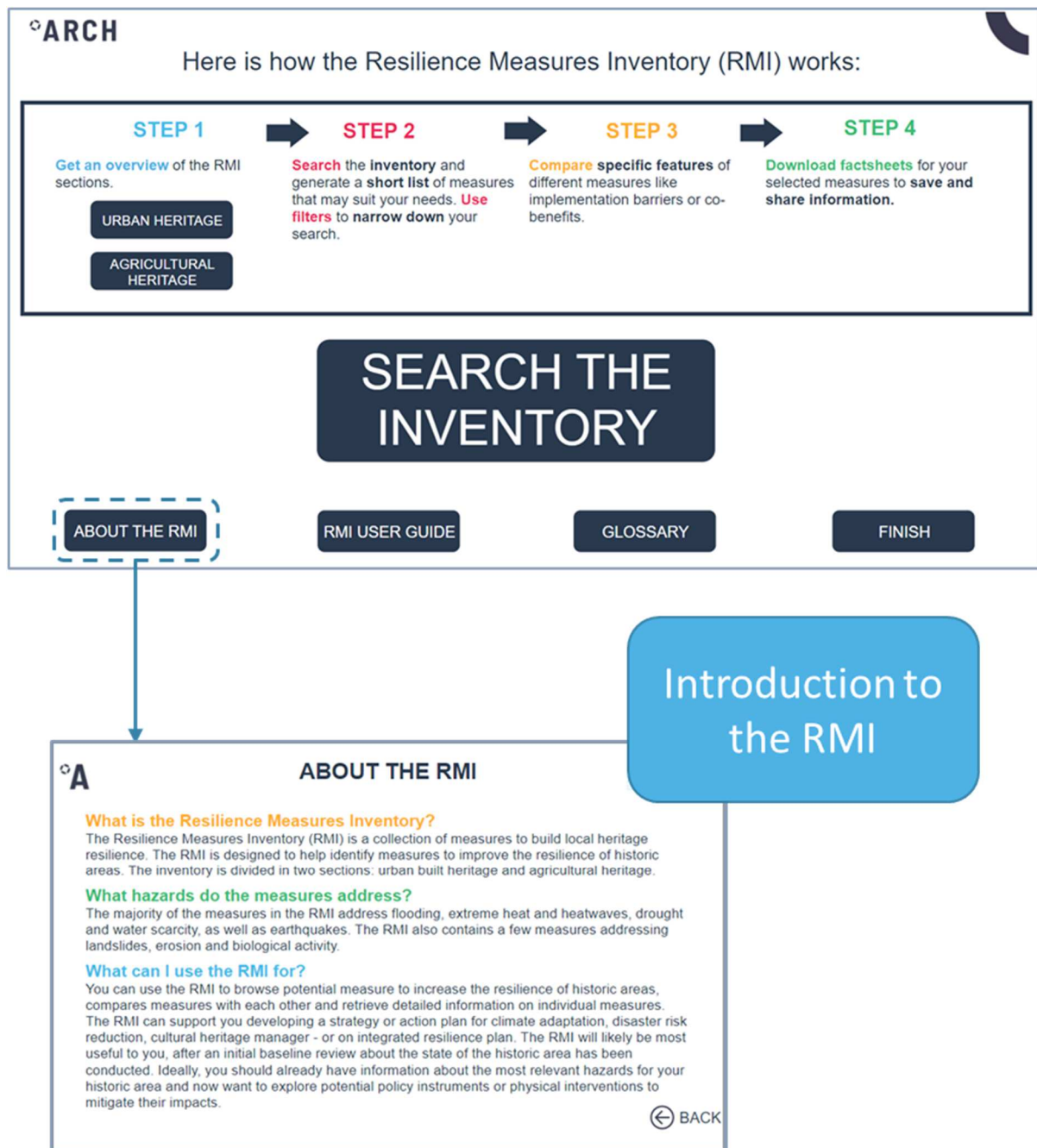


Figure 4. Short RMI introduction window with its aim, envisioned use, and scope

The RMI provides direct access to this report by clicking on “**RMI User Guide**” (Figure 5). This is a shorter version of the deliverable D6.1 “ARCH Resilience Measures Inventory. Concept and user guide”³ is intended to provide practical information on how to navigate through the RMI and use cases.

³ The extended version of this deliverable can be found in the ARCH project’s website: <https://savingculturalheritage.eu/resources/deliverables>

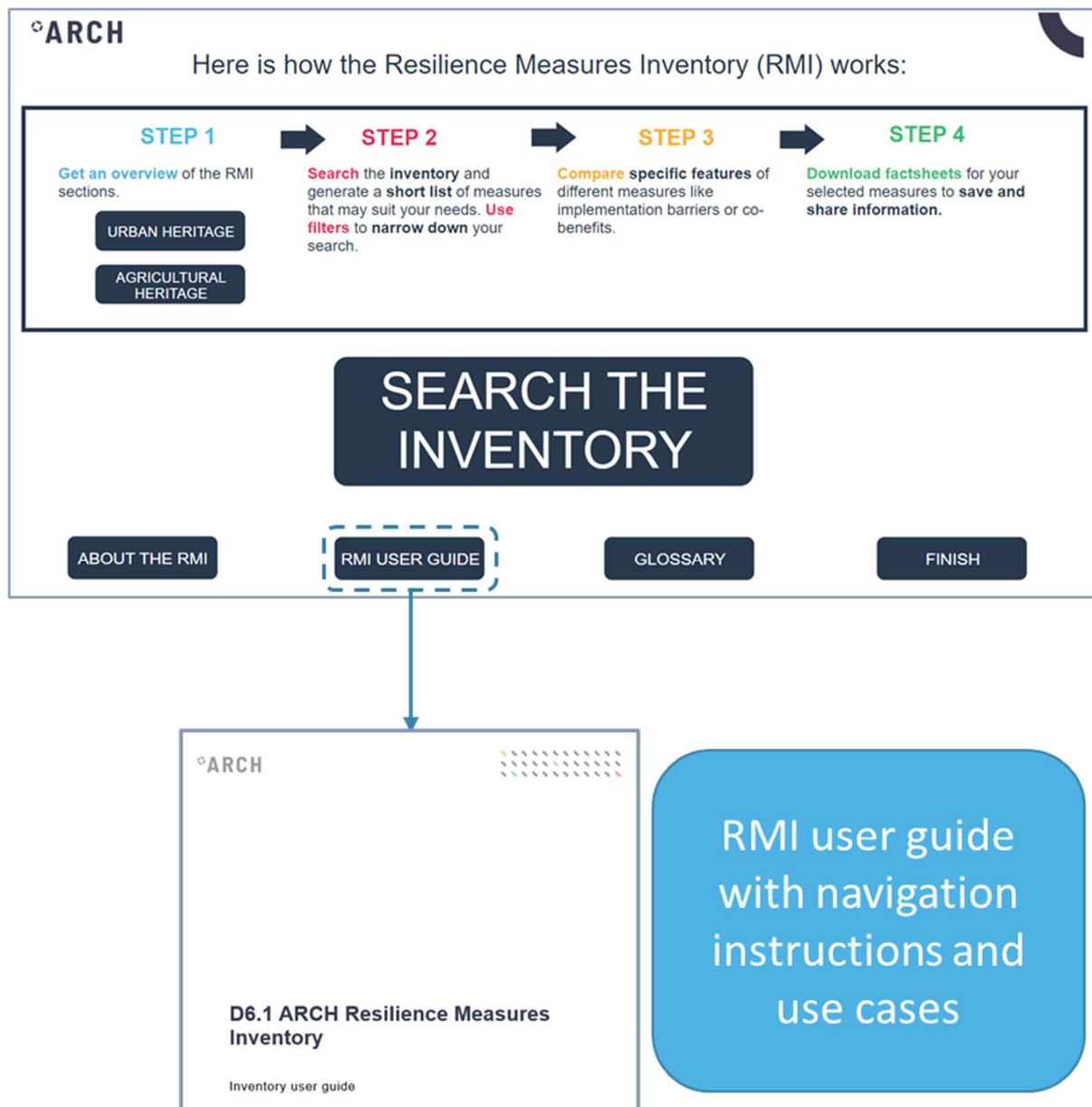


Figure 5. Access to the RMI user guide

As the RMI is intended for users with different backgrounds, mainly in the fields of cultural heritage management, adaptation to climate change and disaster risk management or reduction, a glossary is provided. The glossary based on the ARCH Glossary can be consulted as seen in Figure 6 and includes the terms that are specific for these three themes.



