

The catalogue of Adaptation Options in Climate-ADAPT



Climate-ADAPT Adaptation Options

Adaptation options are measures and actions that can be implemented to reduce vulnerability and improve adaptation to climate extremes and long-term climate change. Climate-ADAPT provides a catalogue of potential options



How to find adaptation options Climate-ADAPT

Home » Knowledge » Adaptation Information » **Adaptation options**

Climate-ADAPT search

Q Search term

Current filters [Reset filters](#)

Type of Data (Match: any)

Adaptation options

Results 1 – 30 of 58

Display as



Order Newest

[Download TSV](#) [Download CSV](#)

Use of remote sensing in climate change adaptation

2019

Adaptation options

Remote sensing refers to the acquisition of data and information about a phenomenon and a territory, without a direct contact with it. It is alternative to in-situ observation. Remote sensing techniques are used in numerous fields, including geography, hydrology, ecology, meteorology, oceanography, glaciology, geology, as well as for military scope, intelligence, commercial, economic, planning, and humanitarian applications. Remote sensing technologies can be satellite- or aircraft-based and are able to detect and classify objects and characteristics of the Earth system through propagated signals (e.g. electromagnetic radiation). In addition, the use of drones is emerging due to the high-res...

Capacity building on climate change adaptation

2019

Adaptation options

The extent to which climate change will impact our society depends on the exposure, vulnerability (which are linked to the socio-economic development) and the type of hazards. In any case climate change adaptation is needed at all levels: at the local, regional, national, transnational, EU and also the international level. Due to the varying severity and nature of climate impacts across regions in Europe, most adaptation initiatives are taken at the regional or local levels. Capacity building is often, if not always, essential components of climate change adaptation initiatives. Capacity building refers to the process by which individuals or organisations obtain, improve or retain the skills...

Use of adapted crops and varieties

2019

Adaptation options

The use of adapted crops and varieties (including both herbaceous and tree crops) is suggested by the United Nation's Food and Agriculture Organization (FAO) among the climate-smart practices for risk reduction, soil and water conservation, and efficient water management. The use of adapted crops and varieties (either annual or perennial) helps to reduce the negative impacts of climate change on agricultural systems and at the same time to ensure stable agricultural production. Introducing new crops or varieties, or bringing back heritage crops, leads to diversification of agricultural production, with positive effects on biodiversity and ecosystem services, in particular if cultivated in as...

Type of Data

Count	Value	Match an
58	Adaptation options	<input checked="" type="checkbox"/>
106	Case studies	<input type="checkbox"/>
152	Guidance	<input type="checkbox"/>
40	Indicators	<input type="checkbox"/>
179	Information portals	<input type="checkbox"/>
113	Organisations	<input type="checkbox"/>
913	Publications and reports	<input type="checkbox"/>
611	Research and knowledge projects	<input type="checkbox"/>
82	Tools	<input type="checkbox"/>
5	Videos	<input type="checkbox"/>

Adaptation Sectors

Climate Impacts

Transnational regions

Adaptation Elements

Source Website

Countries

- » [RISC-KIT Toolkit](#)
- » [UNFCCC Adaptation knowledge Portal](#)
- » [Urban green-blue grid: Adaptation measures catalogue](#)
- » [weADAPT](#)
- » [Water recycling](#)
- » [Improved water retention in agricultural areas](#)
- » [Awareness campaigns for behavioural change](#)
- » [Water sensitive urban and building design](#)
- » [Adaptation or improvement of dikes and dams](#)



How to find adaptation options Climate-ADAPT

59 Adaptation options

Cross-sectors (3)

Capacity building on adaptation
Awareness campaign for behavioural change
Use of remote sensing in climate change adaptation

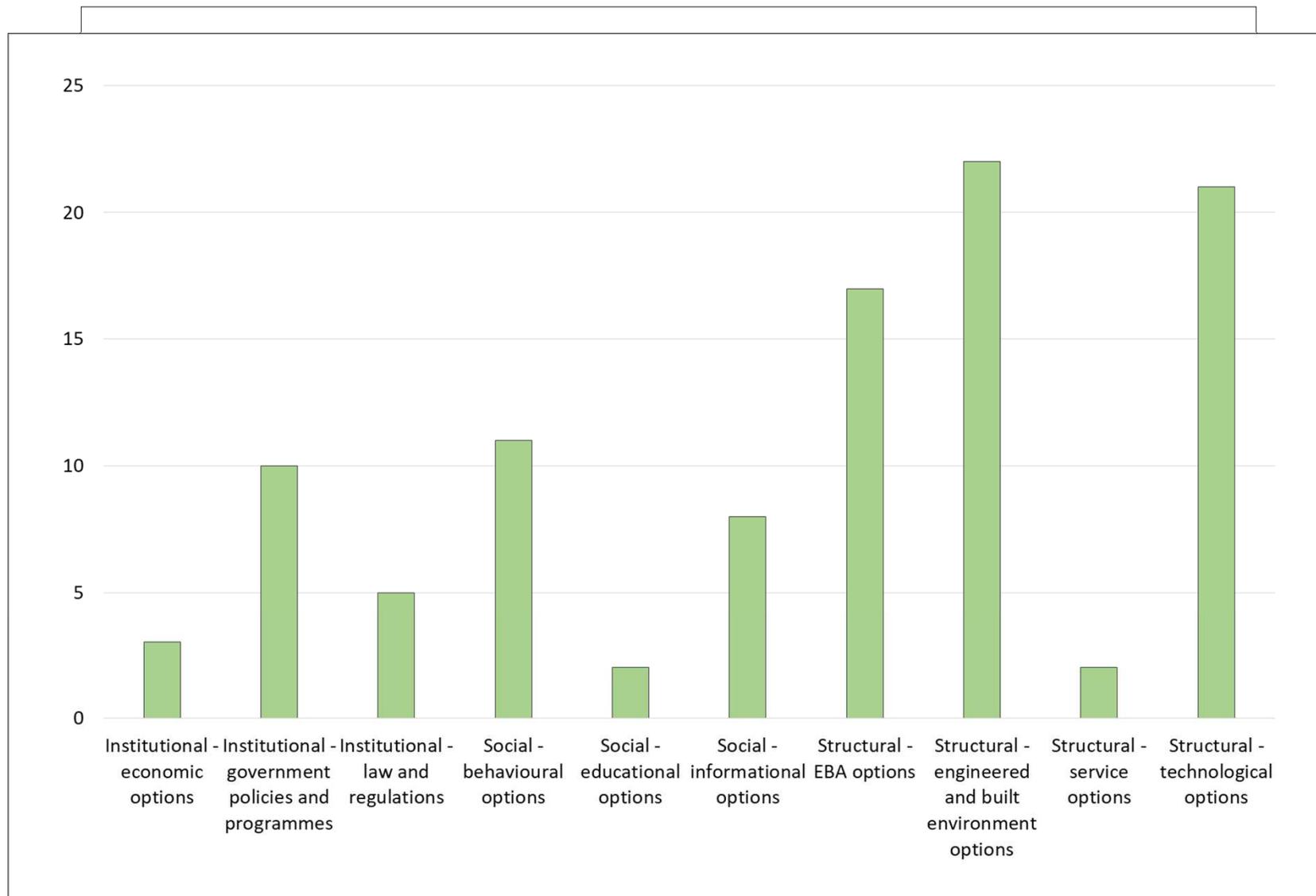
Multi sectors (13)

