



Title: Financing Pathways and Business Plans

Deliverable 7.2: Financial pathways and business plans

Author: Phoebe Koundouri, Conrad Felix Michel Landis, Mary Psilou, ChrysiLaspidou, Ralf Ludwig, Gunnar Braun, Dijana Likar, Maria Papadopoulou, Noelia Cruz Pérez, Nicolaos Theodossiou, Martin Drews, Albert Chen, Marco Dettori.

Date: 30 September 2024



This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101037424.

Deliverable Number and Name	D7.2: Financial pathways and business plans
Work Package	WP7 – Financial issues and financing instruments/ Business models
Dissemination Level	Public
Author(s)	Phoebe Koundouri, Conrad Felix Michel Landis, Mary Psilou, ChrysiLaspidou, Ralf Ludwig, Gunnar Braun, Dijana Likar, Maria Papadopoulou, Noelia Cruz Pérez, Nicolaos Theodossiou, Martin Drews, Albert Chen, Marco Dettori.
Primary Contact and Email	conrad@aub.gr
Date Due	30 September 2024
Date Submitted	30 September 2024
File Name	ARSINOE_D7.2
Status	Public
Reviewed by (if applicable)	Martin Drews, Katryn Noritha Pasaribu
Suggested citation	Koundouri et al (2024) Ecosystem Services, Preferences and the Design of Financial Instruments for Climate Change Adaptation. ARSINOE Deliverable 7.3, H2020 grant no. 101037424

© ARSINOE Consortium, 2024

This deliverable contains original unpublished work except when indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation, or both. Reproduction is authorised if the source is acknowledged.

This document has been prepared in the framework of the European project ARSINOE. This project has received funding from the European Union’s Horizon 2020 innovation action programme under grant agreement no. 101037424.

The sole responsibility for the content of this publication lies with the authors. It does not necessarily represent the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein

TABLE OF CONTENTS

LIST OF ABBREVIATIONS	4
EXECUTIVE SUMMARY	5
1.0 INTRODUCTION	6
1.1 Scope of the Deliverable	6
1.2 Overview	6
2.0 FINANCIAL PATHWAYS AND BUSINESS PLANS - WORKSHOP TO ASSESS CASE STUDY NEEDS AND CAPACITY	7
2.1 Introduction	7
2.1.1 Financing Sources.....	7
2.1.2 Financial Instruments.....	8
2.1.3 Barriers to Adaptation Finance	9
2.2 Solutions to overcome barriers	11
2.2.1 Unlocking Access to Adaptation Finance	11
2.2.2 Leveraging Finance for Adaptation	14
3.0 WORKSHOP TO ASSESS CASE STUDY NEEDS AND CAPACITY	16
3.1 Workshop Design	16
4.0 CONCLUSIONS AND NEXT STEPS	19
3.2 Workshop Results.....	20
3.2.1 Case Study related information	20
3.2.2 Identification of Barriers.....	22
3.2.3 Access to Financing Sources	28
3.2.4 Use of Financial Instruments	28
4.0 Next Steps	29
REFERENCES	30

LIST OF ABBREVIATIONS

AUEB	Athens University of Economics and Business
PuFS	Public Financing Sources
PrFS	Private Financing Sources
VFS	Voluntary Financing Sources
BFS	Blended Financial Sources
PPP	Public Private Partnership
CIP	Collaborative Investment Platforms
WP	Word Package
CS	Case Study

EXECUTIVE SUMMARY

This deliverable is linked to ARSINOE Task 7.2. It is the third of five deliverables in Work Package 7 (WP7) which aims to provide support for the development of "financing pathways", meaning portfolios of financing solutions to support the innovation and adaptation pathways developed in ARSINOE.

The main objectives are:

- To identify the current state of play in EU regions, with a focus on ARSINOE's case studies (CS), in relation to the availability of financing sources and financial instruments (Task 7.1).
- To assess the extent to which stakeholders have access to or can effectively leverage financing sources/instruments to support their adaptation projects, including identifying barriers faced by the regions involved. This task will also explore possible business models to support the identified solutions/interventions in the ARSINOE case studies (Task 7.2).
- To design financial instruments that support the financing of transition pathways toward the vision of the case studies (Task 7.3).
- To develop a hybrid model to quantify and measure performance at the CS level. This model integrates the Sustainable Development Goals (SDGs) into the sustainability reporting and performance model, which is based on Environmental, Social, and Governance (ESG) criteria (Task 7.4).
- Ultimately, the outcome of these tasks will culminate in a "Manual for Sustainable Finance," which will combine the results of all previous tasks into tailored portfolios of financing solutions/pathways for each of the ARSINOE case studies.

1.0 INTRODUCTION

1.1 Scope of the Deliverable

The scope of this deliverable is to:

- Identify the barriers faced by the case studies in Accessing financing Sources and in leveraging adaptation finance.
- Identify the state of play in relation to the accessibility of the CS in financing sources and their use of financial instruments.
- Identify possible solutions to overcome barriers

1.2 Overview

This deliverable is structured as follows:

- Section 2 describes the framework for the definition of Financing Sources, Financial Instrument, Types of Barriers and the identification of specific solutions to overcome the barriers. Moreover, a description of the workshop and the relevant exercises is included.
- Section 3 Presents the results of the workshop in detail.
- Section 4 concludes by summarizing the next steps.

A list of references is also provided.

2.0 Financial Pathways and Business Plans - Workshop to Assess Case Study Needs and Capacity

2.1 Introduction

Deliverable D7.1 provided the theoretical context for the identification of financing sources, financial instruments and the classification of barriers of EU regions in accessing and leveraging adaptation finance.

Based on our ARSINOE WP7 framework (Koundouri and Landis, 2023), the tools to support the financing of the Case Studies adaptation finance refer to 3 pillars:

- Financing Sources
- Financial Instruments
- Barriers to Adaptation finance

2.1.1 Financing Sources

Financing sources (Figure 1) refer to the origins or entities from which funds are generated to finance an adaptation action plan or an adaptation intervention. These sources can be public, private or Voluntary, including any combination among them. The sources may refer to institutions, stakeholders, or mechanisms responsible for mobilizing the funds.

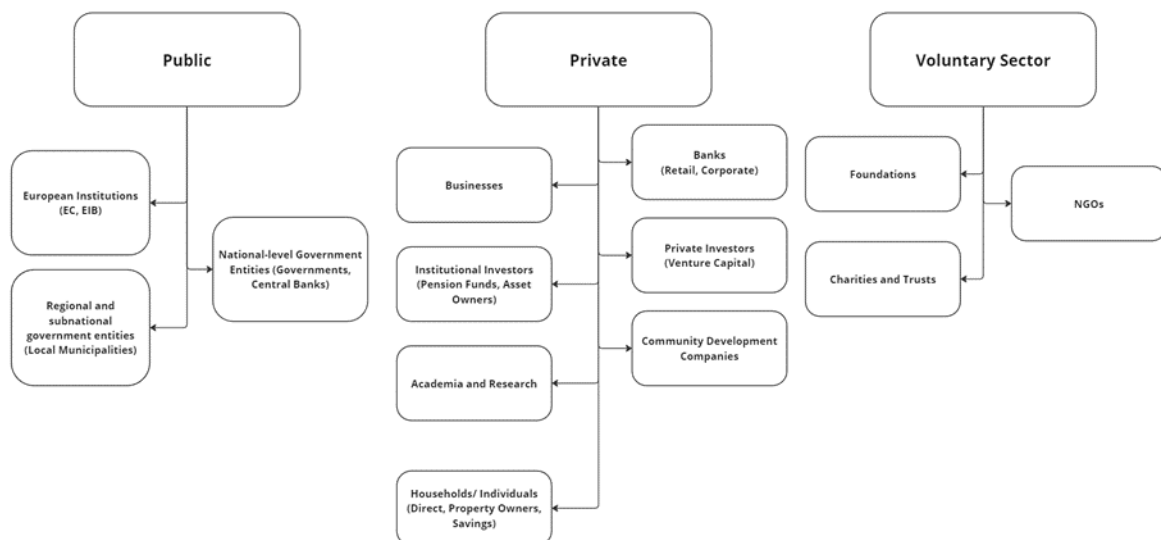


Figure 1 - Financing Sources, Source: ARSINOE D7.1 (Koundouri and Landis, 2023)

Public Financing Sources (PuFS) include National, Regional and local authorities (budgets), national development banks, international organizations (e.g., the World Bank, United Nations funds), climate funds (e.g., Green Climate Fund), multilateral development banks, bilateral aid,

etc. On the other hand, Private Financing Sources (PrFS) refers to Commercial banks, private equity, venture capital, corporations, institutional investors (e.g., pension funds, insurance companies), community development companies, individuals or Households (e.g. family offices) and impact investors.