Figure 6. A brief ARCH glossary with terms regarding disaster risk management, adaptation to climate change and cultural heritage management

The main page also describes the recommended steps to create a portfolio of resilience measures, especially for first-time users. This sequence is envisioned to be applied when a search from general to more concrete information is desired. However, all steps are optional and once the user is proficient with the tool the navigation is meant to be free between the different windows of information. See subsections 4.2.1 to 4.2.4 for further information about the steps and the RMI's functionalities.

4.2.1. Step 1: Overview of the two sections of inventory

As explained before, the RMI is divided into two sections: one focused on urban, heritage buildings & structures and the other one focused on agricultural heritage.

The 261 measures present in the RMI are categorized by similarities in the intended outcomes⁴ and nature⁵ according to hierarchical classes (group & subgroups). Thus, Step 1, aims at a general **exploration of the hierarchical classification of the measures** (group & subgroups) by type of inventory. This classification may help for a quicker identification of resilience measures according to needs and/or function, especially for new users.

To access this categorization click on the section of the inventory of interest (Dark blue boxes: “**Urban Heritage**” or “**Agricultural Heritage**”) as seen in Figure 7. However, the descriptions of each group and subgroup are found after clicking “**Search the inventory**” under the “**Definition of your search**” window (see subsection 4.2.2 for further information).

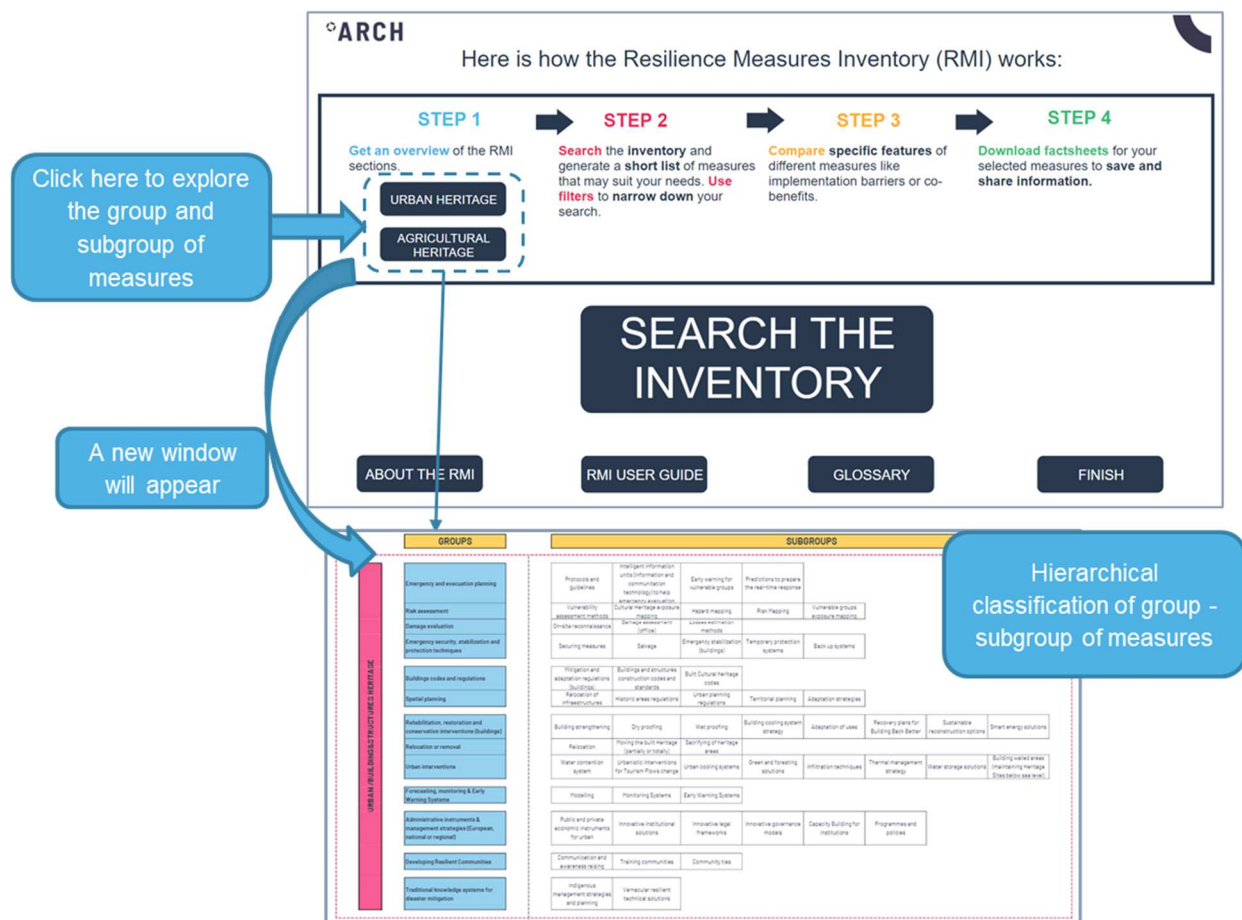


Figure 7. How to explore the higher hierarchical classification of resilience measures

There are different buttons to open the overview of the group and subgroup classification in the web browser (e.g. Google Chrome, Microsoft Edge etc.), download it as a PDF file or print it (Figure 8a). This allows to enlarge the font size and/or to aid in the measures search without the need to go back to the main page. This new window has also a zoom and search function in the bottom of the window (Figure 8b).

⁴ Outcomes are can be defined as the results or impacts that the group or subgroup of measures achieve by their implementation

⁵ Nature is referred to the type of measures according to the IPCC's classification.