Early warning systems
Economic incentives for behavioural change
Green space and corridors in urban areas
Crises and disaster management plans
Improve ecological networks

Sector specific (43)

Beach nourishment
Measures to increase airport resilience
Climate proofing of buildings against excessive heat
Diversification of fisheries and aquaculture
Heat health action plans

Options categorization



Provided information

Adaptation option

Climate proofing of buildings against excessive heat (2019)

There are several options to implement climate-proofing of buildings with respect to excessively high temperatures. Such options relate to building design (including the use of IT technologies to optimise thermal comfort) and building envelopes (roof, ceilings, external walls, doors, windows – including solar control glasses that reduce the solar radiation entering the dwelling - and foundations). Building design solutions include traditional features of dwellings located in traditionally warm climate countries, as:

- the building aspect ratio, that is, the ratio between interior space and the external surface of the building that maximises the dispersion of internal heat and minimizes the uptake of heat through solar radiation.
- architectural elements such as awnings, overhangs, window shades, porticoes, white or lightly coloured external walls and roof
- the solar orientation of the building, which can minimise the daily exposure of the building to sunlight.

Hi-tech solutions can also play a very important role. These include sensors that allow a fine monitoring of thermal conditions and hence an optimized fine-tuning of air conditioning and ventilation, and even the orientation of shading panels according to real-time insulation conditions. Sensors and digital thermal regulation devices can also be coupled with demand side management measures that help reducing the impact of cooling demand on peak loads when the electrical system is under stress (see also the adaptation option on [changes in individual behaviour in the energy sector](#)). A famous example of a building in which a complete package of state-of-the-art solutions has been applied is [The Edge](#) office building in Amsterdam, completed in 2014. The building envelope includes dynamic windows, automatic shades and displacement ventilation. A total of 28,000 sensors track movement, lighting levels, humidity and temperature, which allow an immediate and more efficient response to energy needs, such as automatically switching off heating, air conditioning and lighting in unused areas. Moreover an app provided to those working in the building allows them to adjust temperature and lighting levels around them using their smartphone. Cooling and heating involves the use of a heat exchanger that transfers heat in the desired direction between the building and an aquifer beneath it.

The organization of the space in the proximity of buildings also matters: the presence of trees in particular increases air flow and reduces the impact of solar radiation and the heat island effect typical of modern cities.

The technical features of the building envelope are crucial for its ability to control indoor temperatures. The materials of which the envelope is built and their mass in fact determine how quickly temperature differentials between indoors and outdoors are compensated. Thick-wall traditional buildings in the Mediterranean, for instance, require much less air conditioning than modern ones; alternatively, the use of materials with high thermal resistance can reduce the heat that enters the building. This option is particularly interesting for retrofitting existing building with insulation layers that compensate for the poor thermal properties of the original building materials.

Also, the use of mechanical or natural ventilation, or storing cold in materials with high thermal mass like tiles or stones, reduces the need of air-conditioning. Cold storage can be coupled with a heat pump (possibly based on a geothermal system, exploiting the differential between underground and surface temperatures) to increase the flexibility in the deployment of cold air. Adjusting indoor humidity can have a strong impact on perceived temperatures and ultimately on thermal comfort of the occupants of a building.

Roofs are also important heat exchange surfaces, and their design can help reducing significantly the energy needs of a building. Green roofs, for instance can significantly help reducing the heat island effect in cities by naturally cooling building surfaces through the action of water and vegetation. A cheaper but also effective option is painting roofs white or in light, highly reflective colours that bounce back solar radiation. Top grade white roofs reflect 80% of solar energy; black roofs on the other hand reflect only 5% to 10% ([CRRC, 2013](#)).

The described measures focus on coping with excessive heat. This does not automatically imply that all of them can also help

Updated:

2020-03-23

Keywords:

Building envelope, building materials, cool roofs, green roofs, heat island effect, hi-tech, shading

Sectors:

Buildings

Climate impacts:

Extreme Temperatures

Governance level:

Local (e.g. city or municipal level)

Geographic characterisation:

Global

Case studies related to this option:

[Four pillars to Hamburg's Green Roof Strategy: financial incentive, dialogue, regulation and science](#)

[Stuttgart: combating the heat island effect and poor air quality with green ventilation corridors](#)

[Living in a tree house in Torino \(Italy\): combining adaptation and mitigation measures to improve comfort](#)

[Adapting to heat stress in Antwerp \(Belgium\) based on detailed thermal mapping](#)

[Green roofs in Basel, Switzerland: combining mitigation and adaptation measures](#)

