



MASTER ADAPT

MAInSTreaming Experiences
at Regional and local level
for ADAPTation to climate change

**CLIMATE CHANGE ADAPTATION PRACTICES
ACROSS THE EU
MAINSTREAMING ADAPTATION POLICIES AT
REGIONAL AND LOCAL LEVEL**



Con il contributo dello strumento finanziario LIFE dell'Unione Europea
With the contribution of the LIFE financial instrument of the European Community

LIFE MASTER ADAPT - MAInStreaming Experiences at Regional and local level
for ADAPTation to climate change - LIFE15 CCA/IT/000061

Report coordination

AMBIENTEITALIA

RICERCA, CONSULENZA E PROGETTAZIONE PER LA SOSTENIBILITÀ

(responsible for Action A2)

Alessia Albini, Lorenzo Bono, Teresa Freixo Santos, Mario Zambrini

With the contribution of all partners

F. Giordano (ISPRA), I. Leoni (ISPRA), V. Lucia (ISPRA), M. Lapi (FLA), L. Cozzi (FLA), F. Fraschini (FLA), M. Pregnolato (FLA), S. Marras (UNISS), D. Maragno (IUAV), F. Magni (IUAV), M. F. Musco (IUAV), F. Arras (Regione Sardegna), A. Congiu (Regione Sardegna), G. Satta (Regione Sardegna)



REGIONE AUTONOMA
DE SARDEGNA
REGIONE AUTONOMA
DELLA SARDEGNA



AGENZIE LOCALI ITALIANE



uniss
UNIVERSITÀ DEGLI STUDI DI SALERNO



FLA
Fondazione Lombarda
per l'Ambiente



ISPRA
Istituto Superiore per la Protezione
e la Ricerca Ambientale



I
U
A
V



Regione
Lombardia

July 2017

CONTENTS

1	Preface	4
2	Analysis of the Best Practices in Europe	5
2.1	Questionnaire and feedback from public authorities	5
2.2	Setting the adaptation strategy.....	7
2.3	Implementation of the adaptation strategy	19
2.4	Governance of the planning process	21
2.5	Monitoring and evaluation	27
3	Mainstreaming of adaptation policies - some examples.....	30
4	Best practices exchange	46
5	Annexes	54
5.1	Questionnaire	54
6	References.....	61

1 PREFACE

Master Adapt project focuses on adaptation policies at subnational level (regional, provincial and local). In order to acquire direct and useful information in different EU areas, action A2 involved mainly the subnational level from different EU Countries. To reach the objective it was prepared a questionnaire regarding the main phases in developing Adaptation Policies at sub national level.

Other than obtained direct information, the objective of action A2 was the creation of contacts and permanent links between the project partners and those actors that answered positively to the project solicitation, fostering a more fruitful international cooperation and ensuring widespread dissemination of the project's results.

A workshop was organized in Milan inviting all partners and three public authorities: Catalonia Region Climate Change Office (Spain), Environmental Protection Agency of the Baden-Württemberg Federal State (Germany) and County of Kronoberg (Sweden).

For more information about the Master Adapt project and to follow the next activities, please see the project website:

www.masteradapt.eu

2 ANALYSIS OF THE BEST PRACTICES IN EUROPE

2.1 Questionnaire and feedback from public authorities

The self-assessment survey has been conceived as a questionnaire with 25 questions (included in the Annex for the details). The main themes addressed included the following: the adaptation strategy setting process (Part A); the adaptation implementation process (Part B); the evaluation of the adaptation setting and implementation process including the administrative bodies and stakeholders involvement on it (Part C). Most of the questions were designed as closed questions (including multiple-choice options) to restrict the time needed to respond, to reduce the ambiguity of both questions and answers and to facilitate the analysis of results; but there were also three open-ended questions that gave public authorities the opportunity to include more information and/or add details better explaining their experiences.

The questionnaire was sent to forty Public Administration (Federal State, Regional Government and Municipal Authorities and Malta); of those, twenty-one sent their responses to the self-assessment survey (50% of the contacts made). The below figure 2.1 illustrates the distribution of those who answered considering both the geographic distribution and the level of governance. It was encouraged to involve directly the administrative bodies in the self-assessment questionnaire, but it was also accepted that other stakeholders (e.g. all levels of government, environment protection agencies (EPAs), researchers, associations, and non-governmental organisations - NGOs) involved in the process could answer on behalf of them (the case of Basque Region (Spain), Murcia Region (Spain) and Emscher-Lippe Region - Germany).

The questionnaire was answered by twelve regional authorities (including federal states in Germany and counties in Sweden), three metropolitan areas and three cities. The questionnaire was also answered by the State of Malta; the present report will take it into account considering that, given the small size of the country, climate adaptation policy is driven mainly at national level (Table 2.1).

We still hope to receive, during the project development, some answers from French authorities, involved by the Comité 21 – (the French twin of the partner project “Coordinamento Agenda 21”), who had kindly translated the questionnaire and distributed among its associates.