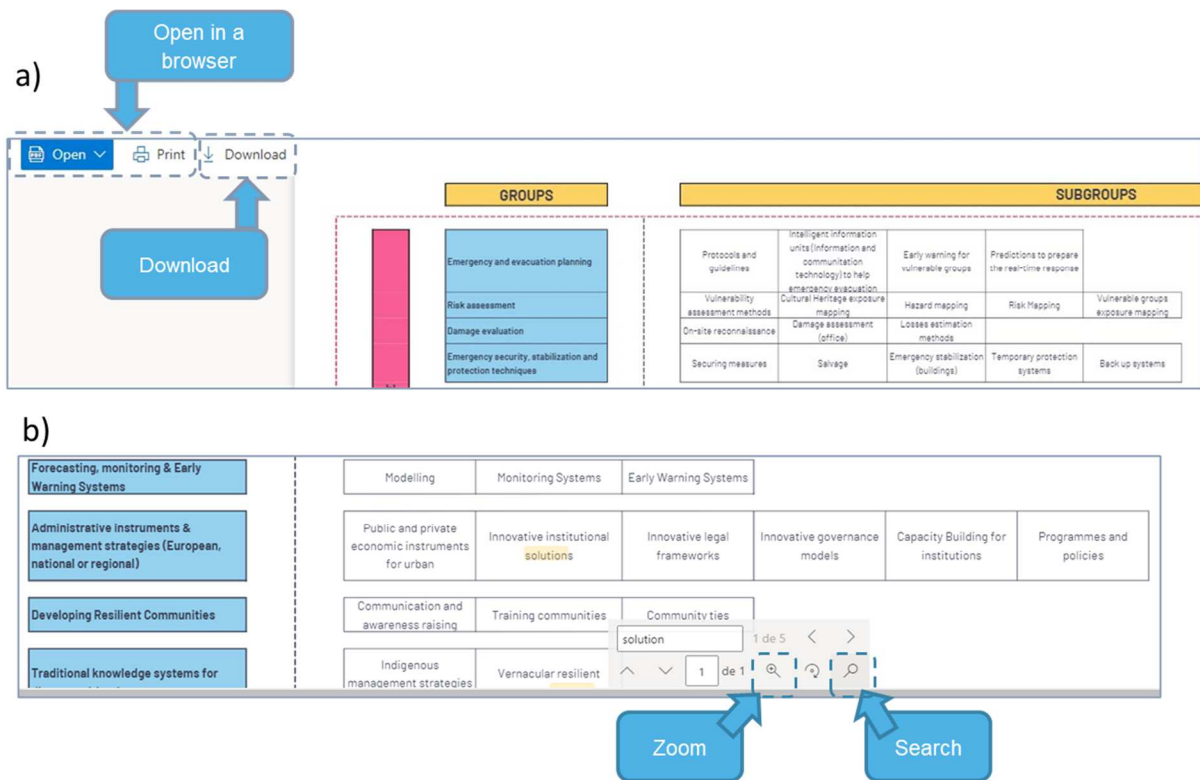


Figure 8. Available functions within the group and subgroup classification window. a) Download or open in an explorer window functions, b) zoom and search functions

4.2.2. Step 2: Search the inventory and arrive at a short list of measures

From the main page, the big dark blue button ('**Search the inventory**') brings the user to the inventory itself as seen in Figure 9.



Figure 9. How to access to the RMI and the resilience measures search window with multiple filters

This new window offers several filters to identify suitable resilience measures. It also provides info boxes ⓘ where descriptions of the filters and supporting information is available.

To make searching the over 250 measures included in the inventory less time-consuming, three categories of filter have been created to narrow down your search for suitable resilience measures as follows:

“Basic Information” filters allow to limit the search to those measures of interest, according to the measure categorization found in Step 1. These filters also allow to search for measures

suitable to address gaps in the resilience assessments done via ARCH Resilience Assessment Dashboard (RAD), after its completion.

“Specific Information” filters provide parameters to fine-tune the search.

“Search measures” field allows to filter measures using a specific term.

To select the appropriate choice for each filter, click on the arrow icon “v” as seen in Figure 10. Note that the order in which filters are selected is important, because selecting one filter field automatically restricts the choices available for the next filter. For example, if only one category is selected under “Group of measure” (e.g. “Developing Resilient Communities”) then only the subgroups related to this category will appear under “Subgroup of measure”. In the same manner, if “soil erosion” is first selected under “Type of hazard” and then the user revisits “Type of inventory” the only option that will appear within this filter is “Agricultural Heritage”. The “Search Measures” feature also works as a filter and it will only show those measures that include the search words in their title. If no filters are used, all the measures will appear in the following window when clicking on “Check compatible measures”. It has to be highlighted that the more filters are used the more restrictive the search will be. However, an iterative search can be made until the final selection of measures is achieved.

ARCH DEFINITIVE

Use filters to narrow down your search.

You can also search without selecting filters, but this will result a very long list. Select multiple fields within one filter by holding down "CTRL". Click on the info icon for more information about each set of filters. Once you have defined your filters, click "Check compatible measures" to see the results.

BASIC INFORMATION

Type of inventory
Todas

Group of measure
Selección múltiple

- ☐ Administrative instruments and management strategies
- ☐ Buildings codes and regulations
- ☐ Crop adaptation and sowing
- ☐ Damage evaluation
- ☒ Developing Resilient Communities
- ☐ Emergency and evacuation planning
- ☒ Emergency security, stabilization and protection techniques
- ☐ Forecasting, monitoring and early warning
- ☒ R&D&I measure
- ☐ Rehabilitation, restoration and conservation interventions
- ☐ Relocation and resettlement

Todas

SPECIALIZED INFORMATION

Disaster
Todas

Type of measure
Todas

Type of impact
Todas

Scale of impact
Todas

Reversibility
Todas

Click here to select the interested group of measures

Full name appears when the user leaves the pointer of the mouse still on the name

Click "Ctrl" at the same time of selecting the multiple choices

Figure 10. Instructions on how to select the desired filters

To select more than one choice at once, simply hold down Ctrl⁶ while selecting the choices with the mouse (left button) as explained in Figure 11.

How to select more than one choice

Ctrl + (click with mouse- left button)

Figure 11. How to select multiple choices

⁶ Note: German keyboards may label "Ctrl" key as "Strg".

A

SUBGROUP OF MEASURES

Measure Subgroup	Description
Adaptation of uses	Adaptation of uses
Buildings and structures construction codes and standards	Building scale codes and standards in construction and retrofitting that help buildings being more resilient to hazards
Building walled areas	Building walled areas
Back-up systems	Emergency supplies and equipment to ensure provision and restoration of basic services
Losses estimation methods	Evaluation of the socioeconomic losses and recovering capacities of a Cultural Heritage asset
Information and communications technology (ICT) tools to raise awareness enabling resilient communities	ICT tools to raise awareness enabling resilient communities
Damage assessment (office)	In-depth analysis of the damages produced to Cultural Heritage assets, considering on-site information collected and comparative analysis with historic data
Securing measures	Measures and solutions to secure Cultural Heritage and its surroundings in order to avoid damage or prevent further damages
Efficient water conveyance (channels)	Measures that contribute to minimize conveyance losses of surface water due to e.g. water evaporation
Adaptation strategies	Measures that enable Historic assets adapting to their territory or urban location in order to be more resilient to hazards
Monitoring Systems	Measures that promote the implementation of tools, protocols and systems to monitor and assess hazards, vulnerability and risk and adaptation/DRM measures and plans
Moving the built Heritage (partially or totally)	Moving the built Heritage (partially or totally)
Dry proofing	Physical interventions and technological devices that avoid water reaching the building and therefore improving its resilience against flood related hazards
Crop management strategies	Practices that optimize crop yield by considering e.g. climate change projections

Click on the option that you want to include in the analysis:

Adaptation of uses	Built Cultural Heritage codes	Disaster Risk Management tools	Farming techniques adaptation	Infiltration techniques	Monitoring Systems	R+D+I in adaptation evaluation and ...	Sacrifice of heritage areas
Adaptation strategies	Capacity building for institutions	Dry proofing	Green and foresting solutions	Information and communications technology (ICT...)	Moving the built Heritage (partially or totally)	R+D+I in adaptive measures	Salvage
	Communication & Awareness raising			Innovative	On-site	R+D+I in adaptive measures	Securing

← BACK

In black, selected subgroup of measures

Use "Ctrl" for multiple choice

BASIC INFORMATION

- ☒ Adaptation of uses
- ☒ Adaptation strategies
- ☐ Awareness raising
- ☒ Back-up systems
- ☐ Building cooling system
- ☐ Building strengthening
- ☒ Building walled areas
- ☒ Buildings and structures construction codes and s...
- ☐ Built Cultural Heritage codes
- ☐ Capacity building for institutions
- ☐ Communication & Awareness raising



Selección múltiple
^

Figure 13. How to select filter options within the info boxes: when clicking on the back button the selection will be registered in the filter field from the "Definition of your search" window

In case there is a need to amend the selection of the filters, there are two ways to erase the filter selection (Table 1. Erase function buttons and information

):

Table 1. Erase function buttons and information

Button type	Button image	What is its function?
Delete filter button		Erase all the filter selections
Eraser		Erase this specific filter field information (Image of “Search a measure” as example)

Once the filters have been selected click on the “**Check compatible measures**” button from Figure 9 to study which resilience measures meet the search needs or requirements.