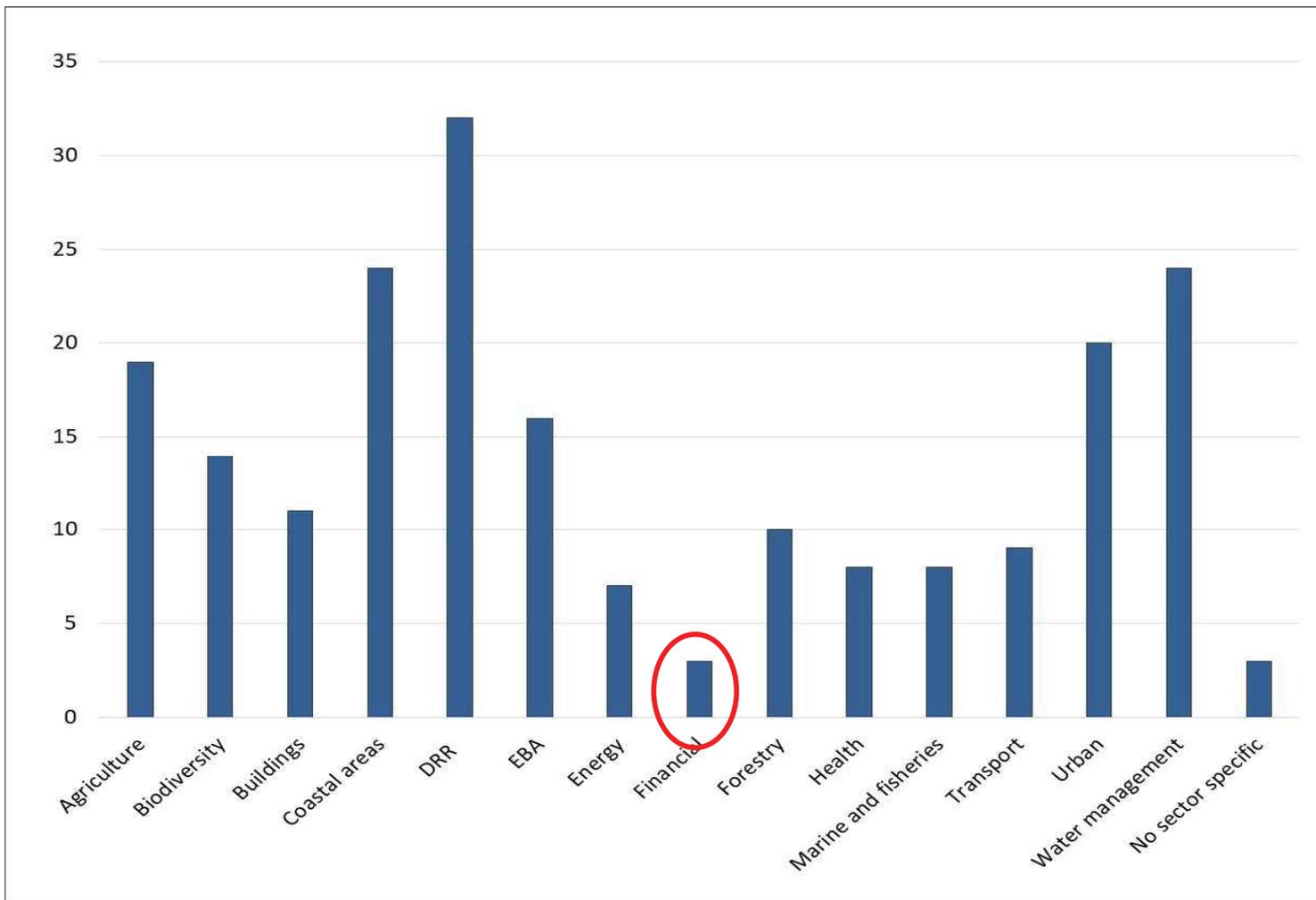
[Climate resilient retrofit of a Rotterdam building](#)

[White roof, innovative solar shadings and bioclimatic design in Madrid](#)

Source of information

Country	Warning Level
AT	
BA	Ra
BE	
BG	
CH	
CY	
CZ	Ra
DE	Ra
DK	
EE	Ra
ES	Ra, CC
FI	Ra
FR	Ra
GR	
HR	Ra
HU	Ra
IE	
IL	
IS	