Finally, Voluntary Financing Sources (VFS) refer to philanthropies, charities, NGOs and Foundations. Hybrid Financing Sources: Blended finance mechanisms that combine public and private funds, public-private partnerships (PPP), or collaborative investment platforms.

Even though both Private and Voluntary Financing Sources originate from non-public entities, the distinction between them lies in the nature of the funding and the motivations behind it. PrFS are profit-driven and require financially viable projects that offer a clear return on investment. As a result, adaptation projects funded by private sources may need to demonstrate long-term financial sustainability or be structured in ways that appeal to private investors. On the other hand, VFS refer to non-obligatory contributions made without the expectation of direct financial returns, where the primary motivation is often social impact, ethical responsibility, or corporate social responsibility (CSR), rather than financial gain.

Consequently, Hybrid Financing Sources (HFS) can be considered any blended finance mechanisms/portfolios that combine sources falling under any of the above categories, e.g. public and private funds such as public-private partnerships (PPP), or Collaborative Investment Platforms (CIP). The above categories consist of a comprehensive list of possible sources, which channel the funds needed for financing adaptation pathways.

2.1.2 Financial Instruments

Financial instruments (Figure 2) are defined as the specific tools or vehicles used to manage, allocate, or raise capital from the financing sources described in the previous session. They define the terms, structure, and nature of financial transactions, specifying how the financing is deployed, managed, and repaid¹.

¹ Detailed definitions for the Financial Instruments are provided in Deliverable 7.1 (Koundouri and Landis, 2023).

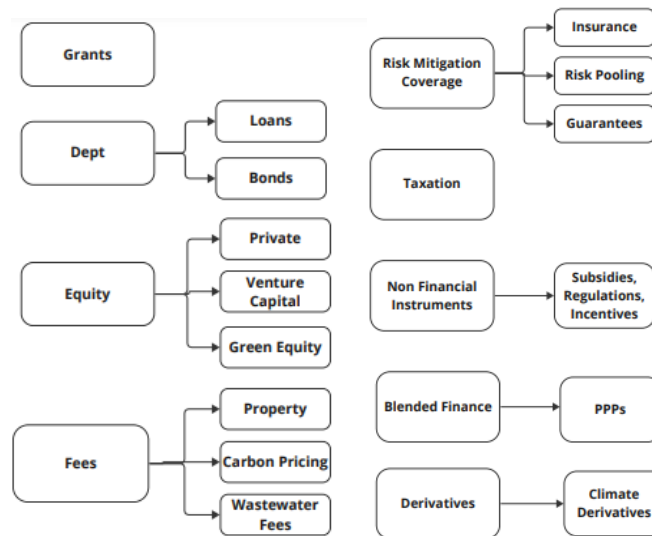


Figure 2 – Financial Instruments, Source: ARSINOE D7.1 (Koundouri and Landis, 2023)

2.1.3 Barriers to Adaptation Finance

The 2023 UNEP Adaptation Gap Report (UNEP, 2023) conducted an in-depth review of existing literature and initiated new research to update the estimates for adaptation costs and financial flows, thereby assessing the current adaptation finance gap for developing nations. The report underlines that the adaptation finance gap keeps on swelling. The currently required funds needed for the climate adaptation of developing countries are now estimated to be 10 to 18 times higher than the current international public adaptation finance flows (UNEP,2023). This situation is indicative of a climate change crisis that is getting much worse and, consequently, leading to more significant loss and damage to come. The adaptation cost goes up; therefore, the report calls for more ambitious and persistent policies for these emerging needs are needed. The closing of this gap will involve much more than the mere increase of international public finance, that is not only the utilization of private and voluntary sector but also new and more effective financial tools/instruments.

One of the key aspects in unlocking the finance needed and bridging the gap refers also to addressing the obstacles that prevent problem owners (various stakeholders such as regions, cities, municipalities, governments, communities or businesses) from accessing or effectively leveraging finance for adaptation. These barriers can exist at different levels—whether in the availability of financing sources, the suitability of financial instruments, or the enabling conditions.

Our framework (Table 1), classifies the following types of barriers identified in EU:

- Economic
- Technological
- Socio-Cultural
- Knowledge & Awareness
- Political, Institutional and Governance

Table 1 – Barriers to Climate Finance By Type, Source: ARSINOE D7.1 (Koundouri and Landis, 2023)

Type of Barrier	Access to Finance	Leveraging Financial Resources
Economic Barriers	Poor identification of type of adaptation needs and portfolio of financial solutions	Lack of a bankable investment project, planning and mobilizing diverse stakeholders at the regional and national level
	Inadequate capabilities of local actors to quantify and attract finance	Financial resources allocated to targets other than adaptation
Technological Barriers	Regions and Firms do not meet the criteria for Finance	low presence of Innovative firms and innovation systems to apply complex adaptation (transformational) solutions
		Poor dissemination due to lack of infrastructure to facilitate synergies
Socio-Cultural Barriers	poor evaluation of adaptation finance needs	Poor estimation of budget allocations required and inability to shape public-private solutions
		allocation of scarce financial resources to other projects
Knowledge & Awareness	No identification of funding opportunities and procedures, EU projects	no identification of actors (private & research sector) to efficiently design, implement and monitor an adaptation project
	Inadequate estimation of financing needs for adaptation and financial opportunities	poor identification of actors to engage, inadequate design of bankable adaptation projects
Political, Institutional and Governance barriers	Adaptation Needs not high in Priorities	Mismanagement of Funds
	Lack of mechanism to identify and assess investment plans	

In Table 3, we do map the set of Barriers in terms of relevance to Public, Private/Voluntary and Blended Financing sources, rather than their type as in Table 2.

Table 2 - Barriers to Climate Finance By Financing Source

Public	Private	Blended
Lack of Public Demand	Lack of Cooperation within and Between Sectors	Lack of Human Resources

Public	Private	Blended
Poor Performance of regional Innovation	Lack of awareness of the need for adaptation within Sectors	Inadequacy of current financial systems and approaches
Lack of Management Structures with long-term perspectives within corporation	Lack of Management Structures with long-term perspectives within corporation	Complexity and Diversity of funding Mechanisms
Lack of awareness among general population	Capacity challenges and Commitment Issues within Sectors	Lack of Skilled Personnel and/or insufficient staff to analyse information
Lack of specialized Knowledge within the Government	Lack of attention, strategic Planning and responsibility within companies	Time Frame and Conflicted scales
Lack of attention, strategic Planning and responsibility within Institutions	tax distortion	Lack of Willingness to Act and Pay
Loss of trustworthiness on the relationships among and within institutions	Size of the Firm (SMEs)	Conflicts with other more pressing development issues
Lack of Vision of Government		Financial Capacity
Lack of Political Will and Comittment		
Uncertainty of state planning policies		

2.2 Solutions to overcome barriers

Financial literature has underlined several solutions which help stakeholders to overcome certain barriers in the direction of unlocking access and accelerating the leverage of funds for adaptation. In this deliverable we attempt to showcase some possible solutions for the identified barriers of Table 1. In the Deliverable D7.5 Manual for Sustainable Finance we will provide concrete examples of solutions and best practices for the underlying case studies.

2.2.1 Unlocking Access to Adaptation Finance

Table 3 presents the list of possible solutions/recommendations for the barriers of accessing adaptation finance, together with the relevant references.

Table 3 – Recommendations for Barriers in Accessing Climate Finance

Access to Finance	Solutions
Poor identification of type of adaptation needs and portfolio of financial solutions	<ol style="list-style-type: none"> 1. Strengthen climate vulnerability assessments to identify specific needs. 2. Develop a diverse portfolio of financial instruments tailored to adaptation. 3. Foster collaborations between governments, development banks, and private sector actors.