A new window will appear with the full list of compatible measures. The table also includes information about the subgroup and group of measures they belong to. In the top right-hand corner, a counter is available where it shows how many results the search returned (Figure 14).

Information on how to print this table

Counter of the measures that fulfil the requirements set in the definition of the search window

°ARCH LIST OF MEASURES

These are the measures that meet the defined specifications. ⓘ

N° of filtered measures: 77 / 261

Name of Measure	Measure Subgroup	Groups of measures	PDF factsheet
Climate projections and agricultural climate indices	R+D+I in climate change assessment	R&D&I measures and knowledge generation	PDF factsheet
Terrace construction or conservation	Reduction of soil erosion and compaction	Soil management	PDF factsheet
Capacity building programme for staff engaged in disaster preparedness, response and recovery	Capacity building for institutions	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Awareness-raising campaign to the community on hazards and risks	Innovative governance models	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Capacity building campaign on hazards and risks	Innovative governance models	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Community recovery programme	Innovative governance models	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Developing governance models and mechanisms for coordination, participation and capacity building in post-first-aid	Innovative governance models	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Gather resources and prepare coordination for post-first-aid	Innovative governance models	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Inclusion of local labour conditions in tender procedures	Innovative institutional solutions	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Innovative institutional management solutions	Innovative institutional solutions	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Memorandum of understanding between	Innovative institutional solutions	Administrative instruments and management strategies (European, national or regional)	PDF factsheet

You can explore the measures by analysing each of them individually through online factsheets or by comparing selected measures. You can also download the factsheets using the hyperlink provided.

FACTSHEETS ← b Step 3 a → COMPARE MEASURES

← BACK

Figure 14. List of resilience measures results

While the RMI is not designed to export or download the table with measures, there is a “quick fix” to print the selection in PDF. Instructions can be found in the info box.

4.2.3. Step 3: Compare specific features

Once the preliminary list of resilience measures has been identified (Figure 14), there are two different options on how to proceed:

1. If further refinement is needed, click on “**Compare measures**” button to compare the resilience measures with each other. This will lead to a new window (Figure 15) where all filtered measures are listed on the left, the benchmarking parameters are presented at the bottom on the window and the table with the comparing information is presented in the centre of the window. Select the parameters of interest for benchmarking the measures. There is no need to do anything if all parameters are of interest. However, the table may be a bit overwhelming if many measures and all parameters are selected.
2. If the comparing parameters are not clear click on the info boxes ⓘ (to the right of the parameter buttons). A new window will appear (Figure 16) with the description of the parameter and the alternatives of choice for each parameter.

ARCH

COMPARING MEASURES

Select the measures and the parameters to compare.
For multiple selection, keep "CTRL" button pressed.

Name Measure

- Collapse Early Warning Systems
- Early warning systems
- Early warning systems for vulnerable groups
- Establishment of early warning systems for high temperatures
- Flood Early Warning Systems

Name Measure	Implementation conditions	Negative Effects	Physical impact	Receptor of adaptation	Spatial impact
Collapse Early Warning Systems	Sensors network need to be in place	Cost maintenance	None	Moveable heritage/ Archaeological resources/ Building and structures/ Cultural landscapes/ Community and stakeholders	Minor
Early warning systems	Sensors network need to be in place	-	N/A	Cultural landscapes	None
Early warning systems for vulnerable groups	-	-	N/A	Community and stakeholders	N/A
Establishment of early warning systems for high temperatures	Sensors network need to be in place	Cost maintenance	None	Moveable heritage/ Archaeological resources/ Building and structures/ Cultural landscapes/ Community and stakeholders	Minor

Parameter

Co-Benefits	Implementation conditions	Physical impact	Spatial impact
Contributing to climate change mitigation	Negative Effects	Receptor of adaptation	Visual impact

FINISH **BACK**

Figure 15. Benchmarking window of resilience measures

PARAMETERS TO COMPARE 1

CO-BENEFITS: The positive effects that a policy or measure aimed at one objective might have on other objectives, irrespective of the net effect on overall social welfare. Co-benefits are often subject to uncertainty and depend on local circumstances and implementation practices, among other factors. Co-benefits are also referred to as ancillary benefits.

Co-benefits	Definition
Higher well-being	Provision areas where well-being is increased
Support ecosystem functions	-
Contribute to environmental conservation	Save natural resources of the environment from collapsing
Easy to install	The measure does not require specific skills or knowledge, or machinery to install
Energy saving	The implementation of the measure reduces the consumption of energy, either by using energy more efficiently or by reducing the demands of energy to be used
Improve health, well-being, service quality of life	Through many factors may affect well-being, the implementation of the measure influences positively for a

IMPLEMENTATION CONDITIONS: Specific condition or requirement that need to be addressed for implementing this solution such as specific skills/expertise. E.g. buildings' emergency stabilization techniques usually require specific training for civil protection/ fires brigades.

Implementation conditions
Agreed technical standards
Existent capacity related with the use of Copernicus CDS forecasts and projections
Limitation to data available in databases such as Copernicus CDS forecasts and projections
May need specific knowledge
May need specific training
Need specific knowledge
Need specific training
Need the local level information
Previous modeling and calculation
Secure network need to be in place
At least one network system

PHYSICAL IMPACT: Changes in the physical aspects that the application of the solution may influence on the mechanical performance and moisture performance. This filter will determine if the applied solution benefits or deteriorates the heritage.

Physical impact	Definition
Positive	The measure applied caused harmful physical damage to the heritage
None	No physical changes can be appreciated in the heritage to which the measure has been applied or implemented
Positive	Due to the measure applied in the heritage, its physical properties are improved

SPATIAL IMPACT: Spatial impact refers to the changes occurred in the distribution or occupation of an area or space due to arrangements made by the application or implementation of the described solution.

Spatial impact
Minor
None
Sign
Minor
Outstanding

BACK

Figure 16. Parameter definition and characterization information

- To have comprehensive information about each specific measure without comparing them, click on **"Factsheets"** (Figure 14). A new window will appear (Figure 17). Click on the measure (on the left side of the window) of interest to visualize the information.