Coverage and gaps

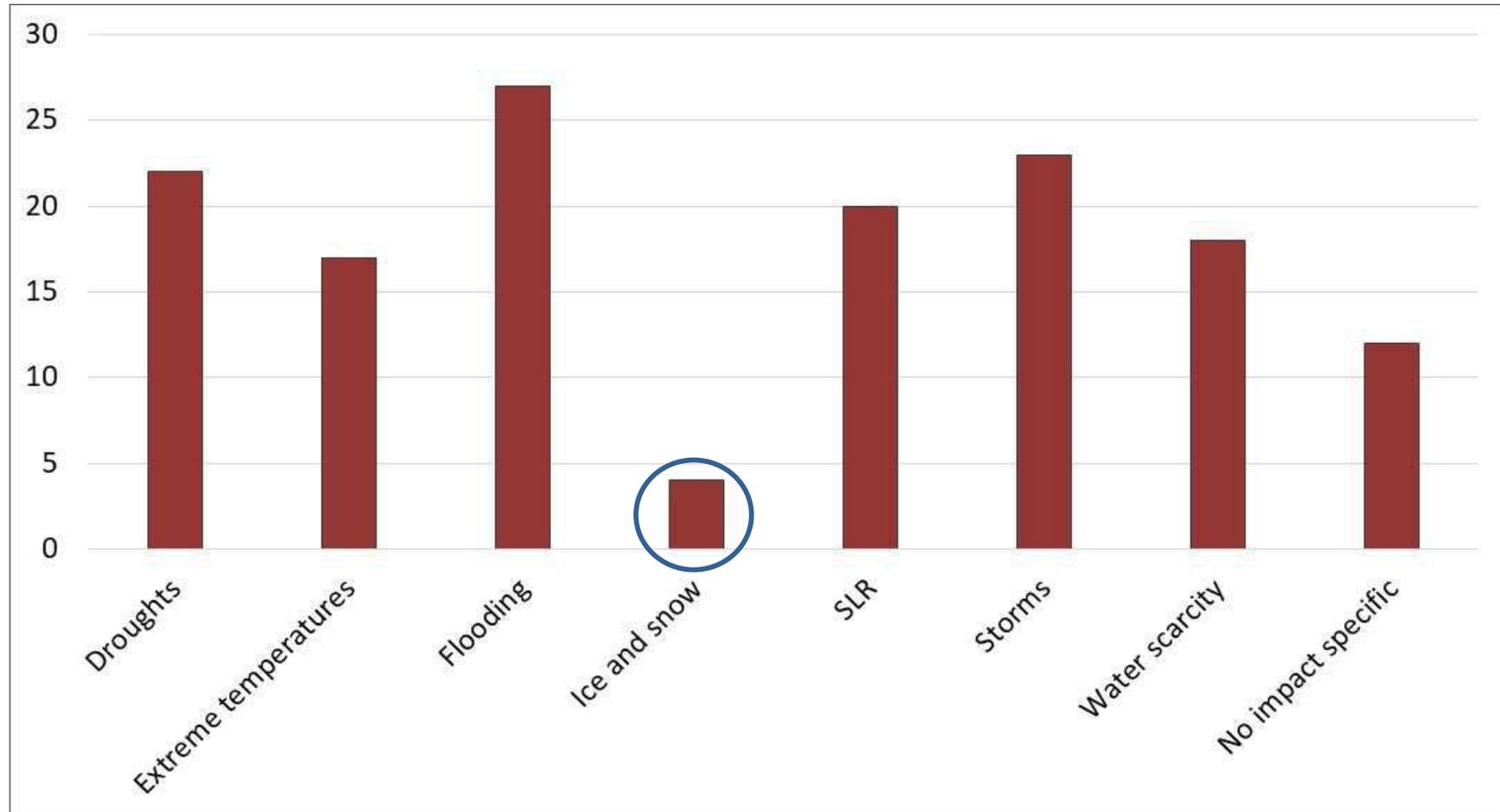


Gap category 1 - Missing scientific/practical evidence

Gap category 2 - Incomplete information gathering

Gap category 3 - Information is not eligible according to the CA database criteria

Coverage and gaps



Linking options to case studies



Living
m

ation

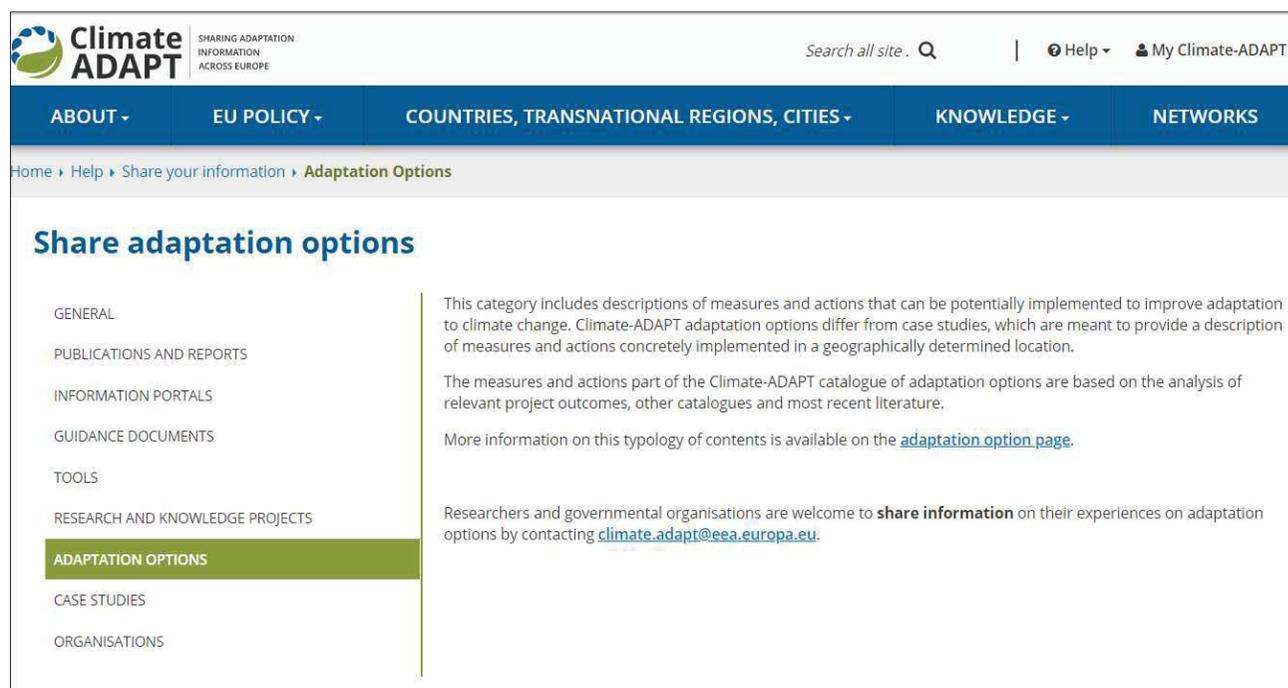
Ones, alternatively, the use of materials with high thermal resistance can reduce the heat that enters the building. This option is particularly interesting for retrofitting existing building with insulation layers that compensate for the poor thermal properties of the existing building materials.