Figure 2.1. Who answered the questionnaire

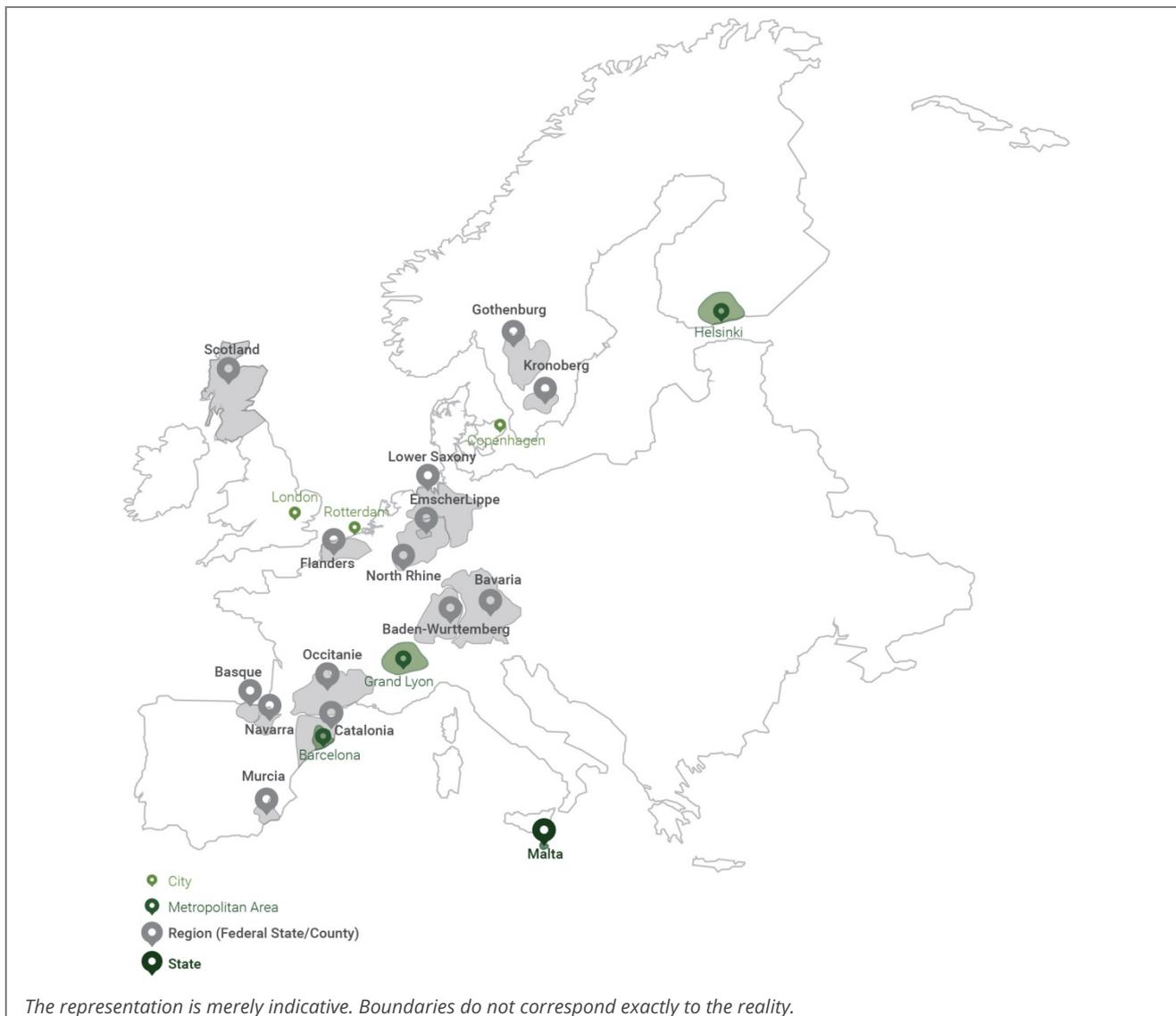


Table 2.1 Who answered the questionnaire

Country	Area	Governance level
Finland	Helsinki Metropolitan Area	Metropolitan area
France	Occitanie Region	Regional
France	Grand Lyon (Métropole de Lyon)	Metropolitan area
Spain	Barcelona Metropolitan Area (Àrea Metropolitana de Barcelona)	Metropolitan area
Spain	Catalonia Region (Generalitat de Catalunya)	Regional

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

Country	Area	Governance level
Spain	Basque Region (Comunidad Autónoma del País Vasco o Euskadi)	Regional
Spain	Murcia Region (Comunidad Autónoma de la Región de Murcia)	Regional
Spain	Navarra Region (Comunidad Autónoma de la Región de Navarra)	Regional
Belgium	Flanders Region	Regional
Sweden	Kronoberg County (Kronobergs Län)	Regional
Sweden	Gothenburg County (Västra Götalands Län)	Regional
Germany	North Rhine Westphalia Federal State (Landesregierung Nordrhein-Westfalen)	Regional
Germany	Emscher-Lippe-Region	Regional
Germany	Baden-Wurttemberg Federal State (Landesregierung Baden-Württemberg)	Regional
Germany	Bavaria Federal State (Bayerische Staatsregierung)	Regional
Germany	Lower Saxony Federal State (Landesregierung Niedersachsen)	Regional
United kingdom	Scotland	Regional
United kingdom	London	Local
Netherland	Rotterdam	Local
Denmark	Copenhagen	Local
Malta	State of Malta	National

2.2 Setting the adaptation strategy

In April 2013, the European Commission adopted the communication 'An EU Strategy on adaptation to climate change' (commonly known as the EU Adaptation Strategy), which main objective is to *"contribute to a more climate-resilient (...) enhancing the preparedness and capacity to respond to the impacts of climate change at local, regional, national and EU levels, developing a coherent approach and improving coordination Europe"* (EU, 2013). The EU Adaptation Strategy has three objectives:

1. Promoting action by Member States: encouraging all Member States to adopt comprehensive adaptation strategies providing guidance and funding to help build up adaptation capacities and take action and supporting adaptation in cities by launching a voluntary commitment based on the Covenant of Mayors initiative.
2. Promoting better informed decision-making by addressing gaps in knowledge about adaptation and further developing the European Climate Adaptation Platform (Climate-ADAPT) as the 'one-stop shop' for adaptation information in Europe.
3. Promoting adaptation in key vulnerable sectors through agriculture, fisheries and cohesion policy, ensuring that Europe's infrastructure is made more resilient, and encouraging the use of insurance against natural and man-made disasters.