Access to Finance	Solutions
Inadequate capabilities of local actors to quantify and attract finance	<ol style="list-style-type: none"> 1. Capacity building initiatives for local actors, enhancing their ability to quantify climate impacts and articulate adaptation finance needs. 2. Technical assistance for developing project pipelines that align with international funding criteria. 3. Support from multilateral development banks and climate funds in training local authorities in financial literacy.
Regions and Firms do not meet the criteria for Finance	<ol style="list-style-type: none"> 1. Streamlining application procedures and adjusting eligibility criteria to include highly vulnerable regions and small enterprises. 2. Providing technical support to firms and regions in the pre-application stages to help them meet the criteria for accessing funds. 3. Initiating capacity development programs for local governments and businesses to align their projects with international finance requirements
Poor evaluation of adaptation finance needs	<ol style="list-style-type: none"> 1. Implement standardized methodologies for assessing adaptation finance needs. 2. Use long-term climate impact projections and scenario planning to evaluate financing requirements. 3. Establish frameworks for continuous monitoring and evaluation of adaptation interventions to ensure their financial efficiency.
No identification of funding opportunities and procedures, EU projects	<ol style="list-style-type: none"> 1. Increase accessibility to information on funding opportunities through centralized platforms. 2. Simplify application processes for climate finance to enable better access for small actors. 3. Foster collaborations between local governments and funding agencies for joint initiatives that pool resources and streamline financing procedures.
Inadequate estimation of financing needs for adaptation and financial opportunities	<ol style="list-style-type: none"> 1. Use advanced climate risk models to determine accurate estimates of adaptation costs and financial opportunities. 2. Apply scenario analysis and multi-sectoral assessments to comprehensively capture direct and indirect financial needs of adaptation interventions. 3. Engage in international knowledge-sharing initiatives to align methodologies across different regions and sectors.
Adaptation Needs not high in Priorities	<ol style="list-style-type: none"> 1. Mainstream climate adaptation in national development planning and budgeting. 2. Increase advocacy for adaptation as a critical aspect of sustainable development goals (SDGs). 3. Engage in dialogues with international funding bodies to prioritize adaptation in climate finance allocations.
Lack of mechanism to identify and assess investment plans	<ol style="list-style-type: none"> 1. Establish Integrated investment platforms 2. Implement standardized assessment frameworks 3. Capacity Building and Technical Assistance projects

To address economic challenges, such as the “ineffective identification of adaptation needs and the limited development of financial solutions”, a solution would be the mainstreaming of climate vulnerability assessments, which is essential for clearly recognizing adaptation needs in different areas and sectors. Establishing a collection of financial assets furnishes necessary resources. (Carmin et al., 2013). “Building a varied portfolio of financial instruments” ensures that adequate resources are available. Also, cooperation between governments, development banks, and the private sector also fosters the effective mobilization of resources necessary for adaptation (Huq & Ayers, 2009; UNFCCC, 2021; IPCC, 2014).

To secure much-needed finance and analyse climate impacts effectively local groups need to develop proficiency in these areas. By conducting these initiatives local municipalities acquire the skill to evaluate climate impacts and communicate their financial aspirations more efficiently (Watson et al., 2020). Moreover, it is vital to offer technical help to create project frameworks that meet international funding requirements. Essential training in finance is available to local governments from multilateral development banks and climate funds.

By making application processes easier and adjusting eligibility criteria to suit vulnerable areas and small businesses we can reduce technological barriers. Firms and regions should receive essential technical help to grasp the necessary criteria for obtaining funds. Programs aimed at capacity development enable local entities and firms to connect their initiatives with global financing guidelines creating a higher possibility for support.

The ineffective assessment of adaptation finance requirements creates social and cultural barriers that need standardized evaluation methods. Advancing scenario planning with accurate long-term climate forecasts enhances the evaluation of financing demands. Moreover, establishing ongoing monitoring and assessment methods for adaptation projects helps to guarantee the effectiveness of their financial resources and permits adjustments with changing climate circumstances.

By promoting better access to central platforms with funding opportunities clearly listed, knowledge and awareness issues can be effectively addressed. The simplified application methods for small organizations increase their opportunity to gain climate finance. By aligning local governments with funding institutions to share resources and knowledge funding steps become simpler for securing finances.

To tackle the problem of misestimating costs for adaptation efforts advanced climate risk models need to be adopted for accurate estimations. Combining scenario analysis with assessments across multiple sectors offers precise understanding of financial needs both direct and indirect. To standardize these estimation approaches in diverse regions and fields worldwide is essential for effective knowledge-sharing efforts.

Policies are shaped by a clear lack of emphasis on adaptation strategies for climate challenges. Including adaptation actions within national planning and financial resources is important to make sure these issues receive necessary concentration and financial backing. Promoting adaptation as a core focus of the Sustainable Development Goals (SDGs) may increase its value during policy debates. Involvement with overseas financial organizations supports climate adaptation in funding selections by guaranteeing that assistance it to places where it is most essential.

To address this problem effective identification of investment plans requires the establishment of coordinated platforms that unite public and private partnerships. Standardized evaluation methods allow comprehensive evaluations of possible projects regarding their financial viability and sustainable effects. Capacity-building programs can

strengthen local players to create strong investment strategies that draw in essential climate finance.

2.2.2 Leveraging Finance for Adaptation

Table 4 – Recommendations for Barriers in Leveraging Finance for Adaptation

Type of Barrier	Leveraging Financial Resources	Solutions
Economic Barriers	Lack of a bankable investment project, planning and mobilizing diverse stakeholders at the regional and national level	<ol style="list-style-type: none"> 1. Enhance coordination among various stakeholders, including local governments, the private sector, and civil society organizations. 2. Create multi-stakeholder platforms to develop bankable projects that align with both local and national adaptation goals. 3. Use these platforms to identify priority adaptation projects and attract finance.
	Financial resources allocated to targets other than adaptation	<ol style="list-style-type: none"> 1. Conduct a comprehensive review of current financial allocations and introduce mechanisms that prioritize adaptation needs. 2. Develop policies that ensure a portion of climate finance is ring-fenced for adaptation projects. 3. Ensure long-term financial commitments for climate-resilient infrastructure and systems.
Technological Barriers	low presence of Innovative firms and innovation systems to apply complex adaptation (transformational) solutions	<ol style="list-style-type: none"> 1. Create incentives for firms to invest in adaptation technologies through tax breaks, subsidies, and innovation grants. 2. Establish innovation hubs that foster collaboration between technology developers and adaptation practitioners, enabling the scaling of complex, transformative adaptation solutions. 3. Knowledge transfer from well prepared region that invent the innovation (ex. NL on flood management system) to island regions of Europe with high flood risk (which are below sea level).
	Poor dissemination due to lack of infrastructure to facilitate synergies	<ol style="list-style-type: none"> 1. Strengthen infrastructure that supports information sharing and collaboration. 2. Develop centralized databases and knowledge-sharing platforms to facilitate the transfer of adaptation technologies and best practices among regions, sectors, and businesses.
Socio-Cultural Barriers	Poor estimation of budget allocations required and inability to shape public-private solutions	<ol style="list-style-type: none"> 1. Improve the accuracy of financial estimates for adaptation projects by applying advanced modeling tools. 2. Promote public-private partnerships (PPPs) that incentivize private sector investment in adaptation initiatives through risk-sharing mechanisms and guarantees.
	allocation of scarce financial resources to other projects	<ol style="list-style-type: none"> 1. Advocate for the reallocation of financial resources by raising awareness among policymakers and stakeholders about the critical need for adaptation finance. 2. Establish financial tracking mechanisms to ensure that adaptation projects receive the necessary funding.

Type of Barrier	Leveraging Financial Resources	Solutions
Knowledge & Awareness	no identification of actors (private & research sector) to efficiently design, implement and monitor an adaptation project	<ol style="list-style-type: none"> 1. Map key stakeholders in the private and research sectors who have expertise in adaptation and establish partnerships with them. 2. Provide training and capacity-building initiatives that focus on project design, implementation, and monitoring specific to adaptation needs.
	poor identification of actors to engage, inadequate design of bankable adaptation projects	<ol style="list-style-type: none"> 1. Engage financial experts, consultants, and development banks to help design more bankable adaptation projects. 2. Develop standardized project assessment tools to ensure projects are attractive to investors and meet international funding criteria.
Political, Institutional and Governance barriers	Mismanagement of Funds	<ol style="list-style-type: none"> 1. Strengthen transparency and accountability mechanisms in financial management by adopting international best practices. 2. Implement regular audits, monitoring, and evaluation processes to ensure that adaptation finance is being effectively utilized. 3. Establish anti-corruption measures and improve governance frameworks to enhance trust and attract international finance for adaptation projects.

Table 4 presents the list of possible solutions/recommendations for the barriers of leveraging finance for adaptation, together with the relevant references.