[Adapting to heat stress in Antwerp \(Belgium\) based on detailed thermal mapping](#)

thermal mapping

Development of adaptation options

- An user submits a short abstract
- Based on the feedback, the user develop the full description through an offline template
- The adaptation option is reviewed by ETC-CCA and EEA experts
- The user finalizes the adaptation option description
- EEA approves the off-line version of the adaptation option and publish it on Climate-ADAPT



The screenshot displays the Climate-ADAPT website interface. At the top, the logo for Climate ADAPT is visible, along with the tagline 'SHARING ADAPTATION INFORMATION ACROSS EUROPE'. A search bar and navigation links for 'Help' and 'My Climate-ADAPT' are present. Below the main navigation menu, the breadcrumb trail reads 'Home > Help > Share your information > Adaptation Options'. The main heading is 'Share adaptation options'. A sidebar on the left lists various categories: GENERAL, PUBLICATIONS AND REPORTS, INFORMATION PORTALS, GUIDANCE DOCUMENTS, TOOLS, RESEARCH AND KNOWLEDGE PROJECTS, ADAPTATION OPTIONS (highlighted in green), CASE STUDIES, and ORGANISATIONS. The main content area provides a description of the 'ADAPTATION OPTIONS' category, stating that it includes descriptions of measures and actions that can be potentially implemented to improve adaptation to climate change. It also mentions that these options differ from case studies and are based on the analysis of relevant project outcomes, other catalogues, and most recent literature. A link to the 'adaptation option page' is provided for more information. At the bottom, it invites researchers and governmental organisations to share information on their experiences by contacting climate.adapt@eea.europa.eu.

Way forward

- Enrich the catalogue of adaptation options
- Fill major gaps
- Improve links with case studies
- Review old and overlapping adaptation options
- Link to other catalogues of adaptation options and measures

Thank you for your attention

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αλλάζουμε κλίμα

LIFE-IP AdaptInGR – Boosting
the implementation of adaptation
policy across Greece
LIFE17 IPC/GR/000006

An example of How Climate-ADAPT Adaptation Options are used in Europe

*Webinar on Exploring potential adaptation options for
policy and decision making: the Climate-Adapt
Catalogue. 18 May 2020*

Spyridoula Ntemiri
Climate Change PM
Green Fund GR



With the contribution of the LIFE
Programme of the European Union



With the contribution of
the Green Fund



ΤΡΑΠΕΖΑ ΤΗΣ ΕΛΛΑΔΟΣ
ΕΥΡΩΣΥΣΤΗΜΑ



ΑΚΑΔΗΜΙΑ



ΑΘΗΝΑΝ



ΕΛΛΗΝΙΚΗ ΕΤΑΙΡΕΙΑ
Περιβάλλοντος και Πολιτισμού



ΜΑΡΙΟΛΟΓΟΥΛΕΙΟ - ΚΑΝΑΓΚΙΝΕΙΟ ΙΔΡΥΜΑ
ΕΠΙΣΤΗΜΩΝ ΠΕΡΙΒΑΛΛΟΝΤΟΣ

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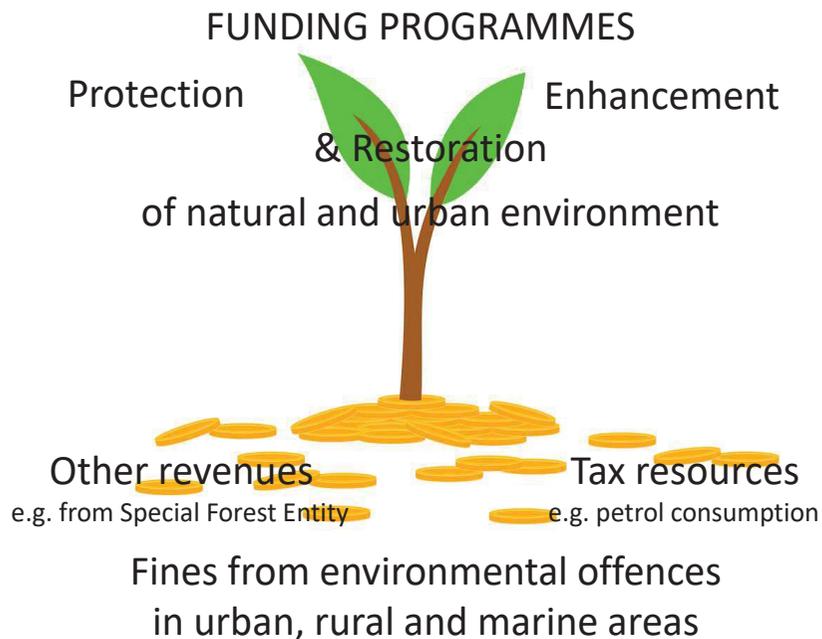


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www.adaptivegreece.gr

A few words about the Green Fund (GRFU)

- GRFU is a funding organization in Greece, founded in 2010.
- It is a public body, supervised by the Ministry of Environment and Energy (MEEN).



Scope of the GRFU:

- To enhance development through environmental protection;
- To support the country's environmental policy;
- To serve public and social interests through the management of its resources.

The Director of the GRFU is the Greek National Contact Point for the LIFE Programme/ENV.

Green Fund and the LIFE Programme



LIFE is the EU's financial instrument for the environment and climate change.

GRFU participates in:

- 1 capacity building LIFE project (GR LTF)
- 3 integrated LIFE projects (IPs)
- 4 traditional LIFE projects

Through the GR LTF the GRFU supports potential beneficiaries in the submission of LIFE proposals. For CCA proposals, the use of the Climate-ADAPT platform is suggested as a key tool for gathering information on adaptation options and research projects.

Climate-ADAPT use case 8 — Greece

Supporting the preparation of EU LIFE Climate Action funding proposals in Greece at national, regional and local levels by using the Climate-ADAPT database, adaptation options and research projects

Climate-ADAPT features used: database; countries/regions/cities (country pages); knowledge (research projects, adaptation options)

Sector: adaptation in general

Governance level: national

Biogeographical region: Mediterranean

Macro-region: southern Europe

Policy stage: policy development

The challenge

fulfilling the requirements of the fund. Furthermore, the team supports the GRFU and the MEE when they participate in LIFE projects, especially strategic projects implemented over a wider geographical area (integrated projects).

Potential beneficiaries in Greece, including national, regional and local authorities, with various backgrounds and different levels of knowledge and skills on adaptation, have a range of training and information needs. In its role as a facilitator, the GR LTF had to become familiar with all aspects of adaptation relevant to the different sectors and governance levels in the country.