In 2016, the Commission launched a first evaluation phase of the EU Adaptation Strategy, examining the actual implementation and the achievement of the Strategy compared to what was expected. The evaluation follows the standard framework for evaluation of EU policies

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

and examines the relevance, effectiveness, efficiency, coherence and EU added value. The evaluation is planned to be completed by mid-2018.

The following table 2.2 synthetises the state of the art in terms of Adaptation Strategy and Adaptation Plan adopted at national level, as encouraged by the EU Adaptation Strategy; it seems clear that EU Countries are still a little bit late in terms of adaptation policy frameworks: twenty-one countries seem to have adopted a National Adaptation Strategy (NAS) but only twelve have already set out a National Adaptation Plan (NAP). This synthesis cannot be considered as exhaustive, but rather a snapshot based on data available on European Climate Adaptation Platform (Climate-ADAPT) and on United Nations Framework Convention on Climate Change (UNFCCC) websites as well on national websites (as reported on "References").

Table 2.2 National Adaptation Strategy and Plan - Status of art in European countries

Country	National Adaption Strategy (NAS)	National Adaptation Plan (NAP)
Austria	Adopted in 2013	Adopted in 2013
Belgium	Adopted in 2010	Being developed
Bulgaria	Being developed	Being developed
Croatia	Being developed	Being developed
Cyprus	Being developed	Being developed
Czech Republic	Adopted in 2015	Adopted in 2017
Denmark	Adopted in 2008	Adopted in 2012
Estonia	Adopted (data not available)	Adopted (data not available)
Finland	Adopted in 2005	Adopted in 2014
France	Adopted in 2007	1 st Plan adopted in 2011 2 nd Plan adopted in 2016
Germany	Adopted in 2008	Adopted in 2011
Greece	Adopted in 2016	Being developed
Hungary	Being adopted	Being developed
Ireland	Draft of National Adaptation Framework (NAF) statutory consultation attended by the end June 2017	Data not available
Italy	Adopted 2014	Being developed, in consultation phase, to be finalised in 2017
Latvia	Expected to be approved by national government at the mid of 2017	Data not available
Lithuania	Being developed	Data not available
Luxembourg	Adopted in 2012 Ongoing revision	Data not available
Malta	Adopted in 2012	Data not available
Netherlands	1 st NAS adopted in 2007 2 nd NAS adopted in 2016	Adopted in 2016
Poland	Adopted in 2013	Data not available

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

Country	National Adaption Strategy (NAS)	National Adaptation Plan (NAP)
Portugal	1 st NAS adopted in 2010 2 nd NAS adopted in 2015, includes the two Regional Adaptation Strategies for the Autonomous Regions of Madeira e Azores	Being developed, to be finalised in 2017
Romania	Adopted in 2013	Adopted (data not available)
Slovakia	Adopted in 2014	Planned
Slovenia	Adopted (data not available)	Being developed
Spain	Adopted in 2008	1 st Plan adopted in 2006 2 nd Plan adopted in 2009 3 rd Plan adopted in 2014
Sweden	Adopted in 2009	21 Regional Action Plan adopted in 2014
United Kingdom	<u>UK</u> : adopted in 2008, in revision process, to be finalised in middle June 2017 <u>Wales</u> : adopted in 2010 <u>Scotland</u> : adopted in 2009	<u>UK</u> : adopted in 2013 <u>Wales</u> : adopted in 2011 <u>Scotland</u> : adopted in 2014 <u>North Ireland</u> : adopted in 2014

As reported in the "Study of Adaptation Activities at Regional Level in the EU", "*Across the EU, there are a variety of approaches to multi-level governance, depending upon size, political and historical tradition and a host of other factors. In some Member States responsibilities for policy-making and implementation are clearly defined across levels of governance; in others they are more blurred. Adaptation to climate change is a relatively new policy field in the EU, and a complex one that crosses sectors and geographical boundaries. This complicates the definition and description of how adaptation is handled at the regional level across the EU.*" (Milieu&al., 2013).

A similar issue has been also highlighted in the Committee of Regions' Report concerning "Regional and Local Adaptation in the EU since the Adoption of the EU Adaptation Strategy in 2013" (Committee, 2016), stating that "*The role of regions is not particularly focussed on per se, whereas the local level is addressed directly.*"

In some Countries like Austria, Belgium, France, Germany, Italy, Spain, Sweden and United Kingdom adaptation strategies are in place across all the sub-national levels.

Coordination at regional and national level is often better in Countries in which regional adaptation is more developed. For example, the Austrian and German Federal States were included in the developments of their respective national strategies and their contributions contained in national documents. Sweden has also strong regionally driven governance and therefore adaptation strategies have been developed in all Counties: the national Government has mainly a coordination role, supporting all the Swedish county boards implementing regional adaptation strategies. At the same time, the Swedish Government has directly influenced the local level through the Planning and Building Act, stating that adaptation concerns have to be considered in municipalities' comprehensive and location-specific planning. Spain also encouraged coordination between the various different government levels when producing a working plan to its adaptation strategy.