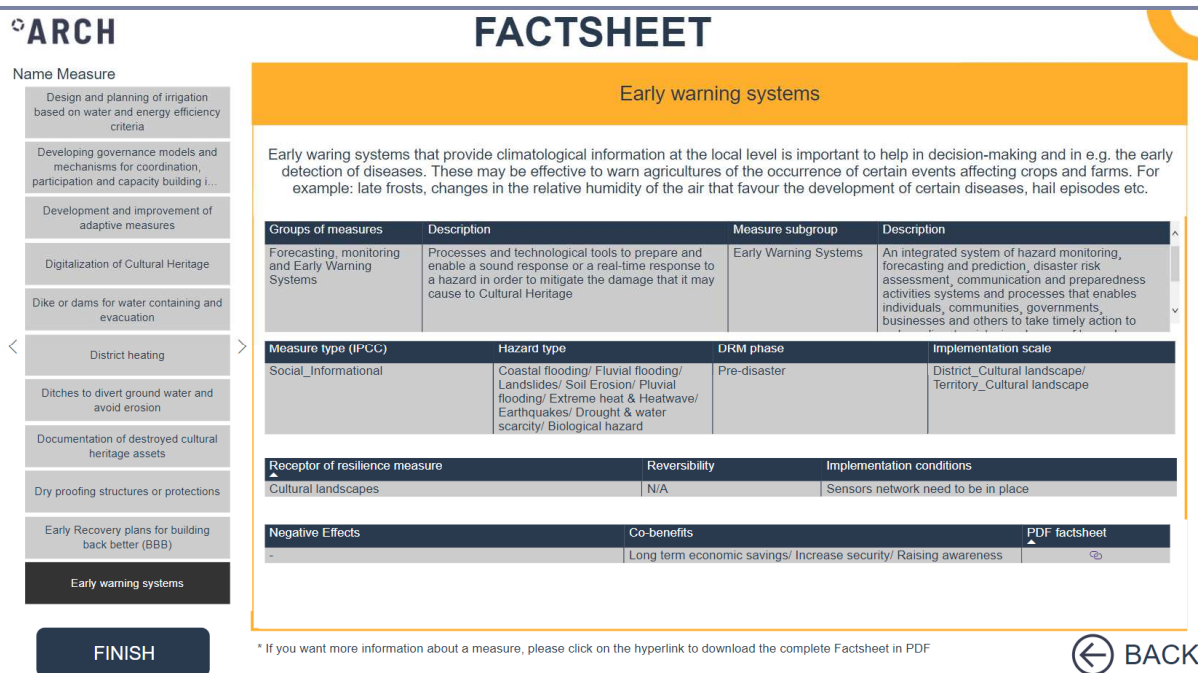


Figure 17. Factsheet window

4.2.4. Step 4: Download factsheets

If the selection of the resilience measures is finished, to save the factsheet for each resilience measure of interest as PDF files (Figure 18), click on each of the hyperlinks to download them (Figure 19).

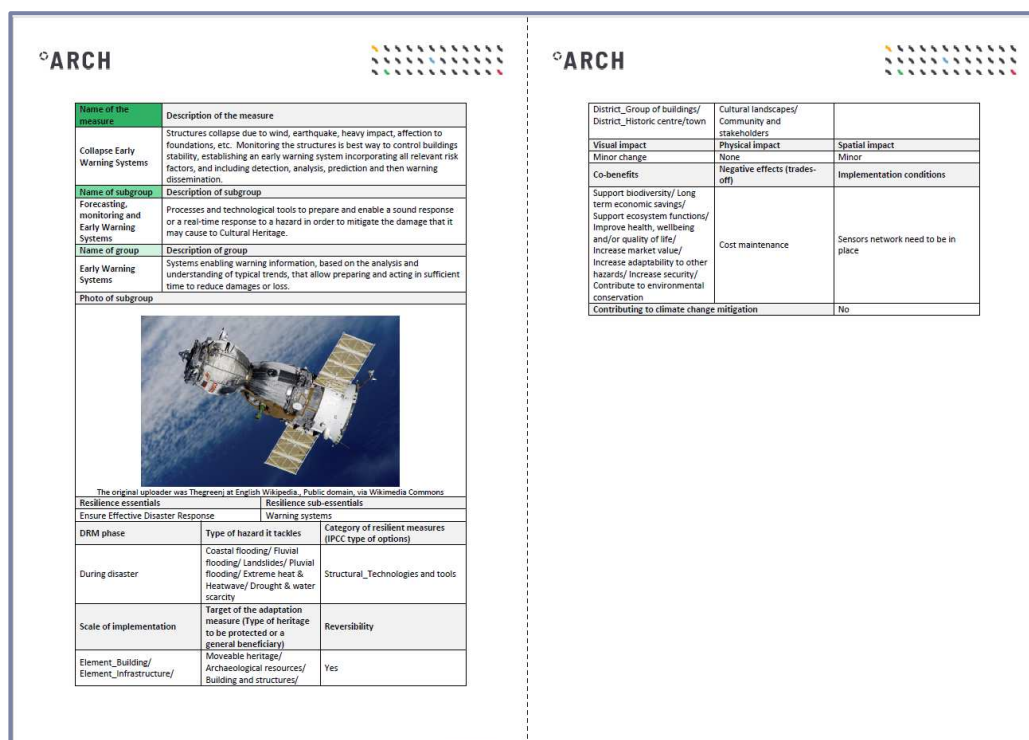


Figure 18. Example of a downloaded PDF factsheet

a)

ARCH

LIST OF MEASURES

These are the measures that meet the defined specifications. ⓘ

N° of filtered
measures:

5 / 261

Name of Measure	Measure Subgroup	Group of measures	Factsheet hyperlink
Early warning systems for vulnerable groups	Early warning for vulnerable groups	Emergency and evacuation planning	📄
Collapse Early Warning Systems	Early Warning Systems	Forecasting, monitoring and Early Warning Systems	📄
Early warning systems	Early Warning Systems	Forecasting, monitoring and Early Warning Systems	📄
Establishment of early warning systems for high temperatures	Early Warning Systems	Forecasting, monitoring and Early Warning Systems	📄
Flood Early Warning Systems	Early Warning Systems	Forecasting, monitoring and Early Warning Systems	📄

b)

FACTSHEET

Early warning systems

Early warning systems that provide climatological information at the local level is important to help in decision-making and in e.g. the early detection of diseases. These may be effective to warn agricultures of the occurrence of certain events affecting crops and farms. For example: late frosts, changes in the relative humidity of the air that favour the development of certain diseases, hail episodes etc.

Groups of measures	Description	Measure subgroup	Description
Forecasting, monitoring and Early Warning Systems	Processes and technological tools to prepare and enable a sound response or a real-time response to a hazard in order to mitigate the damage that it may cause to Cultural Heritage	Early Warning Systems	An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to

Measure type (IPCC)	Hazard type	DRM phase	Implementation scale
Social, Informational	Coastal flooding/ Fluvial flooding/ Landslides/ Soil Erosion/ Pluvial flooding/ Extreme heat & Heatwaves/ Earthquakes/ Drought & water scarcity/ Biological hazard	Pre-disaster	District, Cultural landscape/ Territory, Cultural landscape

Receptor of resilience measure	Reversibility	Implementation conditions
Cultural landscapes	N/A	Sensors network need to be in place

Negative Effects	Co-benefits
	Long term economic savings/ Increase security/ Raising awareness

[PDF factsheet](#)

* If you want more information about a measure, please click on the hyperlink to download the complete Factsheet in PDF

← BACK

Download factsheet

Figure 19. How to download the PDF factsheet. a) From the "List of measures" window and b) from the "factsheet" window

4.3. Other functions

Apart from all the functions that have been described in subsection 4.2 to describe the sequence of search, three extra functions are presented such as how to expand the table for better visualization, see which filters apply (Figure 20) and how to re-arrange the list in a table by alphabetical order (Figure 21).

Shows the applied filters

Nº of filtered measures: 132 / 261

Lista de filtros

Filtros y segmentaciones que afectan a este objeto visual

- Type of hazard: Extreme heat & Heatwave
- Type of inventory: Urban/ Building & Structures heritage

Expanded table

Name of Measure	Measure Subgroup	Group of measures	Factsheet hyperlink
Adaptive re-use	Adaptation of uses	Rehabilitation, restoration and conservation interventions in buildings	[Link]
Adapt the design of the built environment to the changing climate conditions	Adaptation strategies	Spatial planning	[Link]
Implement adaption measures depending on urban form that influences temperature dynamics	Adaptation strategies	Spatial planning	[Link]
Planning for the promotion of green spaces as public cooling islands	Adaptation strategies	Spatial planning	[Link]
Standards planning regulations to protect water bodies and green space	Adaptation strategies	Spatial planning	[Link]
Systematic mapping of urban vegetation for planning of green spaces more effectively	Adaptation strategies	Spatial planning	[Link]
Co-creation with the community disaster preparation plan	Awareness raising	Developing Resilient Communities	[Link]
Educate building occupants for optimal and sustainable use of the buildings	Awareness raising	Developing Resilient Communities	[Link]
Evaluate the use, function and meaning of Cultural Heritage in the recovery process	Awareness raising	Developing Resilient Communities	[Link]
Prevent excessive use of air conditioning since it is threatening the energy supply	Awareness raising	Developing Resilient Communities	[Link]
Public education for good response against hazards	Awareness raising	Developing Resilient Communities	[Link]
Safeguard outdoor workers against (present or coming) hazards. Raise awareness and work against stereotypes (tough attitude of males)	Awareness raising	Developing Resilient Communities	[Link]
Back-up power generator	Back-up systems	Emergency security, stabilization and protection techniques	[Link]
Establishment of back-up system for communications infrastructure	Back-up systems	Emergency security, stabilization and protection techniques	[Link]
Establishment of back-up system for drinking water supply	Back-up systems	Emergency security, stabilization and protection techniques	[Link]
Identification of temporary alternatives to key physical	Back-up systems	Emergency security, stabilization and protection techniques	[Link]