The approach

Given that the LIFE programme finances projects that have to add value to the understanding and implementation of climate change adaptation policies at EU level, the content presented on Climate-ADAPT and the functionalities available on the platform proved to be particularly helpful and suitable for establishing the basic background with respect to issues related to climate change impacts and the existing options for

[Climate-ADAPT use case 8](#)

LIFE-IP AdaptInGR

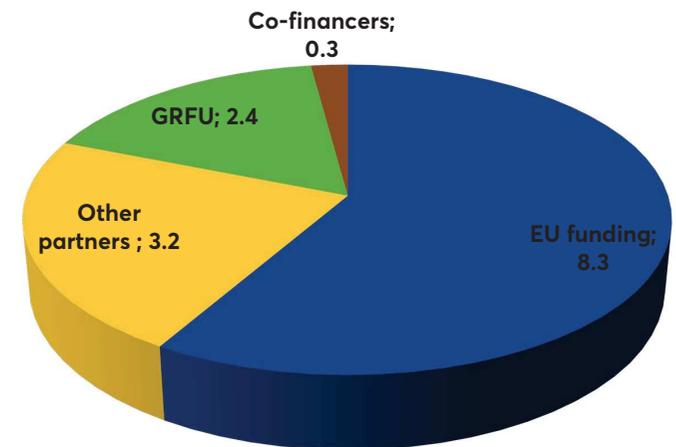


Title:
Boosting the implementation of
adaptation policy across Greece
LIFE17 IPC/GR/000006

19 Partners

- National administration (3)
- Regional administration (4)
 - 3 regions (Regions of Western Greece, Central Greece, Ionian islands)
 - Union of Greek Regions
- Local administration (6)
 - 5 municipalities (Ag. Anargiroi-Kamatero, Katerini, Komotini, Larissa, Rhodes)
 - Central Union of Greek Municipalities
- Academic community (4)
- Non-governmental organizations (2)

Contribution to overall budget (M€)

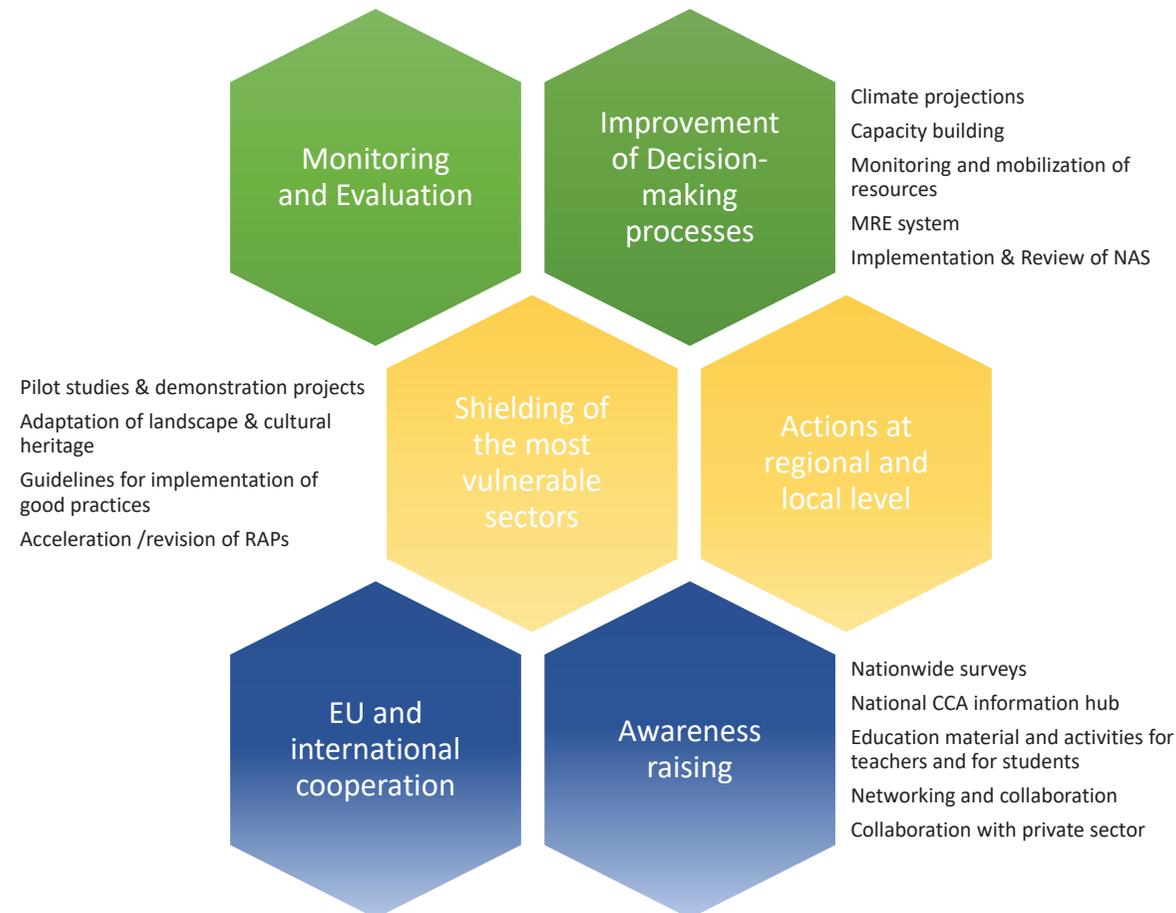


Duration: 2019-2026 (8 years)

Budget: €14.189.548

Coordinator: MEEN

LIFE-IP AdaptInGR Actions



- 20 actions for implementation
- Close link to the Greek National Adaptation Strategy (NAS) and the 13 Regional Adaptation Plans (RAPs)

GRFU role

- Proposal – Suggestion of adaptation options for regional and local demonstration projects
- Project implementation
 - Capacity building
 - Monitoring and mobilization of resources
 - Support in most actions incl. in the implementation of demonstrative projects