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

Another example comes from Italy, where a National Board for Interregional Coordination of Adaptation was established in order to support the adaptation initiatives of sub-national level (regional and local governments). This Board: (i) supports the adaptation initiatives of regional and local government to align strategies and plans to the National Strategy; (ii) ensures that the under-development national plan on adaptation strategy takes into account the specific regional needs; (iii) carries out the monitoring and evaluation of the effectiveness of the implemented actions.

The following boxes report a brief summary of the sub-national levels role on the climate change and adaptation policy in some EU Countries.

Austria

The *Bundesländer* have legislative and executive powers with regard to spatial planning, environmental protection, planning law, transport, all of which have relevance to climate change adaptation. *Bundesländer* are also responsible for the administration, implementation and enforcement of certain federal laws at the lower levels of government (Milieu&al., 2013).

Belgium

The responsibility for adaptation to climate change policy lies with the Working Group Adaptation in the National Climate Commission that gathers representatives from the federal government and the three *gewesten/régions* governments of Wallonia, Flanders and Brussels Capital region, all having legislative powers in all the sectors that are relevant to climate change adaptation (Milieu&al., 2013).

Finland

Management of the climate change adaptation responsibilities in Finland lies with the Ministry of the Environment, and Ministry of Transport and Communications. The Regional councils are required to prepare regional (*maakunta*) level climate change strategies, including considerations for adaptation to climate change. Municipalities are consulted in this process, and participate in the strategies implementation (Milieu&al., 2013).

France

Régions do not have legislative powers but have administrative autonomy, they develop regulations for some sectors relevant to climate change adaptation (such as transport, regional planning, environment) and also provide their opinion (consultation) on the definition of the national sustainable development policy (Milieu&al., 2013).

The Law “Grenelle Environment” and later on the “Grenelle II” of June 2010 (last change in force from June 2017) requires (art. 68) *régions* to set up Regional Air, Climate, Energy Schemes (Schémas Régionaux Climat Air Energie, SRCAE), replacing regional plans for air quality, and defining mitigation and adaptation measures for the short-term (up to 2020) and the medium term (up to 2050). These plans are jointly developed by the state devolved services of the national government (*préfectures*) and the *région* Regional Councils. All *Région* have already adopted their one SRCAE (<http://www.srcae.fr/spip.php?rubrique2>)

Germany

Bundesländer or regions exercise legislative powers in all areas which are not exclusive competence of the Federal level. Environmental policy (including climate change adaptation) is a concurrent competence between the federal and *Bundesländer* level. *Bundesländer* also implement legislation at the lower levels of governance (Milieu&al., 2013).

Public actors play a central role, operating on both the German federal level as well as on the State level. The division of competence between States and the Bund is very strict, although in 2006 a major reform occurred, giving the States more competences in water management, environmental issues and spatial planning. The Bund has the power to specify general, legal frameworks concerning issues such as spatial planning and water management (Van Eerd & al., 2014).

The inter-ministerial working group for climate adaptation (Interministeriellen Arbeitsgruppe –IMA. Anpassung an den Klimawandel) plays a coordinating role. Besides ministries, the Federal Environment Agency (Umweltbundesamt) and Federal Agency for Nature Conservation are also involved in climate adaptation policies.

Following the subsidiarity principle, regions are seen as key actors for the implementation of climate adaptation policies. Regional and local actors are highly autonomous and have the right to self-govern, as long as this does not conflict with the law of the States or Bund. Moreover, different levels of water authorities (Wasserverbände) and dike associations on the regional governmental level (Deichverbände) are concerned with the governing of water issues.

Italy

Regioni have a varying degree of autonomy with regard to legislative and administrative competences. This is defined the Constitution and their Statutes. The protection of environment, ecosystems and cultural heritage is the exclusive competency of the State but, for its transversal character as well as for the connection to matters with concurrent legislative competence (e.g. health protection, land management and environmental enhancement), it is de facto exercised with the *Regioni*, which share legislative responsibility with the State in several sectors relevant to climate change adaptation.

A National Adaptation Strategy (NAS) has been developed between 2012 and 2014 and was formally adopted on June 2015, after the positive evaluation of the Unified Conference, a permanent institutional structure for the coordination of competences shared between Ministries, Regions and Local Authorities. The NAS main targets include actions and guidelines to build adaptive capacity, and concrete proposals for cost-effective adaptation measures and priorities (CMCC 2016).

The process that has been followed in Italy is inspired to a two-directions model where a top-down approach (involving the scientific community and the competent Ministries and National, Regional and Local Authorities, gathered under an Institutional panel) was coupled with a bottom up participative process (involving national stakeholder groups, particularly the civil society, the private sector, the scientific community).

The vertical coordination of institutional stakeholders is a significant feature of the approach which has been adopted to implement the NAS and prepare the National Adaptation Plan (NAP) – as well as to develop future implementing actions.

Namely, a National Board for Interregional coordination of adaptation was promoted by Sardinia Region within the Conference of the Regions, in order to support the adaptation initiatives of sub-national level (regional and local governments), to check the consistency of regional and local

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

adaptation actions with the NAS and the NAP, and to monitor and evaluate the effectiveness of the implemented actions.

NAP is currently under approval by the Ministry of Environment (submission 31 May 2017) and is expected to be formally issued by the end of 2017.

At the same time, few *Regioni* have started procedures to develop their own regional adaptation strategies and plans. Regione Lombardia is the first Italian administration to have implemented a Strategy and approved a Regional Action Paper on Climate Change Adaptation (December 2016). Some *Regioni* (Valle d'Aosta, Piedmont, Friuli Venezia Giulia, Emilia Romagna, Tuscany, Abruzzo, Sardinia and Calabria) and the Autonomous Province of Trento have taken initiatives, although in different stages, to finalize strategic documents in order to face the impacts of climate change. Other *Regioni* (Veneto and Sicily), although not having initiated specific initiatives for the preparation of Strategies and/or Plans, have started working on preparatory activities (ISPRA 2016).