Figure 20. Buttons to expand the table for better visualization and to check which filters apply to the shown search

GLOSSARY

Alphabetical order

Term

Search

Term	Definition	Reference
Adaptation Strategies	[Adaptation Strategies] include a mix of policies and measures with the overarching objective of reducing vulnerability. Depending on the circumstances, the strategy can be set at a national level, addressing adaptation across sectors, regions and vulnerable populations, or it can be more limited, focusing on just one or two sectors	[4] IPCC: Stechow (ed) Contribution Report of the

Figure 21. Button to order the content of the field alphabetically

5. Use cases of the resilience measure inventory

5.1. Use Case 1: Social resilience in an agricultural community

I would like to increase social resilience in an agricultural community. Which subgroup of measures would be appropriate for this purpose?

We present three different strategies to search for this information.

The quickest (Option A), but the one that would give less comprehensive information would be to follow the instructions under subsection Step 1: Overview of the two sections of inventory (Figure 7). That is, from the **main window** click on the blue button **Agricultural Heritage**. A new window will appear with the classification of group and subgroup. By exploring the groups, the user can see that there is one group entitled “**Developing resilient communities** “. The subgroups included in this group of measures are: i) communication and awareness raising, ii) training communities and iii) communities ties. However, the user will not be able to know what each subgroup implies.

A second option (option B) will provide not only the name of the subgroup of resilience measures that increase social resilience, but the resilience measures itself. After clicking on “**Click on the inventory to get started**” from the **main window** a new window will appear. The steps to follow are described below (Figure 22):

1. Select Agricultural heritage choice from **Type of inventory** filter.
2. Click on **Group of measure** filter and after revising the list of options, select **Developing resilient communities**.
3. Click on the dark blue button “**Check compatible measures**”. A new window will appear with the list of measures that are compatible with this search. In the table the different subgroups of measures under the “**Developing resilient communities**” group will be visible as well as the resilience measures under each of the subgroups.

ARCH

DEFINITION OF YOUR SEARCH

Use filters to narrow down your search.

You can also search without applying filters, but this will result in a very long list of measures!

Select multiple choices within one filter category by holding down "CTRL".

Click on info icons to get more information about each type of filter.

Once you have defined your filters, click "Check compatible measures" to continue.

DELETE FILTERS

BASIC INFORMATION

Type of inventory

Todas

Groups of measures

Todas

Subgroup of measures

Todas

Resilience Essentials

Todas

Resilience Subessentials

Todas

SPECIFIC INFORMATION

Disaster Risk Management phase

Todas

Measure type (IPCC)

Todas

Hazard type

Todas

Implementation scale

Todas

Reversibility

Todas

SEARCH MEASURES

Enter search term here:

Search

Search results list

☐ Adapt the design of the built environment to the cha...
 ☐ Adaptive re-use
 ☐ Agricultural insurance that takes into account climat...
 ☐ Air conditioning
 ☐ Anchoring of moveable objects to avoid damages
 ☐ Anchoring of moveable objects to avoid further dam...
 ☐ Apply pavement-watering method during heat wave...
 ☐ Automation and remote control of gravity irrigation
 ☐ Avoiding fires and deforestation
 ☐ Awareness-raising campaign to the community on h...

CHECK COMPATIBLE MEASURES

BACK

ARCH

LIST OF MEASURES

These are the measures that meet the defined specifications.

N° of filtered measures:

6 / 261

Name of Measure	Measure Subgroup	Groups of measures	PDF factsheet
Promotion of agriculture clusters for cooperative work	Community ties	Developing Resilient Communities	
Farmers' education and training programmes	Training communities	Developing Resilient Communities	
Program of pilot farms demonstrating sustainable, adaptive and/or innovative actions	Training communities	Developing Resilient Communities	
Creation of institutional communication mechanisms between administration and farmers for adaptation to climate change	Communication & Awareness raising	Developing Resilient Communities	
Generation of guidelines in the agricultural field (e.g. conservation of soil properties, maintenance of biodiversity and water quality)	Communication & Awareness raising	Developing Resilient Communities	
Information and communications technology (ICT) tools to raise awareness enabling resilient communities within the agriculture sector	Communication & Awareness raising	Developing Resilient Communities	

Resilience measure titles are also shown

You can explore the measures by analysing each of them individually through online factsheets or by comparing selected measures. You can also download the factsheets using the hyperlink provided.

FACTSHEETS

COMPARE MEASURES

BACK

Figure 22. Steps 1 to 3 from use case, option B, and the result window from the search

In case the names of the groups are not self-explanatory enough, a third option (C) is available (Figure 23).

1. First, select Agricultural heritage choice from **Type of inventory** filter.
2. Click on the info-box linked to **group of measures** filter.
3. A new window will appear where the list of the groups of measures (bottom as grey squares) and their definition (top) can be explored. By clicking on the appropriate group of measures, in this case **Developing Resilient Communities**, the box turns black

which means this alternative has been selected. This is the same as selecting on the previous window the desired choices on a filter

4. Click on the **back button**
5. Check on the info box linked to **Subgroup of measures** where all the subgroups associated to **Developing Resilient Communities** and their definitions will appear. Considering the subgroup definition, the user is in a better position of selecting those ones of real interest.

DEFINITION OF YOUR SEARCH

Use filters to narrow down your search.

You can also search without applying filters, but this will result a very long list of measures!
Select multiple choices within one filter category by holding down "CTRL".
Click on info icons to get for more information about each type of filter.

Once you have defined your filters, click "Check compatible measures" to continue.

DELETE FILTERS

BASIC INFORMATION

Type of inventory

Agricultural heritage

Groups of measures

Developing Resilient Communities

Subgroup of measures

Todas

Resilience Essentials

Todas

Resilience Subessentials

Todas

SPECIFIC INFORMATION

Disaster Risk Management phase

Todas

Measure type (IPCC)

Todas

Hazard type

Todas

Implementation scale

Todas

Reversibility

Todas

SEARCH MEASURES

Enter search term here:

Search

Search results list

- ☐ Creation of institutional communication mechanism...
- ☐ Farmers' education and training programmes
- ☐ Generation of guidelines in the agricultural field (e.g. ...)
- ☐ Information and communications technology (ICT) t...
- ☐ Program of pilot farms demonstrating sustainable, a...
- ☐ Promotion of agriculture clusters for cooperative work

CHECK COMPATIBLE MEASURES

BACK

GROUP OF MEASURES

Group of measure	Description
Developing Resilient Communities	Community based adaptation and preparation instruments aiming at increasing resilience against climate change-related and other hazards at both the level of the individual farmer and at the level of agroecological systems including cultural heritage.

Click on the option that you want to include in the analysis:

Administrative instruments and management strategies (European, national or regional)	Forecasting, monitoring and Early Warning Systems	Sustainable and efficient water management
Crop adaptation and sowing	R&D&I measures and knowledge generation	
Developing Resilient Communities	Soil management	

BACK

SUBGROUP OF MEASURES

Measure Subgroup	Description
Communication & Awareness raising	Measures that aim at increasing awareness, knowledge and skills among farmers, that is critical for sound and sustainable measures.
Training communities	Training instruments that aim at skill training both for community in order increase preparedness against climate change hazards and their impacts and disaster management.