FLOOD RISK
MANAGEMENT

FOREST FIRES IN
DROUGHT-PRONE
AREAS



COASTAL RISK
MANAGEMENT

SUSTAINABLE
WATER
MANAGEMENT



URBAN PLANNING
AND
REGENERATION

1. Delineation of Inahos river in Aitoloakarnania (RWG)
2. River bed protection – Flood control in Drimatorema area (RCG)
3. Stream bed management, Amarythos beach in Evia island (RCG)
4. Draining system in the former lake Xynias (RCG)
5. Forest fire prevention in Peristeri and Geraki areas, Iliada (RWG)
6. Assessment, monitoring and recording of coastal erosion using Unmanned Aerial Vehicles in Ionian islands (RII)
7. Coastal zone management in Kalamaki beach (RWG)
8. Coastal zone management in the NW coast of Rhodes island (MoR)
9. Network for the collection of rainwater in Gerovouno area and its transfer to the Antonis Tritsis park (MoAAK)
10. Water resources management in Aigeiros, Komotini (DEYAK)
11. Urban regeneration of public places and creation of green spaces in Katerini (MoK)
12. Retrofitting of a school complex in Larissa (MoL)

Step A: Collect appropriate 'Adaptation Options' – Case 1

Network for the collection of pluvial water in Gerovouno area and its transfer to the Antonis Tritsis park

The Problem

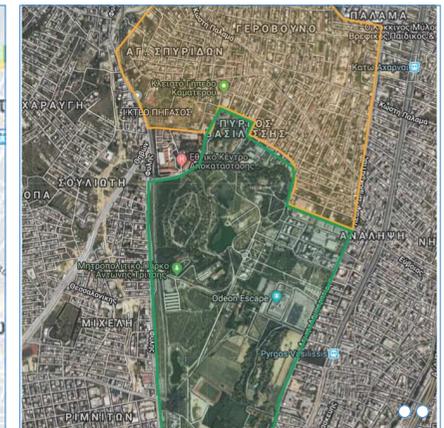
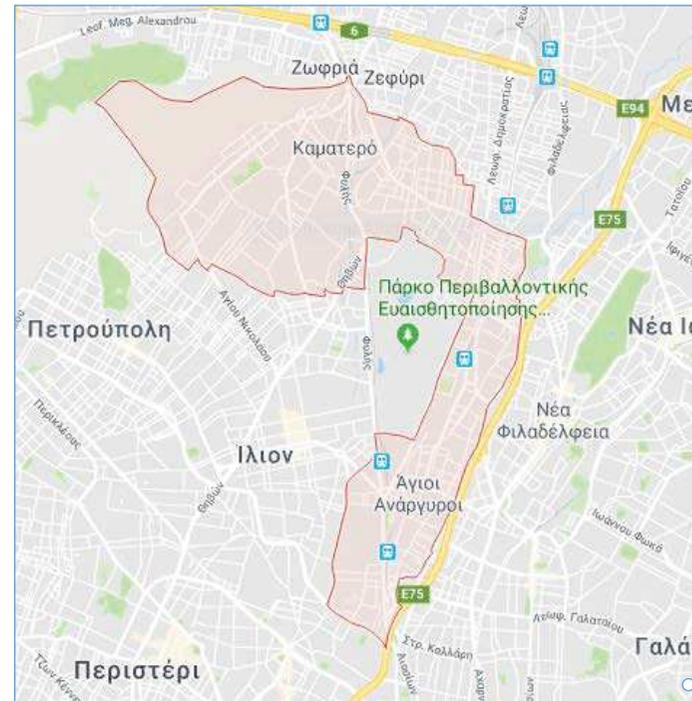
- Extreme flooding in Gerovouno area. No management of pluvial water – Superficial runoff.
- Severe water shortage at the wetlands of the Antonis Tritsis park.

Climate-ADAPT Adaptation Options

Adaptation sector: Urban
Climate impact: Flooding

27 results, including:

- Adaptation or improvement of dikes/dams
- Green spaces and corridors in urban areas
- Water sensitive urban and building design
- Establishment of early warning systems



○ Municipality of AAK ○ Intervention area ○ Flooding event – Images from press (iefimerida 23.10.2015) ○ Lake of Antonis Tritsis park (Ph: I.Georgouleas)

Step A: Collect appropriate 'Adaptation Options'– Case 2

Retrofitting of a school complex in Larissa



Primary School



Secondary School



Intervention area

Climate-ADAPT
Adaptation Options
Adaptation sector:
Buildings, Urban
Climate impact: Extreme
temperatures

The Problem

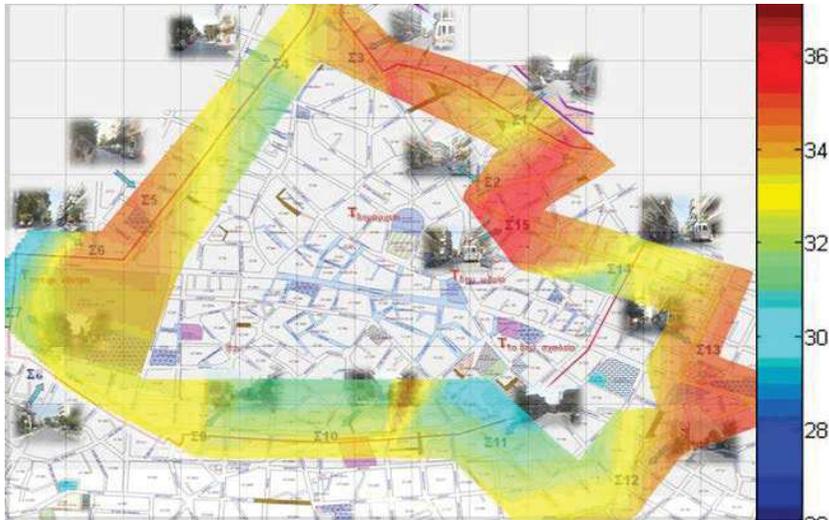
- Very high temperatures in the city centre.
- High activity in the city centre, high concentration of services.
- Climate projections: increase in heat waves frequency and in number of warm days.
- School complex of >1200 students

7 results, including:

- Consumer-side adaptation options in the energy sector – changes in individual behavior
- Green spaces and corridors in urban areas
- Water uses to cope with heat waves in cities
- Establishment of early warning systems
- Urban farming and gardening

Step A: Collect appropriate 'Adaptation Options'– Case 3

Urban regeneration of public places and creation of green spaces in Katerini



Thermal photography in Katerini, 2008; Results presented by Mayor S. Chionnidis in the GR LTF event 'LIFE and Cities', 09.04.2019

The Problem

- Increased vehicle circulation.
- Densely populated → building blocks.
- Air pollution in combination with high temperatures.