Malta

Climate adaptation policy is driven at national level. At the sub-national level, the district committees (*distretti*) and the local councils (*kunsilli*) have only limited competences mainly related to local public services (Milieu&al., 2013).

The Netherlands

Climate change adaptation is planned at the national and provincial levels; provinces are responsible for spatial planning, regional development, transport and the environment. Provinces draw up guidelines and endorse plans for spatial development as well as implement environmental protection plans (Milieu&al., 2013).

The Netherlands is a decentralized, unitary State. On the national level, various actors are concerned with climate adaptation, mainly the Ministry for Infrastructure and Environment, including its Public Works Department (Rijkswaterstaat) and the Ministry of Economic Affairs, Agriculture and Innovation.

Spain

Autonomías (Autonomous Communities) have competence for all matters not allocated to the State by the Constitution. This includes environment and climate change adaptation. *Autonomías* legislate and implement state legislation. The *autonomías* and the lower levels of governance - the *provincias* and *municipios* - run their respective affairs autonomously. The National Adaptation Strategy requires all *autonomías* to develop their own climate change adaptation plans or strategies, either as separate documents or within general climate change programmes (Milieu&al., 2013).

The Spanish platform "AdapteCCA" offers a summary of adaptation initiatives and actions and provides access to the frameworks and actions carried out by autonomous communities. Almost all communities already adopted an Adaptation Strategy but few have adopted an Adaptation Plan.

Sweden

Län or counties are both a level of self-government and of devolved State authority, but do not hold legislative powers. Climate change adaptation policy is developed at the national level, but further strategic action is delegated to the *Län* level. *Län* provide assistance to municipalities in

implementation (Milieu&al., 2013).

The national Government has established an adaptation coordination post at all the Swedish county (*Län*) boards to coordinate regional adaptation. All 21 *Län* already adopted their specific Adaptation Plan.

United Kingdom

Climate change adaptation at the national level is under the responsibility of the Department of the Environment, Food and Rural Affairs (Defra). It has a coordinating and direction setting role with much of the delivery of adaptation responses being delegated to the Environment Agency in England and to the Devolved Administrations of Wales, Scotland and Northern Ireland, all having legislative powers (Milieu&al., 2013).

Wales, Scotland and Northern Ireland already adopted their Adaptation Plan.

Across Europe, depending on the specific Country governance structure, several subnational levels have already adopted their strategy and/or plan. The Master Adapt's questionnaire was answered by eighteen subnational bodies (fifty regional bodies, including federal states in Germany and counties in Sweden and three metropolitan areas) that have already adopted an adaptation strategy or are in process to develop and to adopt one.

According to the results of the Master Adapt's questionnaire, the preparation of a strategy at subnational level (question 2) is still considered, by most of the authorities who have answered, as recommended by National Strategy (12 responses of 19 authorities who answered the question excluding Malta State) and not as mandatory (see Table 2.3).

The authorities were asked to identify which stage of the adaptation process they were in (question 4), four indicated that they had started the process, ten indicated that they had a finalised strategy approved, eleven that they started the implementation stage (including two with approved strategy and one declaring an ongoing process) (see Table 2.3). In terms of time needed to develop the strategy (question 5), only four authorities took less than one year, all the others more than one year (nine more than two years). Regarding the form, the strategy can be either an independent document (11 out of 21) or part of a broader strategic framework (10 out of 21) (question 6).

Each authority was requested to select (from a provided list) what they considered the most important challenges arising from direct (question 8) and indirect (question 9) climate change impacts. Common challenges identified as direct impacts were extreme weather events either as intense precipitation/drainage and flash flooding (selected 17 times by the 21 authorities) or as heat waves / urban heat islands (selected 16 times), followed by drought and water efficiency and river floods (respectively selected 14 and 13 times) (see Figure 2.3). Regarding the indirect impacts, common challenges identified were the loss of biodiversity and the increased on health and diseases problems, respectively selected 17 and 16 times by the 21 authorities (see Figure 2.4). Regarding the indirect impacts, authorities pointed out attended impacts also on agriculture, energy demand and water demand. An interesting result is

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

represented by the lower number of authorities who are expecting to have impacts on migration flows or that consider climate change a driving force able to induce differential social impacts (only 3 times selected).