Finding effective ways to use adaptation finance requires innovations that exceed ordinary financial approaches while promoting inclusivity and sustainability. Financial obstacles develop from the deficiency of viable investment projects and inadequate consultation with various stakeholders. Improving cooperation among governments and private entities will facilitate the establishment of platforms that assist in selecting and ranking projectable initiatives compatible with local and national adaptation targets. Through greater transparency and inclusiveness in selecting projects these platforms can draw in custom financial resources. Research on collaborative governance models in climate finance demonstrates that diverse contributors increase effective resource distribution. In addition, resources are frequently redirected from climate adaptation efforts compounding the financial deficit. An in-depth analysis of funding distribution and policies to allocate climate finance for adaptation will resolve this problem and guarantee the long-term sustainability of funds aimed at climate resilience.

Due to the limited number of inventive companies and inadequate infrastructure for complex adaptation solutions' distribution technological impediments emerge. Cultivating companies to invest in climate adaptation technologies with tax breaks and grant funding can greatly improve the application of transformative measures. At these hubs the relationship between innovation leaders and adaptation specialists is stimulated to confirm that technology is effectively utilized in locations that desperately require it. Investigations reveal that technology hubs can speed up adaptation to climate issues by gathering a variety of participants and lessening the divisions in climate technology development. Also strengthening the framework for knowledge distribution and teaming up is crucial. Setting up centralized databases for adaptation practices in climate can

enhance the movement of best practices and adaptation technologies among different sectors and regions.

Budgeting estimates frequently lead to socio-cultural challenges as it is hard to create efficient public-private partnerships. Advanced financial models are necessary in this scenario because they boost the preciseness of budget estimates and support governments and the private sector in positioning resources wisely. By supporting private sector capital inflows via risk-sharing strategies and guarantees PPPs could resolve this issue further. By leveraging PPPs private capital can be gathered for extensive adaptation projects and help lighten public expenditures (Surminski & Tanner 2016). To ensure proper resource allocation towards adaptation initiatives advocacy plays an important role in informing the community about the importance of financing. Existing research suggests that powerful advocacy can redirect political priorities towards more effective funding for climate resilience.

knowledge and awareness for adaptation project design. Mapping important stakeholders and involving them in capacity-building programs can furnish the required abilities for customizing adaptation-focused project design and oversight. By executing these mapping projects, the overlap between developers and financiers diminishes and projects gain greater sustainability and interest from global investors. Incorrect determination of key actors contributes to project designs lacking effectiveness and reduces chances of attracting major funding. Bringing in financial advisors and global development banks early in project formation may result in the establishment of uniform assessment methods that improve the appeal of these initiatives to funding sources.

The political issues and governance actions can be tackled by following international standards for openness and responsibility. Enhancing governance systems by implementing routine evaluations and enforcing financial oversight will allow effective and efficient adaptation finance use. To enhance trust among donors and financial institutions arranging anti-corruption measures and encouraging effective governance can simplify the attraction of global adaptation finance. Evidence suggests that better governance of finances relates to higher climate finance effectiveness and mobilization (Khan et al., 2019).

To effectively utilize adaptation finance requires multiple methods that address differing economic and knowledge challenges. These strategies not just resolve the issues at hand but also build an encouraging setting for climate finance to flourish.

3.0 Workshop to Assess Case Study Needs and Capacity

3.1 Workshop Design

To investigate the state of play in relation to adaptation finance for the ARSINOE case studies, we designed a template to be filled with the case studies in online workshops organized and facilitated from February to April 2023. In the workshops

all the consortium members related to each of the case studies were participating in filling the templates.

Figure 3 presents the template developed in Microsoft Office Excel 365². The template/workshop contains four distinct pillars:

1. Case Study related information
2. Identification of Barriers
3. Access to Financing Sources
4. Use of Financial Instruments



Figure 3 - Workshop to Assess Case Study Needs and Capacity – Template

The Case Study Related Section of the workshop (Figure 4) requires users to rank the level of importance or several hazards for their case study, that is Extreme Heat/ Heatwaves, Droughts (Water Scarcity and Wildfires), Floods, Heavy precipitation and Storms, Landslides, Snow and Avalanches, Seal Level Rise/ Coastal Erosion and Coastal Flooding, Biodiversity and quality Loss, Land Use, Ecosystem Services, Economic and Financing.

Moreover, the users are required to rank the importance of stakeholders / decision makers, which are the most responsible in drafting the financial plans towards adaptation to climate change. Finally, the last section requires the definition of the horizon for the implementation of the Vision/ Future Narrative of the Case Study. The rankings refer to a four-color scale: Red (Low), Moderate (Orange), Medium (Yellow) and High (Green).

²Template is available here: <https://tinyurl.com/2m5ck652>

1. Case Study Specific Questions

Case Study: (Choose From List !)

a. Hazards - Please complete the relevance of the following hazards using the heatmap below:

	Heatwaves/ Extreme Heat	Droughts (water scarcity & wildfires)	Floods, heavy precipitation and Storms	Landslides, Snow and Avalanches	Sea level rise/ coastal erosion/ coastal flooding	Biodiversity and quality loss	Land Use	Ecosystem Services	Economic/ Financing
Irrelevant (Leave Blank)									
Low									
Moderate									
Medium									
High									

Comments:

b. Stakeholders/ Decision Makers - Please indicate the importance of the following Stakeholder Groups in your Case Study using the heatmap below:

	Public Sector/ Government	Public Sector/ Regional Authorities	Public Sector/ Local Authorities	Private Sector	Academia	Non Governmental Organizations (NGO)	Local Community/ Individuals
Irrelevant (Leave Blank)							
Low							
Moderate							
Medium							
High							

Comments:

b. Horizon - Please Indicate the Horizon to achieve Resilience based on your CS Vision Using the options in the dropdown list Below:

Horizon: (Choose from List !)

Comments:

Figure 4 Workshop – Section1 - Case Study Specific Information

The second section of the template (Figure 5) require users to rank the identified Barriers of Tables 1 and 2. A three scale is used for the evaluation of all barriers: Low (Red), Medium (Orange) and High (Green).

2. Barriers to Adaptation Finance:

a. Please Identify the relevance of the following barriers to your CS / Region of your CS, using the Heatmap below:
(Change the Fill Color of the Relevant Cell)

Type of Barrier	Access to Finance	Leveraging Financial Resources
Economic Barriers	Poor identification of type of adaptation needs and portfolio of financial solutions	Lack of a bankable investment project, planning and mobilizing diverse stake regional and national level
	Inadequate capabilities of local actors to quantify and attract finance	Financial resources allocated to targets other than adaptation
Technological Barriers	Regions and Firms do not meet the criteria for Finance	low presence of innovative firms and innovation systems to apply complex (transformational) solutions
		Poor dissemination due to lack of infrastructure to facilitate syner
Socio-Cultural Barriers	poor evaluation of adaptation finance needs	Poor estimation of budget allocations required and inability to shape pu
		allocation of scarce financial resources to other projects
Knowledge & Awareness	No identification of funding opportunities and procedures, EU projects	no identification of actors (private & research sector) to efficiently design, li monitor an adaptation project
	Inadequate estimation of financing needs for adaptation and financial opportunities	poor identification of actors to engage, inadequate design of bankable adap
Political, Institutional and Governance barriers	Adaptation Needs not high in Priorities	Mismanagement of Funds
	Lack of mechanism to identify and assess investment plans	

b. Please Identify the relevance of the following barriers to your CS / Region of your CS, using the Heatmap below:

Notes: TableBelow Indicates the categorization of the Barriers based on the source of finance for a proposed project. Some of the identified barriers and capacity deficits apply to adaptation projection undertaken by the public sector, while other manifest more often in private adaptation projection sources, private sources and blend form of sources).