Click on the option that you want to include in the analysis:

Communication & Awareness raising	Training communities
Community ties	

BACK

Figure 23. Steps 1 to 5 from option C from use case 1

5.2. Use Case 2: Flood management

I would like to know which measures can be applied during a flood to understand if I could incorporate new measures in my flood management plan. I would also like to explore what type of implementation conditions and negative effects those measures have.

First from the **Main window**, click the Inventory button “**Search the Inventory**”. You will arrive to the “**Definition of your search**” window (Figure 9). Then, follow the described steps (Figure 24):

1. Select in **Type of Inventory** filter: Urban /building & Structures heritage
2. Select in **Disaster Risk Management Phase** filter: 2. During disaster.
3. Select in **Type of hazard** filter: Coastal flooding, fluvial flooding, and pluvial flooding. Press “Ctrl” from the computer keyboard when selecting more than one option.
4. Click on the dark blue button **Check compatible measures**

The screenshot shows the 'ARCH' interface for 'DEFINITION OF YOUR SEARCH'. It includes a 'BASIC INFORMATION' section with filters for 'Type of inventory' (set to 'Urban/ Building & Structures heritage'), 'Groups of measures', 'Subgroup of measures', 'Resilience Essentials', and 'Resilience Subessentials'. The 'SPECIFIC INFORMATION' section includes 'Disaster Risk Management phase' (set to '2. During disaster'), 'Measure type (IPCC)', 'Hazard type' (set to 'Selección múltiple'), 'Implementation scale', and 'Reversibility'. The 'SEARCH MEASURES' section has a search bar and a 'Search results list'. A 'CHECK COMPATIBLE MEASURES' button is highlighted with a green box and the number 4. A 'DELETE FILTERS' button is also visible. On the right, a 'Disaster Risk Management phase' dropdown is shown with '2. During disaster' selected. Below it, a list of hazards is shown with checkboxes: 'Biological hazard', 'Coastal flooding', 'Drought & Water scarcity', 'Earthquakes', 'Extreme heat & Heatwave', 'Fluvial flooding', 'Landslides', and 'Pluvial flooding'. A 'BACK' button is at the bottom right.

Figure 24. Steps 1 to 4 from use case 3

5. The list of measures compatible with the search will appear in the next window. To explore what type of implementation conditions and negative effects those measures have, please, click on the dark blue button **Compare measures** (Figure 25).

LIST OF MEASURES

These are the measures that meet the defined specifications. ⓘ

N° of filtered measures: 44 / 261

Name of Measure	Measure Subgroup	Groups of measures	PDF factsheet
Community recovery programme	Innovative governance models	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Developing governance models and mechanisms for coordination, participation and capacity building in post-first-aid	Innovative governance models	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Promote heritage-led economic activities for a more resilient territory. Circular and community-based tourism	Programmes and policies	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Visitor management strategy	Programmes and policies	Administrative instruments and management strategies (European, national or regional)	PDF factsheet
Guidelines on adaptive re-use and impact assessment for historic places	Built Cultural Heritage codes	Buildings codes and regulations	PDF factsheet
Preventative maintenance	Built Cultural Heritage codes	Buildings codes and regulations	PDF factsheet
Damage assessment report	Damage assessment (office)	Damage evaluation	PDF factsheet
Techniques to evaluate and document post-disaster damage	Damage assessment (office)	Damage evaluation	PDF factsheet
Upgrade of prioritization plan (for on-site actions)	Damage assessment (office)	Damage evaluation	PDF factsheet
First-Aid response: Disaster situation analysis	On-site reconnaissance	Damage evaluation	PDF factsheet
Protocol to evaluate and document immediate risks	On-site reconnaissance	Damage evaluation	PDF factsheet
Quick diagnosis protocol to document disaster	On-site reconnaissance	Damage evaluation	PDF factsheet

You can explore the measures by analysing each of them individually through online factsheets or by comparing selected measures. You can also download the factsheets using the hyperlink provided.

FACTSHEETS

COMPARE MEASURES

5

← BACK

Figure 25. Step 5 from use case 3

- Again, a new window will appear with the information table in the centre (Figure 26). The compatible measures to the left and the parameters to benchmark the measures at the bottom. Click on the parameters entitled **Implementation conditions** and **Negative effects** to limit the visualization to this information.
- To know what type of information the parameters contain or its definition, please click on the info boxes (Figure 16).
- There is a scroll function to the right to be able to see the information for all the measures.
- When the evaluation of these parameters is finalized, click on the dark button **Finish** or start a new search. If the **Finish** button is clicked the back-cover window will pop up (Figure 27). From here the user can re-start⁷ a search or visit the ARCH project's website by clicking on the ARCH button.

⁷ If the re-start button is clicked the user can see on the "**Definition of your search**" that the previous choices are saved. At this point there are two choices, (i) to click on the "**Delete filters**" button to start a new search or (ii) apply extra filters to continue narrowing down the search.