Table 2.3 Developing an Adaptation Strategy

	Total	FI Helsinki Metropolitan Area	FR Occitanie Region	FR Grand Lyon	ES Barcelona Metropolitan Area	ES Catalonia Region	ES Basque Region	ES Murcia Region	ES Navarra Region	BE Flanders Region	SE Kronoberg County	SE Gothenburg County	DE North Rhine Westphalia Federal State	DE Emscher-Lippe region	DE Baden-Wuerttemberg Federal State	DE Bavaria Federal State	DE Lower Saxony Federal State	UK Scotland	UK London	DK Copenhagen	NL Rotterdam	MT State of Malta	
Question																							
2. Does the National Adaptation Strategy enhance the creation of local or regional adaptation strategies?																							
Yes, it mandates	4																						
Yes, it encourages	12																						
No	3																						
4. State of completion of the Adaptation Strategy		Helsinki	Occitanie	Lyon	Barcelona	Catalonia	Basque	Murcia	Navarra	Flanders	Kronoberg	Gothenburg	NR Westphalia	Emscher-Lippe	Baden-Wuerttem.	Bavaria	Lower Saxony	Scotland	London	Copenhagen	Rotterdam	Malta	
Ongoing strategy document	4																						
Finalised strategy document approved	10																						
First implementation steps taken	6																						
Comprehensive implementation steps	5																						
5. How long did it take to develop the Adaptation Strategy?		Helsinki	Occitanie	Lyon	Barcelona	Catalonia	Basque	Murcia	Navarra	Flanders	Kronoberg	Gothenburg	NR Westphalia	Emscher-Lippe	Baden-Wuerttem.	Bavaria	Lower Saxony	Scotland	London	Copenhagen	Rotterdam	Malta	
< 1 year	4																						
> 1 year; < 2 years	7																						
> 2 years	9																						
6. Is the Adaptation Strategy:		Helsinki	Occitanie	Lyon	Barcelona	Catalonia	Basque	Murcia	Navarra	Flanders	Kronoberg	Gothenburg	NR Westphalia	Emscher-Lippe	Baden-Wuerttem.	Bavaria	Lower Saxony	Scotland	London	Copenhagen	Rotterdam	Malta	
An "independent" strategy document	11																						
A part of a broader strategic framework	10																						

Figure 2.3 Main adaptation challenges arising from direct climate change impacts

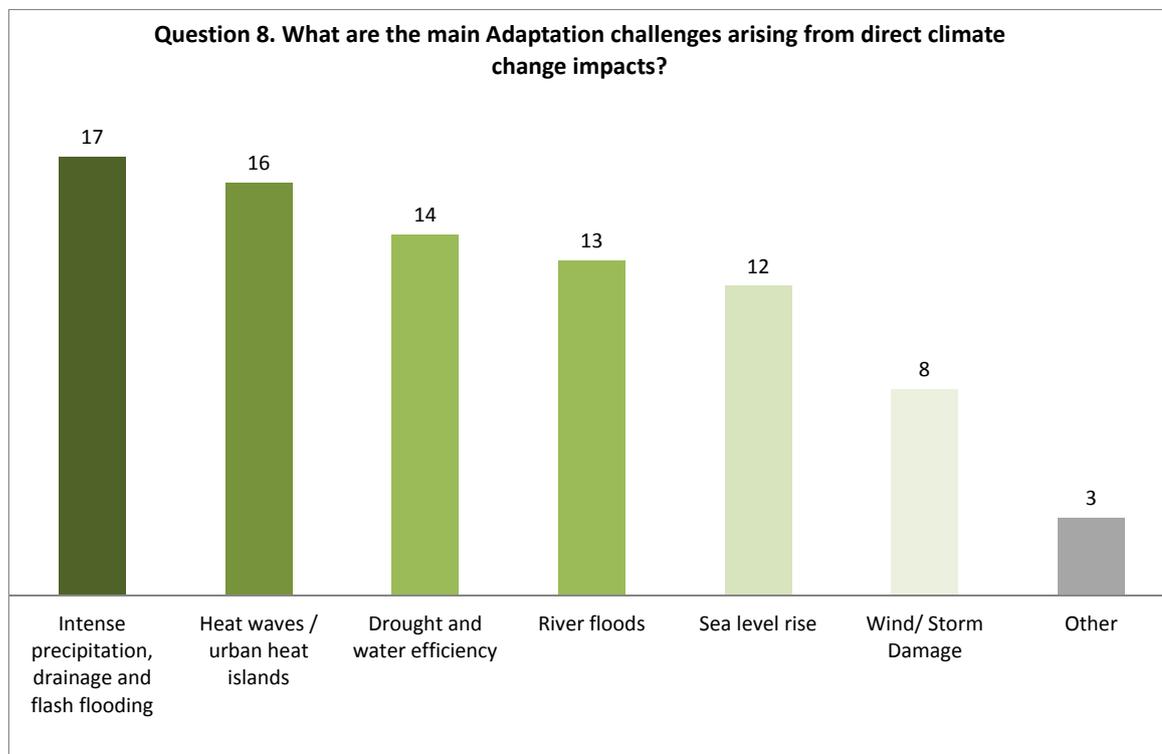
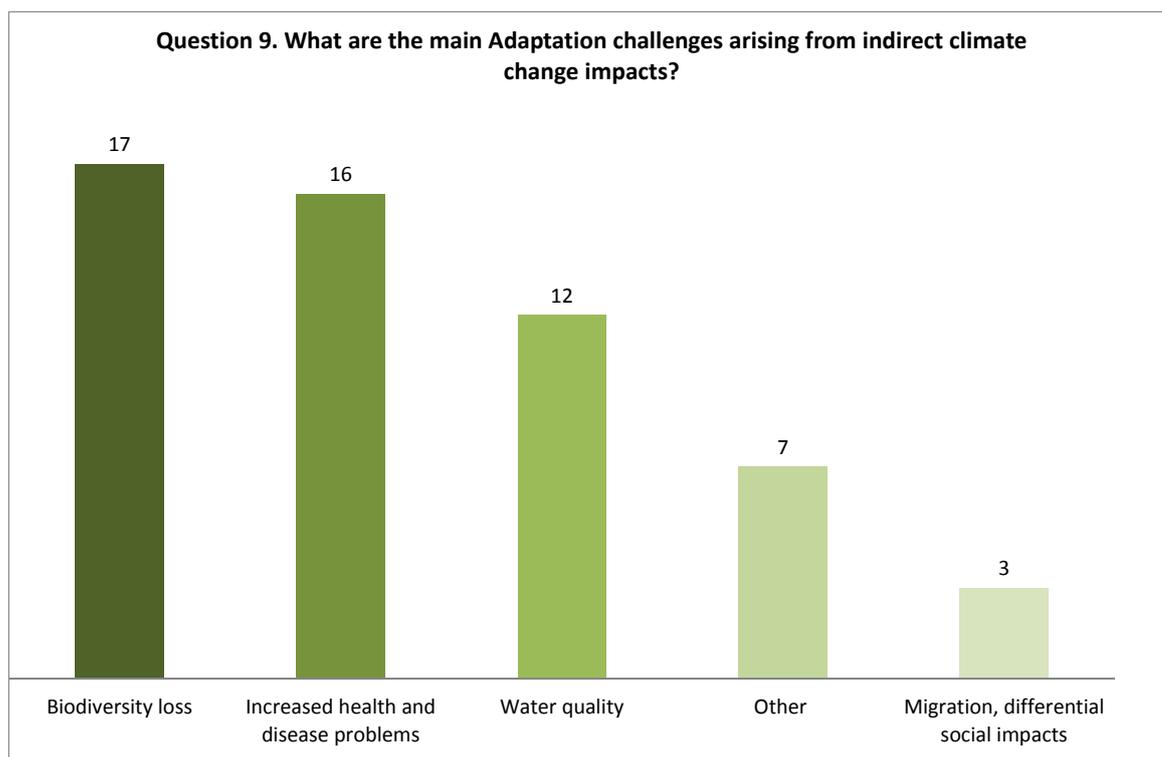