Public	Private	Blended
Lack of Public Demand	Lack of Cooperation within and Between Sectors	Lack of Human Resources
Poor Performance of regional Innovation	Lack of awareness of the need for adaptation within Sectors	Inadequacy of current financial systems and approaches
Lack of Management Structures with long-term perspectives within corporation	Lack of Management Structures with long-term perspectives within corporation	Complexity and Diversity of Funding Mechanisms
Lack of awareness among general population	Capacity challenges and Commitment Issues within Sectors	Lack of skilled Personnel and/or insufficient staff to analyze informatio
Lack of specialized Knowledge within the Government	Lack of attention, strategic Planning and responsibility within companies	Time Frame and Conflicted scales
Lack of attention, strategic Planning and responsibility within institutions	tax distortion	Lack of Willingness to Act and Pay
Loss of trustworthiness on the relationships among and within institutions	Size of the Firm (SMEs)	Conflicts with other more pressing development issues
Lack of Vision of Government		Financial Capacity
Lack of Political Will and Commitment		
Uncertainty of state planning policies		

Comments:

Figure 5 Workshop – Section 2 – Identification of Barriers

4.0 Conclusions and Next Steps

3. Potential Funding Sources



a. Which of the below Financing Sources for Climate Adaptation Projects are/ you are aware they are available to your CS / Region of your CS:

Source Type	Source	Examples
Public Funding / Finance	European Institutions	European Commission, EIT Climate-KIC, European Investment Bank, European Bank for Reconstruction and Development, Council of Europe Development Bank, European Research Council
	National Level Public Entities	Member State Governments, Central Banks, Government Agencies, Sovereign Wealth Funds, National Development Banks, Publicly-owned utilities, regulators, State-owned Enterprises
	Regional and sub-national government entities	Regional Government, Regional agencies (e.g. economic development), Local Municipalities, Wider Public services (e.g. police, fire health)
Private Funding	Bank Financing	Corporate Banks, Retail Banks, Investment Banks
	Businesses	Micro, small and medium enterprises, Large enterprises and multinationals, Business Improvement districts, Adaptation-focused companies, Investor-owned utilities, Social Enterprise
	Households / Individuals	Direct, Property Owners, Billpayers / Utilities, Insurance, Savings, Retail Investors
	Capital Market Financing	Stock Market
Private and Public Equity	Community Entities	Community Development Companies, Community Development Financial Institutions, Community Land Trusts
	Asset Owners/ Institutional Investors	Pension Funds, Investment Trusts, Asset Managers / Institutional Investors, Faith-based Investment Groups, Insurers, Reinsurers, Impact Investors
Blended Finance	Private Investors	Venture capital investors, Angel Investors, Project Developers, High-net worth individuals
	Any Combination of the Above	


b. Please indicate best practices of Blended Finance Mechanisms in your CS / Region of your CS, if aware of any:
(Please refer to the above classification System)

Answer:

Navigation: 2. Barriers | 3. Financing Sources | 4. Financial Instruments

Figure 6 Workshop – Section 3 – Access to Financing Sources

4. Available Financial Instruments



a. Which of the below Financing Instruments for Climate Adaptation Projects are/ you are aware they are available to your CS / Region of your CS:

Note: Instruments used to either Leverage Debt or equity to raise funding and finance, generating revenues for adaptation or de-risking climate adaptation investments

Instrument Type	Instruments
Grants	EU, Implementation Grants, Technical Assistance
Debt	Loans (Any Type), Bonds (Any Type), Crowdfunding
Results Based Financing	Payments for Ecosystem Services, Work for Taxes
Equity	Private equity, Venture capital, Green Equity
Blended Finance	Public Private Partnerships (PPPs)
Land Use Capture	Property and land tax, Betterment charges and special assessments, Tax Increment Financing, Land sale or lease, Joint Development, Air Rights, Land Readjustment, Urban re-development schemes
Taxation	Any Tax not included in the previous category
Risk Mitigation Coverage	Insurance, Risk Pooling, Guarantees
Fees/ User Charges	Property-related fees, Business Improvement Districts, Stormwater/ Wastewater fees, Development Impact fees, On-bill Financing, Carbon Pricing, Visitor fees
Non-Financial Instruments	Subsidies, regulations, incentives, mainstreaming
Non-Monetize Inputs	Time (Labour), Time (Leadership), Access to Land, Access to equipment / facilities. Donations of materials, Expertise

b. Please indicate best practices of Financial Instruments used in your CS / Region of your CS, if aware of any:
(Please refer to the above classification System)

Answer:

Navigation: 2. Barriers | 3. Financing Sources | 4. Financial Instruments

Figure 7 Workshop – Section 3 – Use of Financial Instruments

Sections 3 and 4 (Figures 6), explores the access to financing sources and the use of financial instruments, while the users are also asked to provide the identification of best practices in accessing public/private funding or leveraging financial instruments in their region.

A two scale is used for the evaluation of Financing sources and financial instruments: Rare (Red), Common (Green). For all the fields a blank cell indicates

that either the field is irrelevant (for Hazards and Barriers) or declares that the user is not aware of the underlying financing sources and the financial instruments.

3.2 Workshop Results

This section presents the results for all 4 sections of the workshop. For Transboundary case studies, e.g. CS2, CS4 and CS6, we do present the results separately for all locations. The reason for this specification is that the underlying conditions in relation to the state of play for adaptation finance is different since the locations refer to different countries and regions, and thus this provides a clearer picture.

3.2.1 Case Study related information

Table 5 reports the relevance of different Hazards to ARSINOE Case Studies. As expected from the results of ARSINOE Work Package 2 (WP2) and D7.1, the Heatwaves and extreme heat are the focus of CS1, CS2, CS5; Droughts are the focus of CS4 and CS6, while Flooding is the focus of CS3, CS7 and CS8.

Table 5 Hazards Addressed in ARSINOE Case Studies

Hazard	Heatwaves/ Extreme Heat	Droughts (Water Scarcity & Wildfires)	Floods, Heavy Precipitation, and Storms, Wind and Extreme Weather Events	Landslides, Snow and Avalanches	Sea level rise/ Coastal Erosion/ Coastal Flooding	Biodiversity and Quality Loss	Land Use	Ecosystem Services	Economic/Financing
CS1-Athens Metropolitan Area	Green	Yellow	Yellow	White	Yellow	Green	Green	Green	Yellow
CS2-Med Ports-Piraeus	Green	White	Green	Red	Orange	White	White	White	White
CS2-Med Ports-Valencia	Green	White	Green	White	Red	White	White	White	Orange
CS2-Med Ports-Limassol	Green	Red	Green	White	Red	White	Green	Green	Green
CS3-Main River Germany	Green	Green	Green	Red	White	Yellow	Green	Green	Orange
CS4-Ohrid/Prespa Lakes-Albania	Orange	Green	Yellow	Red	White	Green	Red	Yellow	Orange
CS4-Ohrid/Prespa Lakes-Greece	Orange	Green	Orange	Red	White	Green	Red	Yellow	Green
CS4-Ohrid/Prespa Lakes-North Macedonia	Yellow	Light Green	Red	Red	White	Light Green	Light Green	Light Green	Light Green
CS5-Canary Islands	Green	Green	Yellow	Red	Yellow	Green	Green	Green	White
CS6-Black Sea-Bulgaria	Red	Green	Green	White	Red	Green	Orange	Yellow	Orange
CS6-Black Sea-Greece	Orange	Green	Green	White	White	White	Yellow	White	White
CS6-Black Sea-Turkey	Orange	Orange	Green	Yellow	Green	Green	Green	Green	Green
CS6-Black Sea-Danube Delta	Yellow	Orange	Yellow	White	Orange	Green	Orange	Green	Orange
CS7-Southern Denmark	Red	Orange	Green	White	Green	Yellow	Green	Yellow	Green
CS8-Torbay and Devon County	White	White	Green	White	Green	Red	Red	Red	White
CS9-Sardinia	Green	Green	Orange	White	Red	Yellow	Green	Yellow	Yellow

Since most of the case studies are relevant to most of the Hazards, we do apply a simple index to measure the relevance of all hazards aggregately. Composite Relevance Score is defined as the sum of the scores, $\sum_{j=1}^9 S_j^i$ where S_j^i is the score for the j^{th} case study and the i^{th} hazard. This Score takes the value of zero, if hazard is irrelevant, the value of 1,2,3 and 4 if relevance is classified as Low, Moderate, Medium and High respectively. This score help unveiling the relative importance of all hazards, not identified as the focus of the underlying CS. Interestingly, Ecosystem Services, Land Use and Biodiversity and Quality Loss are ranked as highly important to most of the case studies.