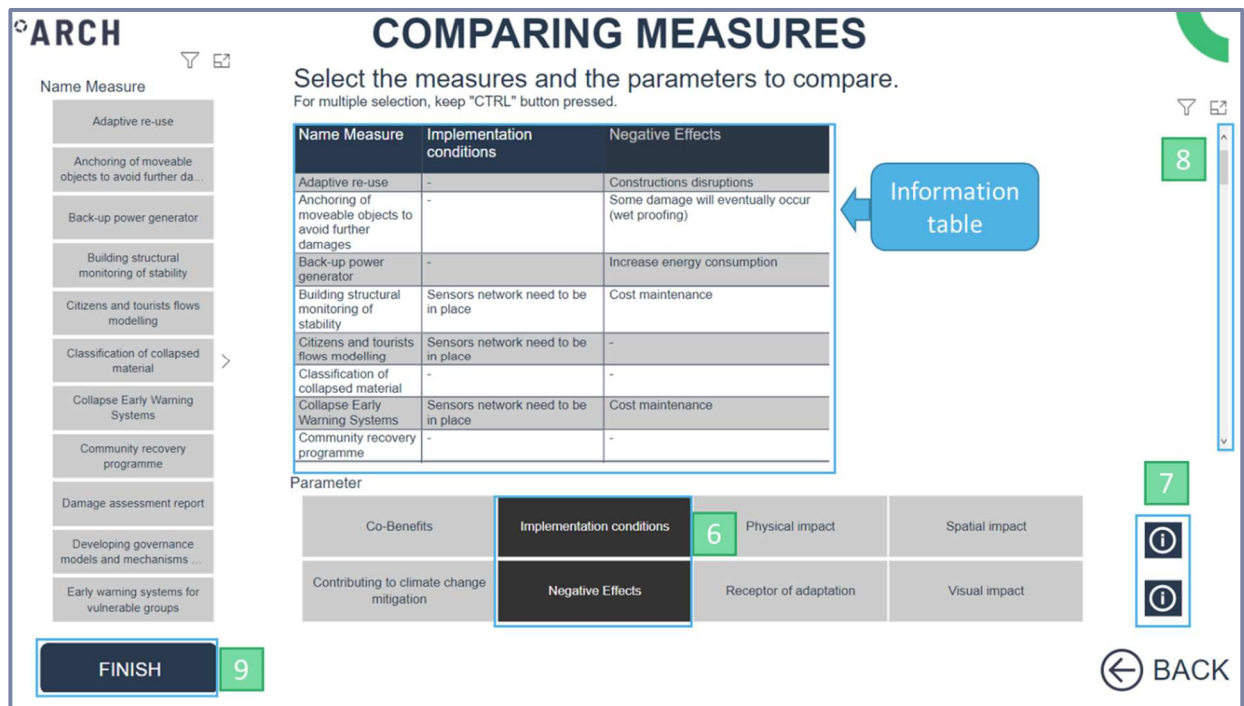


Figure 26. Steps 6 to 9 from use case 3

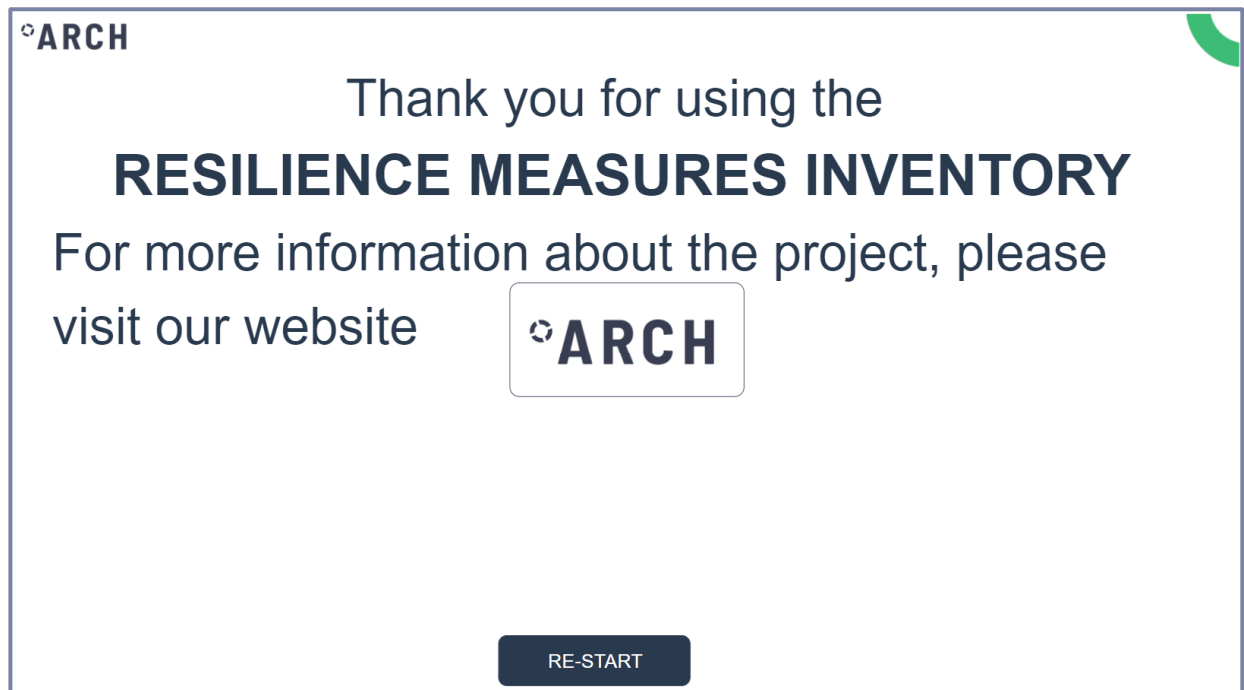


Figure 27. Back cover of the RMI

5.3. Use case 3: Early warning systems

I am interested in early warning systems; thus, I would like to explore this type of measures within the RMI and the information that is provided (factsheets)

This use case aims at answering the following questions: Are early warning systems present as a resilience measure? At group/subgroup or measure level?

1. To know exactly what type of measures to search for, click the “**Search the Inventory**” button on the **main window**. The window **Definition of your search** window will appear. The quickest way to proceed would be to type “early warning system” under the **Search Measures** filter (Figure 28).
2. Click on the magnifying glass icon to apply the filter. A list with resilience measures containing “early warning system” will appear under **Search Result List**.
3. Select under the **Search Result List** all the measures that are relevant. In this case all of them. Press “Ctrl” from the computer keyboard when selecting more than one option.
4. Click on the dark blue button **Check compatible measures** to proceed. A new window (Figure 29) will show with the **List of measures** containing the search term. The result shows 5 out of 261 measures within the RMI contain the “early warning system” term on it, which belong to two subgroups and 2 group of measures.

ARCH **DEFINITION OF YOUR SEARCH**

Use filters to narrow down your search. ①

You can also search without applying filters, but this will result a very long list of measures!
Select multiple choices within one filter category by holding down "CTRL".
Click on info icons to get for more information about each type of filter. ②
Once you have defined your filters, click "Check compatible measures" to continue.

DELETE FILTERS

BASIC INFORMATION

Type of inventory: Todas

Groups of measures: Todas

Subgroup of measures: Todas

Resilience Essentials: Todas

Resilience Subessentials: Todas

SPECIFIC INFORMATION

Disaster Risk Management phase: Todas

Measure type (IPCC): Todas

Hazard type: Todas

Implementation scale: Todas

Reversibility: Todas

SEARCH MEASURES

Enter search term here: early warning system ①

②

Search results list ③

- Collapse Early Warning Systems
- Early warning systems
- Early warning systems for vulnerable groups
- Establishment of early warning systems for high te...
- Flood Early Warning Systems


④

CHECK COMPATIBLE MEASURES

Search Results List

- Collapse Early Warning Systems
- Early warning systems
- Early warning systems for vulnerable groups
- Establishment of early warning systems for high te...
- Flood Early Warning Systems

Figure 28. Steps 1 to 4 from use case 3

5. Click on the factsheets if extra characterisation information is desired about the selected measures. Click either in the PDF factsheets, which can be downloaded by clicking on the symbol  (5), or on the online factsheet by clicking the button **factsheets** (5B). Factsheets allow a quicker switch from one measure to another while

the hyperlink to the PDF files allows to download the information and save the measures on the computer. Note that similar measures come from the two type of inventories, thus if a clear receptor has been identified, it may be pertinent to complement this search with **Type of inventory** filter.

ARCH

LIST OF MEASURES

These are the measures that meet the defined specifications. ① N° of filtered measures: 5 / 261

Name of Measure	Measure Subgroup	Groups of measures	PDF factsheet
Early warning systems for vulnerable groups	Early warning for vulnerable groups	Emergency and evacuation planning	Download
Collapse Early Warning Systems	Early Warning Systems	Forecasting, monitoring and Early Warning Systems	Download
Establishment of early warning systems for high temperatures	Early Warning Systems	Forecasting, monitoring and Early Warning Systems	Download
Flood Early Warning Systems	Early Warning Systems	Forecasting, monitoring and Early Warning Systems	Download
Early warning systems	Early Warning Systems	Forecasting, monitoring and Early Warning Systems	Download

You can explore the measures by analysing each of them individually through online factsheets or by comparing selected measures. You can also download the factsheets using the hyperlink provided.

FACTSHEETS 5B

COMPARE MEASURES

BACK

FACTSHEET

Early warning systems

Early warning systems that provide climatological information at the local level is important to help in decision-making and in e.g. the early detection of diseases. These may be effective to warn agricultures of the occurrence of certain events affecting crops and farms. For example: late frosts, changes in the relative humidity of the air that favour the development of certain diseases, hail episodes etc.

Groups of measures	Description	Measure subgroup	Description
Forecasting, monitoring and Early Warning Systems	Processes and technological tools to prepare and enable a sound response or a real-time response to a hazard in order to mitigate the damage that it may cause to Cultural Heritage	Early Warning Systems	An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to

Measure type (PCC)	Hazard type	DRM phase	Implementation scale
Social, informational	Coastal flooding/ Fluvial flooding/ Landslides/ Soil Erosion/ Pluvial flooding/ Extreme heat & heatwaves/ Earthquakes/ Drought & water scarcity/ Biological hazard	Pre-disaster	District, Cultural landscape/ Territory, Cultural landscape

Receptor of residence measure	Reversibility	Implementation conditions
Cultural landscapes	N/A	Sensors network need to be in place

Negative Effects	Co-benefits	PDF Factsheet
	Long term economic savings; Increase security; Raising awareness	Download

* If you want more information about a measure, please click on the hyperlink to download the complete Factsheet in PDF

BACK

ARCH

ARCH

Figure 29. Step 5 in use case 3