Figure 2.4 Main adaptation challenges arising from indirect climate change impacts

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU



Regarding the target-setting (question 11 and 12) it seems clear that targets are still qualitative ones (13 out of 21) rather than quantitative (7 out of 21) and that are both mainly set for the whole territory (13 of the 20 authorities who answered the question, declare that target are not identified for specific territories) rather than to a specific territorial area (see Table 2.4).

Table 2.4 Target-setting

Question	Total	FI Helsinki Metropolitan Area	FR Occitanie Region	FR Grand Lyon	ES Barcelona Metropolitan Area	ES Catalonia Region	ES Basque Region	ES Murcia Region	ES Navarra Region	BE Flanders Region	SE Kronoberg County	SE Gothenburg County	DE North Rhine Westphalia Federal State	DE Emscher-Lippe region	DE Baden-Wuerttemberg Federal State	DE Bavaria Federal State	DE Lower Saxony Federal State	UK Scotland	UK London	DK Copenhagen	NL Rotterdam	MT State of Malta
11. Does the Adaptation Strategy set targets?																						
Yes, quantitative targets	7																					
Yes, qualitative targets	13																					

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

		Helsinki	Occitanie	Lyon	Barcelona	Catalonia	Basque	Murcia	Navarra	Flanders	Kronoberg	Gothenburg	NR Westphalia	Emscher-Lippe	Baden-Wuerttem.	Bavaria	Lower Saxony	Scotland	London	Copenhagen	Rotterdam	Malta	
No	5																						
12. Does the Adaptation Strategy set targets for specific areas/territories?																							
Yes, quantitative	2																						
Yes, qualitative	6																						
No	13																						

Regarding the themes considered in the adaptation strategy, each authority was requested to select the main themes considered in their adaptation strategy (question 10) and most of them pointed out water resources management (selected 19 times by the 21 authorities), followed by flood and coastal management and land use (both selected 18 times) and nature and biodiversity (selected 17 times) (see Figure 2.5). The first two themes considered (water resources and flood) are pointed out as been mainstreamed into sectoral plans (both with 19 responses of the 20 authorities who answered to the question 14). In fact, this is not particular surprising considering the existence of the EU Water Framework Directive (WFD) adopted in 2000 (Directive 2000/60/EC) and its “daughter” and “sister” directives (Groundwater Directive 2006/118/EC, Environmental quality standards Directive 2008/105/CE; Marine Strategy Framework Directive 2008/56/CE and Floods Directive 2007/60/CE), all setting out precise deadlines for European Countries regarding water protection and management and flood risk management.

The authorities were also asked to indicate which factors have influenced the priority-setting (question 15) and most of them pointed out the results of the vulnerability assessment and the perception of urgency (respectively selected 18 and 16 times by the 20 authorities who answered the question, from which 14 of them indicated both factors), followed by the financial, personnel and other resources availability and the existence of synergies with policy objectives other than adaptation (both with 13 responses) (see Figure 2.6).