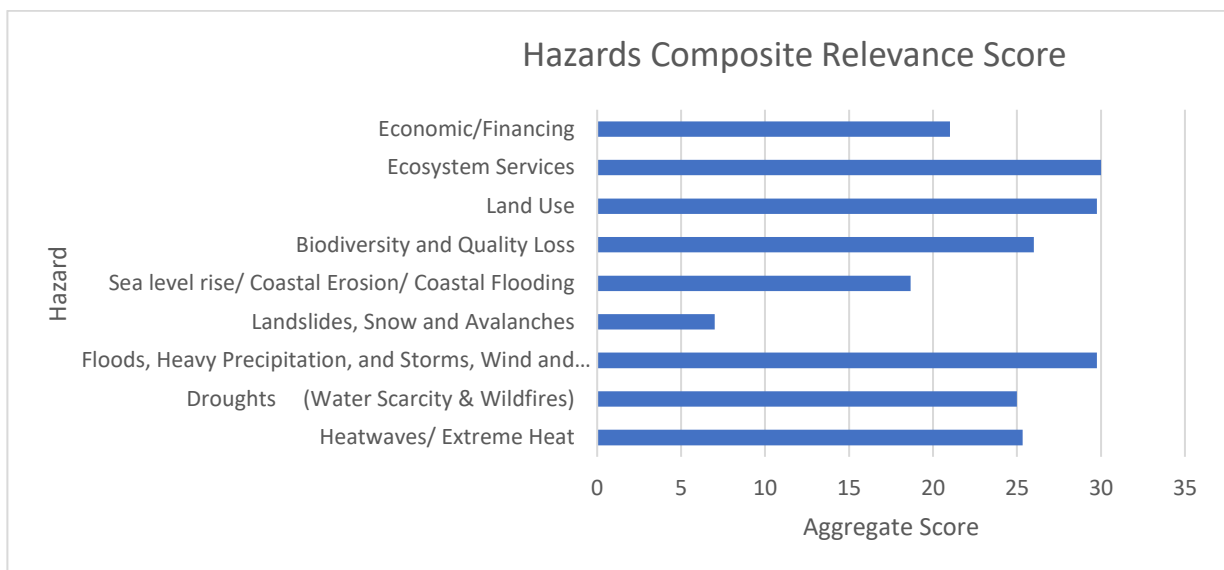


Figure 8 Hazards Composite Relevance Score

In relation to the importance of the different stakeholders, across the Helix, Table 6 presents the relevant classifications in the CSs, where for all the CS the Governments, Regional and Local Authorities are the key players, in relation to decision making and shaping the action plan of the regions.

Table 6 Key Stakeholders in Financing adaptation

Stakeholders	Public Sector/ Government	Public Sector/ Regional Authorities	Public Sector/ Local Authorities	Private Sector	Academia	Non- Governmental Organizations (NGO)	Local Community/ Individuals
CS1-Athens Metropolitan Area	Green	Green	Green	Yellow	Yellow	Yellow	Yellow
CS2-Med Ports-Piraeus	Green	Yellow	Green	Green	Orange	Orange	Yellow
CS2-Med Ports-Valencia	Green	Green	Orange	Yellow	Red	Red	Red
CS2-Med Ports-Limassol	Green	Orange	Orange	Green	Green	Yellow	Red
CS3-Main River Germany	Green	Green	Green	Green	Green	Green	Green
CS4-Ohrid/Prespa Lakes-Albania	Green	Green	Green	Orange	Yellow	Green	Green
CS4-Ohrid/Prespa Lakes-Greece	Green	Yellow	Green	Green	Orange	Orange	Yellow
CS4-Ohrid/Prespa Lakes-North Macedonia	Green	Green	Green	Yellow	Orange	Green	Green

CS5-Canary Islands	Green	Green	Yellow	Yellow	Green	Yellow	Green
CS6-Black Sea-Bulgaria	Green	Green	Yellow	Red	Orange	Red	White
CS6-Black Sea-Greece	Green	Green	Orange	Orange	Red	Red	Orange
CS6-Black Sea-Turkey	Green	White	Green	Yellow	Orange	Orange	Yellow
CS6-Black Sea-Danube Delta	Green	Green	Yellow	Orange	Orange	Orange	Yellow
CS7-Southern Denmark	Green	Red	Green	Yellow	Yellow	Orange	Green
CS8-Torbay and Devon County	Green	Green	Green	Green	Green	Green	Green
CS9-Sardinia	Orange	Green	Green	Red	Red	Red	Orange

Following the same methodology a composite relevance score is also calculated for each Stakeholder Category.

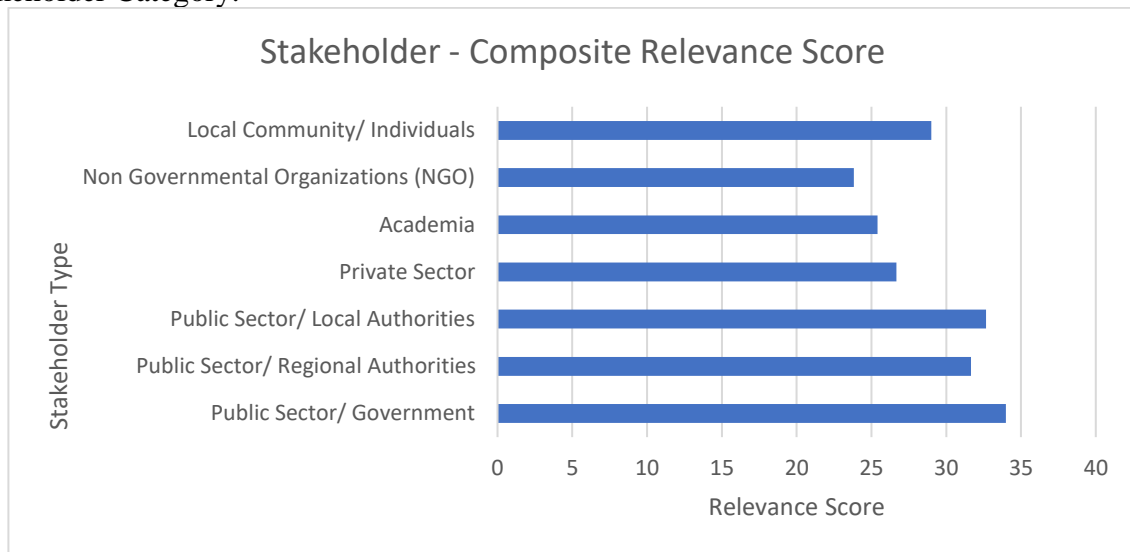


Figure 9 Stakeholders Composite Relevance Score

While all categories are relatively important to the case studies, it is interesting to note that the Individuals and Local Communities ranks higher than the business sector.

3.2.2 Identification of Barriers

Tables 7 presents the results for the most important barriers by type and by in accessing finance for the ARSINOE case studies. Results show that the most important barriers refer to the Poor identification of the type of adaptation needs and the development of portfolio of financial solutions (CS 1,2,3,4,6,7,8). In addition, the fact that “Adaptation Needs is not high in Political agendas and Priorities” seems also to be dominant (CS 1,2,4,6,8,9). Finally, both the “Knowledge and Awareness” and “Political, Institutional and Governance barriers” are ranked high in CS3 and CS9. In deliverable 7.5, after the results will be validated by the stakeholders, the results of these tables will be linked to the solutions presented in the previous section to develop tailor made portfolios of financing solutions and recommendations to all case studies.

Table 8 presents the identified barriers of leveraging finance for adaptation. Based on the results the Technological and Economic barriers are the most important to CS1, 2, 3,4,6,9. Socioeconomic barriers are also important for CS 1,2,3,6,7 and 9.

Table 9 presents the results for the Barriers classified by Source (Public, Private or Blended). Results indicate that the “Poor Performance of regional Innovation”, “Capacity challenges and Commitment Issues within Sectors” and “Complexity and Diversity of funding Mechanisms” are the most identified barriers for Public, Private and Blended sources respectively. It is interesting to note that almost all barriers seem to be significant for CS2 Limassol and CS5 Canary Islands.