Climate-ADAPT Adaptation Options

Adaptation sector: Buildings, Urban

Climate impact: Extreme temperatures; non specific

9 results, including:

- Consumer-side adaptation options in the energy sector – changes in individual behavior
- Green spaces and corridors in urban areas
- Water uses to cope with heat waves in cities
- Establishment of early warning systems
- Remote sensing monitoring

Step A: Collect appropriate 'Adaptation Options'– Case 4

Water resources management in the municipal department of Aigeiros, Komotini

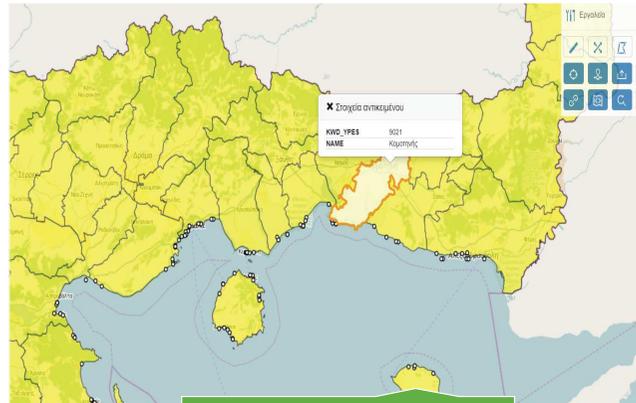
The Problem

- Aigeiros is in the south of the municipality. Main occupation of residents is agriculture. Coastal part: Natura2000 area
- Local water needs are covered by 10 water boreholes. For the 3 coastal settlements water is provided by 3 main boreholes.
- Resident population: 505 residents << seasonal population (5,000)→ Low water pressure/cuts, expected to get worse
- Water quality issues noted (brackish water)

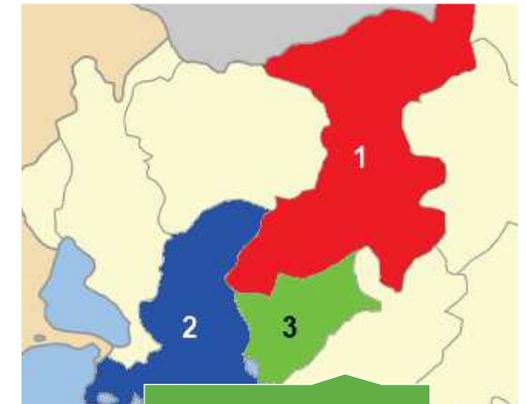
Climate-ADAPT Adaptation Options

Adaptation sector: Water management

Climate impact: Water scarcity; droughts



Location of the municipality of Komotini



Municipal departments of Komotini

17 results, including:

- Water restrictions and consumption cuts
- Improvement of irrigation efficiency
- Adaptation of groundwater management
- Water recycling

Step B: Getting more information from Climate-ADAPT 'Adaptation Options'

Cases	Category	Key aspects
1: Management of pluvial water in Municipality of Agioi Anargyroi-Kamatero - Water sensitive urban and building design	Green-grey measure IPCC - Structural and physical: Ecosystem-based adaptation options Engineering and built environment options	Inter-organisational collaboration and cooperation with stakeholders Long procedures Combination of different funding tools
2: Retrofitting of school complex in Municipality of Larissa – Green spaces and corridors/Urban farming and gardening	Green IPCC - Structural and physical: Ecosystem-based adaptation options	Involvement of stakeholders (municipality, school community) Selection of plant species (water scarcity), indirect benefits, 1-5 years
3: Urban regeneration in Municipality of Katerini – Green spaces and corridors , Remote sensing monitoring , Early Warning Systems	Green IPCC - Structural and physical: Ecosystem-based adaptation options Soft, Grey Social: Informational, Structural and physical: Technological options	Active involvement of local stakeholders/final users Consultation with public sector at various levels Preparedness & performance of key structures
4: Water resources management in Municipal Supply & Sewage Company of Komotini – Monitoring of water uses/ Consumption Cuts	Soft IPCC - Social: Behavioural	Monitoring of the network Dynamic management of water supply – Restrictions in peak period

Conclusions

- Adaptation options in Climate-ADAPT provides a **good overview of different solutions** for adapting to climate change in different sectors.
 - The selection of an adaptation option over another necessarily needs to come after **good discussions and insights provided by the local authorities & stakeholders**, taking into account their **wider vision** for the area.
 - In practice and in many cases a **combination of measures** may fit better the problem targeted.
 - Mind the **budget, time** and **maturity** needed for each adaptation option-consider a combination of funding tools.
 - Many solutions carry **co-benefits** in addition to the solution of the main problem. In Climate-ADAPT, for each adaptation option element a general description and key aspects related to stakeholders, success and limiting factors, costs and benefits and links to legislation are provided. Exploring them can provide useful ideas during planning and implementation.
 - Dissemination through Climate-ADAPT can contribute to the transferability and replicability of **good practices** and **successful implementation cases** keeping in mind that the same options can be implemented in different ways.
-

Thank you for your attention!

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This presentation uses material provided by the Municipalities of Agioi Anargyroi-Kamatero, Katerini, Larissa and the Municipal Water Supply and Sewerage Company of Komotini during the preparation and the implementation of the LIFE-IP AdaptInGR project.

Other material used:

Iefimerida, [article posted on 23.10.2015](#). Accessed on May 8th 2020.

Pyrgos Vasilissis, ['Antonis Tritsis' park](#). Accessed on May 8th 2020.

Hellenic Ornithological Society, [Park of environmental information and sensitisation 'Antonis Tritsis'](#). Accessed on May 10th 2020.

Municipality of Komotini, [the Municipality of Komotini](#). Accessed on May 10th 2020.