Table 7 Barriers in assessing Finance By Type of Barrier

Type of Barrier	Access to Finance	CS1-Athens Metropolitan Area	CS2-Med Ports-Piraeus	CS2-Med Ports-Valencia	CS2-Med Ports-Limassol	CS3-Main River Germany	CS4-Ohrid/Prespa Lakes-Albania	CS4-Ohrid/Prespa Lakes-Greece	CS4-Ohrid/Prespa Lakes-North Macedonia	CS5-Canary Islands	CS6-Black Sea-Bulgaria	CS6-Black Sea-Greece	CS6-Black Sea-Turkey	CS6-Black Sea-Danube Delta	CS7-Southern Denmark	CS8-Torbay and Devon County	CS9-Sardinia
Economic Barriers	Poor identification of type of adaptation needs and portfolio of financial solutions	Green	Yellow	Yellow	Green	Green	Green	Green	Red	Yellow	Yellow	Green	Green	Yellow	Green	Green	Red
	Inadequate capabilities of local actors to quantify and attract finance	Yellow	Yellow	Red	Green	Yellow	Green	Yellow	Yellow	Red	White	White	Green	Yellow	Green	Yellow	Yellow
Technological Barriers	Regions and Firms do not meet the criteria for Finance	White	White	White	Red	Yellow	Green	Red	Red	Red	White	White	Green	Red	White	White	Red
Socio-Cultural Barriers	poor evaluation of adaptation finance needs	Green	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Green	Green	Yellow	Yellow	Green	Yellow	Red
Knowledge & Awareness	No identification of funding opportunities and procedures, EU projects	Yellow	White	Red	White	Green	Yellow	Yellow	Red	Yellow	Red	Yellow	Red	Red	Red	Green	Green
	inadequate estimation of financing needs for adaptation and financial opportunities	White	Yellow	Red	Green	Green	Yellow	Red	Red	Yellow	Yellow	White	Green	Yellow	Red	Yellow	Green
Political, Institutional and Governance barriers	Adaptation Needs not high in Priorities	Green	Green	Green	Green	Yellow	Yellow	Green	Yellow	Yellow	Green	Green	Green	Red	Yellow	Green	Green
	Lack of mechanism to identify and assess investment plans	Red	Yellow	Red	White	Red	Green	Yellow	Yellow	Red	Yellow	White	Yellow	Yellow	Green	Green	Green

Table 8 Barriers in leveraging adaption finance by Barrier Type

7	Access to Finance	CS1-Athens Metropolitan Area	CS2-Med Ports-Piraeus	CS2-Med Ports-Valencia	CS2-Med Ports-Limassol	CS3-Main River Germany	CS4-Ohrid/Prespa Lakes-Albania	CS4-Ohrid/Prespa Lakes-Greece	CS4-Ohrid/Prespa Lakes-North Macedonia	CS5-Canary Islands	CS6-Black Sea-Bulgaria	CS6-Black Sea-Greece	CS6-Black Sea-Turkey	CS6-Black Sea-Danube Delta	CS7-Southern Denmark	CS8-Torbay and Devon County	CS9-Sardinia
Economic Barriers	Lack of a bankable investment project, planning and mobilizing diverse stakeholders at the regional and national level	Green	Yellow	Red	Green	Yellow	Red	Green	Light Green	Yellow	White	White	Yellow	White	Green	White	Yellow
	Financial resources allocated to targets other than adaptation	Green	Green	Green	Green	Green	Yellow	Yellow	Light Green	Yellow	Green	White	Green	Green	White	Yellow	Green
Technological Barriers	low presence of innovative firms and innovation systems to apply complex adaptation (transformational) solutions	Green	Red	Red	Green	Green	Green	Green	Light Green	Yellow	Yellow	White	Green	Red	Red	Red	Red
	Poor dissemination due to lack of infrastructure to facilitate synergies	Yellow	White	Red	Green	Yellow	Yellow	Yellow	Light Green	Yellow	Red	White	Green	White	Red	White	Green
Socio-Cultural Barriers	Poor estimation of budget allocations required and inability to shape public-private solutions	Yellow	White	Yellow	Green	White	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	White	Yellow	White	Green
	allocation of scarce financial resources to other projects	Green	White	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	White	White	Green	White	Green	Yellow	Green
Knowledge & Awareness	no identification of actors (private & research sector) to efficiently design, implement and monitor an adaptation project	Yellow	White	Red	White	Green	Red	Yellow	Light Green	Yellow	White	White	Yellow	White	Yellow	White	Red
	poor identification of actors to engage, inadequate design of bankable adaptation projects	Green	White	Red	Green	Green	White	White	Light Green	Yellow	White	White	Yellow	Yellow	White	White	Red
Political, Institutional and Governance barriers	Mismanagement of Funds	Yellow	Yellow	Red	White	White	White	Red	Yellow	Yellow	White	Green	Yellow	Yellow	Yellow	White	Green

Table 9 Barriers by Source of Adaptation Finance (Public, Private and Blended)

Public	CS1- Athens Metropolitan Area	CS2- Med Ports- Piraeus	CS2- Med Ports- Valencia	CS2- Med Ports- Limassol	CS3- Main River Germany	CS4- Ohrid/Prespa Lakes- Albania	CS4- Ohrid/Prespa Lakes- Greece	CS4- Ohrid/Prespa Lakes- North Macedonia	CS5- Canary Islands	CS6- Black Sea- Bulgaria	CS6- Black Sea- Greece	CS6- Black Sea- Turkey	CS6- Black Sea- Danube Delta	CS7- Southern Denmark	CS8- Torba y and Devon County	CS9- Sardinia
Lack of Public Demand			Red	Green	Red	Red	Red	Green	Green			Yellow		Yellow		Red
Poor Performance of regional Innovation	Green	Green		Green		Green	Green	Green	Yellow	Red			Green			Red
Lack of Management Structures with long-term perspectives within corporation	Yellow	Green			Green			Yellow	Yellow			Green	Green			Yellow
Lack of awareness among general population	Yellow	Yellow	Red	Green		Yellow	Yellow	Yellow	Green	Green	Yellow	Yellow	Green	Red	Green	Red
Lack of specialized Knowledge within the Government			Red	Green	Yellow	Red	Red	Green				Green		Red		Green
Lack of attention, strategic Planning and responsibility within Institutions	Yellow	Green	Green	Green	Green	Yellow	Yellow	Green	Yellow	Green		Green	Green	Yellow	Yellow	Red
Loss of trustworthiness on the relationships among and within institutions	Yellow		Red			Yellow	Yellow	Green								Green
Lack of Vision of Government	Green		Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow		Yellow			Green		Yellow
Lack of Political Will and Commitment	Red		Green	Green	Yellow	Yellow	Green	Yellow				Green		Yellow	Red	Yellow
Uncertainty of state planning policies		Green	Yellow	Green	Red	Yellow	Yellow	Yellow		Green	Yellow	Green	Green	Green		Red
Private																
Lack of Cooperation within and Between Sectors	Yellow	Yellow	Red	Green		Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Green	Green		Yellow
Lack of awareness of the need for adaptation within Sectors	Green	Green	Red	Green	Green	Red	Red	Red	Green	Yellow		Green	Yellow	Green	Yellow	Red
Lack of Management Structures with long-term perspectives within corporation	Red				Yellow	Red	Red	Red	Green			Green	Green			Red
Capacity challenges and Commitment Issues within Sectors	Yellow	Yellow	Red	Green	Yellow	Green	Green	Red	Green			Green	Yellow	Green	Yellow	Green
Lack of attention, strategic Planning and responsibility within companies	Green	Yellow	Yellow	Green	Yellow	Yellow	Red	Green	Green		Green	Green	Yellow			Yellow
tax distortion				Green		Yellow	Yellow	Green	Yellow							Yellow
Size of the Firm (SMEs)			Yellow	Green	Yellow	Yellow	Yellow	Green	Green			Green				Green
Blended																
Lack of Human Resources	Red		Red	Green		Green	Green	Green	Yellow	Yellow		Green		Yellow		Red
Inadequacy of current financial systems and approaches	Red		Red	Green		Green	Green	Green	Yellow					Yellow	Yellow	Yellow
Complexity and Diversity of funding Mechanisms	Green	Green	Red			Green	Green	Green	Yellow		Green	Red	Green	Green		Green

Lack of Skilled Personnel and/or insufficient staff to analyze information	Green	Yellow	Red	Green		Red	Red	Green	Yellow	Yellow	Green	Green	Yellow	Yellow	Red	Green
Time Frame and Conflicted scales	Yellow			Green		Yellow	Yellow	Red	Green			Green		Green		Yellow
Lack of Willingness to Act and Pay	Yellow		Red	Green		Yellow	Yellow	Red	Yellow			Green		Green	Red	Red
Conflicts with other more pressing development issues	Green	Green	Yellow	Green		Yellow	Green	Yellow	Yellow		Green	Green	Green	Yellow	Green	
Financial Capacity	Green		Red			Green	Green	Green	Yellow	Yellow		Green		Green	Yellow	Yellow



3.2.3 Access to Financing Sources

Table 10 presents the results of the identification of the most used sources of adaptation finance. The results clearly indicating that the Public Finance (National, Regional and Local) is clearly dominant in all the Case Studies. Public Funding by Businesses seems also to be common in CS1, 2, 3 and 4, while Institutional Investors is only common to CS2 Limassol and CS7 Southern Denmark. Moreover, Private Investors is only common to Limassol and Blended Finance only to Limassol and CS8.

Table 10 Access to Adaptation Finance

Source Type	Source	C S 1	C S 2 - P	C S 2 - V	C S 2 - L	C S 3	C S 4 - A	C S 4 - G	C S 4 - N M	C S 5	C S 6 - B	C S 6 - G	C S 6 - T	C S 6 - D	C S 7	C S 8	C S 9
Public Funding / Finance	European Institutions	Green	Green	Green	Green	Green	Green	Green	Light Green	Green	Green	Red	Green	Green	Red	Red	Red
	National Level Public Entities	Yellow	Green	Green	White	Green	Green	Red	Light Green	Red	Green	Green	Green	Green	Red	Green	Red
	Regional and sub-national government entities	Green	Green	Red	Green	Green	Green	Green	Light Green	Green	Green	Green	White	Green	Green	Green	Green
Private Funding	Bank Financing	White	White	Red	Green	Green	White	White	White	Red	White	White	White	White	White	White	White
	Businesses	Green	Green	Red	Red	Green	Green	Green	Red	Red	Red	White	White	White	Red	Red	White
	Households / Individuals	Red	White	White	Green	Green	Red	Red	Red	Red	White	White	White	White	Green	Red	White
	Capital Market Financing	Red	White	Red	Green	Green	Red	Red	Red	Red	White	White	White	White	White	White	White
Community Entities	Red	White	White	Green	White	White	Green	Red	Red	White	White	White	White	White	White	White	
Private and Public Equity	Asset Owners/ Institutional Investors	Red	White	White	Green	White	White	Red	Red	White	White	White	White	White	Green	White	White
	Private Investors	Red	White	Red	Green	White	Red	Red	Red	White	White	White	White	White	White	Red	White
Blended Finance	Any Combination of the Above	White	White	Red	Green	White	White	White	White	White	White	White	White	White	White	Green	White

3.2.4 Use of Financial Instruments

Table 11 presents the state of play in relation to the access and use of financial instruments. Again, the results here are striking in favor of the public financing with Grants and technical assistance, but also “Subsidies, regulations, incentives, mainstreaming” to be the dominant instruments used in all cases.

The results clearly indicate the gap in financing between Public and Private and Blended Finance sources, indicating the need to further mobilize private capital, and use of innovative financial instruments in all CS. A synthesis of good practices and recommendations will be included in D7.5.

Table 11 Use of Financial Instruments

Instrument Type	Instruments	C S 1	C S 2-P	C S 2-V	C S 2-L	C S 3	C S 4-A	C S 4-G	C S 4-NM	C S 5	C S 6-B	C S 6-G	C S 6-T	C S 6-D	C S 7	C S 8	C S 9
Grants	EU, Implementation Grants, Technical Assistance	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Green	Green	Red	Green	Red
Debt	Loans (Any Type), Bonds (Any Type), Crowdfunding	Red	White	Red	Green	Green	White	Red	Red	Red	White	White	White	White	Green	Green	White
Results Based Financing	Payments for Ecosystem Services, Work for Taxes	White	White	White	White	White	Red	Red	Red	White	White	White	White	White	White	Green	White
Equity	Private equity, Venture capital, Green Equity	White	White	Red	White	White	White	Red	Red	White	White	White	White	White	White	White	White
Blended Finance	Public Private Partnerships (PPPs)	White	White	Red	Green	White	Green	Red	Red	White	White	White	White	Green	Red	White	Red
Land Use Capture	Property and land tax, Betterment charges and special assessments, Tax Increment Financing, Land sale or lease, Joint Development, Air Rights, Land Readjustment, Urban re-development schemes	Green	White	White	White	Red	White	Green	Green	Red	White	White	White	White	Red	Red	Red
Taxation	Any Tax not included in the previous category	White	White	White	White	White	White	Red	Red	White	White	White	White	White	Green	Red	White
Risk Mitigation Coverage	Insurance, Risk Pooling, Guarantees	Green	White	White	White	Red	Red	Green	Red	White	White	White	White	White	Green	White	Green
Fees/ User Charges	Property-related fees, Business Improvement Districts, Stormwater/ Wastewater fees, Development Impact fees, On-bill Financing, Carbon Pricing, Visitor fees	Red	White	White	White	Red	Green	Red	Red	Red	White	Green	Green	White	Green	Red	Green
Non-Financial Instruments	Subsidies, regulations, incentives, mainstreaming	Green	White	White	Green	White	White	Green	Green	Green	White	White	White	Green	Green	Red	Green
Non-Monetize Inputs	Time (Labour), Time (Leadership), Access to Land, Access to equipment / facilities. Donations of materials, Expertise	Red	White	White	White	White	Red	Red	Green	Red	White	Green	Red	White	Red	Red	Red

4.0 Next Steps

The next steps include the following milestones:

- Synthesis of the above results into a set of financing pathways and tailor-made recommendations for all case studies in Deliverable 7.5.
- Validation of the identified pathways by the Stakeholders.

References

- Carmin, J., Dodman, D., & Chu, E. (2013). Urban Climate Adaptation and Leadership: From Conceptual to Practical Understanding. OECD Working Paper.
- Fankhauser, S., & McDermott, T. K. J. (2021). Economics of climate-resilient development. Elgar Publishing, 11(2), 135-142.
- Hallegatte, S., Rentschler, J., & Rozenberg, J. (2020). Adaptation Principles: A Guide for Designing Strategies for Climate Change Adaptation. World Bank Publications.
- IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.
- Khan, M., Robinson, S.A., & Weikmans, R. (2019). Twenty-five years of adaptation finance through a climate justice lens. *Climatic Change*, 162, 1-18. doi:10.1007/s10584-019-02563-x
- Koundouri, P. and Landis C. (2023) Pathways of funding requirements and portfolios of potential funding sources. ARSINOE Deliverable 7.1, H2020 grant no. 101037424.
- Dilling, L., et al. (2021). The dynamics of vulnerability: Why adapting to climate variability will not always prepare us for climate change, *WIREs Clim Change* 2015. doi: 10.1002/wcc.341.
- Pauw, P., & Pegels, A. (2013). Private sector engagement in climate change adaptation in least developed countries: an exploration. *Climate and Development*, 5(4), 257–267. <https://doi.org/10.1080/17565529.2013.826130>.
- Surminski, S., & Tanner, T. (2016). Realising the ‘Triple Dividend of Resilience’. Global Facility for Disaster Reduction and Recovery. World Bank Group.
- UNFCCC (2021), Annual Report, ISBN: 978-92-9219-202-0
- United Nations Environment Programme (2023). Adaptation Gap Report 2023: Underfinanced. Underprepared. Inadequate investment and planning on climate adaptation leaves world exposed. Nairobi. <https://doi.org/10.59117/20.500.11822/43796>
- Watson, C. and Schalatek, L. (2020). The Global Climate Finance Architecture. Climate Funds Update Climate Finance Fundamentals. ODI and Heinrich Böll Stiftung. Available at: <https://climatefundsupdate.org/wp-content/uploads/2020/03/CFF2-2019-ENG-DIGITAL.pdf>.

Systems Innovation Approach (SIA) addresses the growing complexity, interdependencies and interconnectedness of modern societies and economies, focusing on the functions of the cross-sectoral system as a whole and on the variety of actors. The Climate Innovation Window (CIW) is the EU reference innovations marketplace for climate adaptation technologies. ARSINOE shapes the pathways to resilience by bringing together SIA and CIW, to build an ecosystem for climate change adaptation solutions. Within the ARSINOE ecosystem, pathways to solutions are co-created and co-designed by stakeholders, who can then select either existing CIW technologies, or technologies by new providers (or a combination) to form an innovation package. This package may be designed for implementation to a specific region, but its building blocks are transferable and re-usable; they can be re-adapted and updated. In this way, the user (region) gets an innovation package consisting of validated technologies (expanding the market for CIW); new technologies implemented in the specific local innovation package get the opportunity to be validated and become CIW members, while the society (citizens, stakeholders) benefits as a whole. ARSINOE applies a three-tier, approach: (a) using SIA it integrates multi-faceted technological, digital, business, governance and environmental aspects with social innovation for the development of adaptation pathways to climate change for specific regions; (b) it links with CIW to form innovation packages by matching innovators with end-users/regions; (c) it fosters the ecosystem sustainability and growth with cross-fertilization and replication across regions and scales, at European level and beyond, using specific business models, exploitation and outreach actions. The ARSINOE approach is show-cased in nine widely varied demonstrators, as a proof-of-concept with regards to its applicability, replicability, potential and efficacy.



This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101037424.