Figure 2.5 Main themes considered and mainstreamed

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

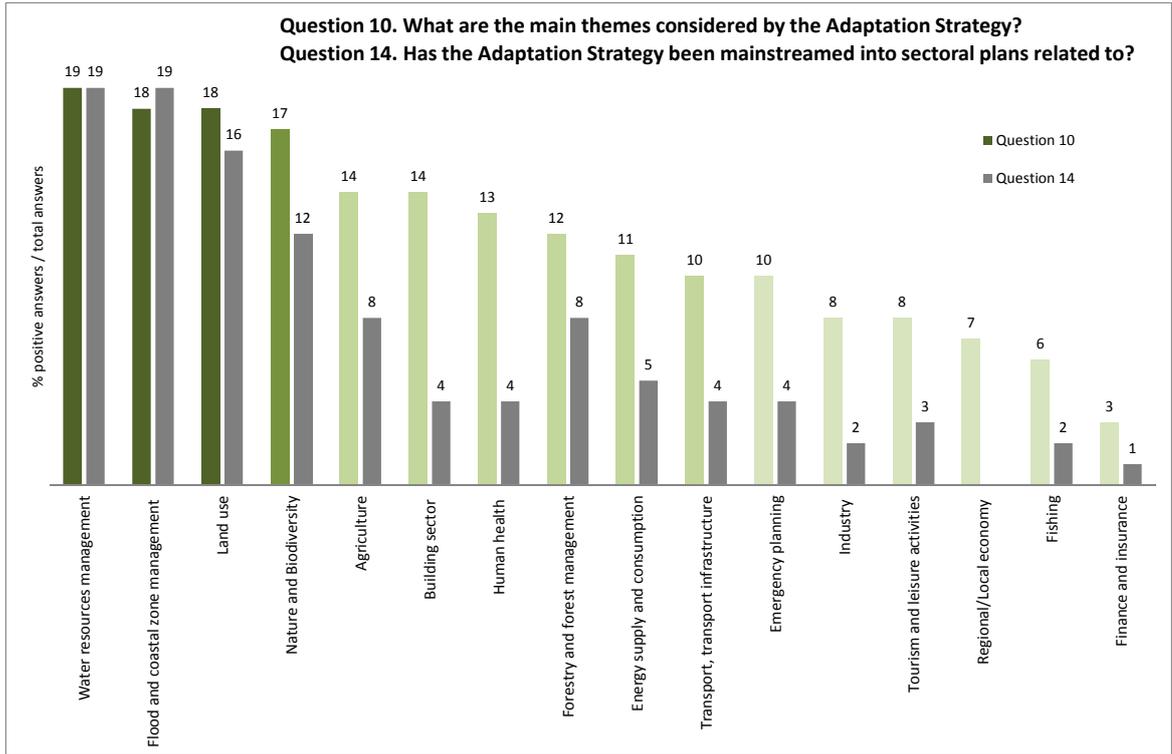
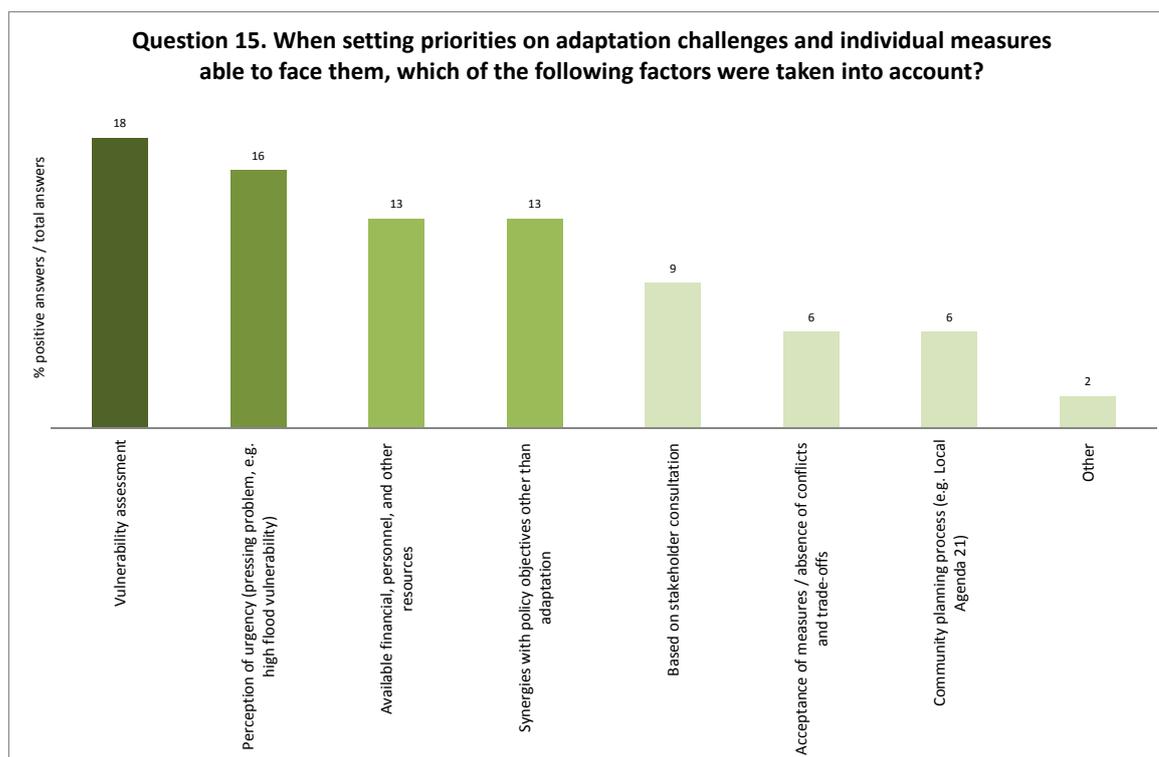


Figure 2.6 Setting priorities on adaptation challenges – factors taken into account



2.3 Implementation of the adaptation strategy

The process of strategy implementation (question 13) seems to need at least an action plan (unique response for 2 of the 20 authorities who answered the question) or the design of specific measures (unique response for 3 of 20), but more often it needs the elaboration of an action plan or an action plan plus the mainstreaming into sectoral plans (in total 11 out of 20) integrated by the design of specific measure (4 of the 11 authorities who indicated also the need of an action plan or an action plan plus mainstreaming) (see Table 2.5).

Table 2.5 implementing the strategy

	Total	FI Helsinki Metropolitan Area	FR Occitanie Region	FR Grand Lyon	ES Barcelona Metropolitan Area	ES Catalonia Region	ES Basque Region	ES Murcia Region	ES Navarra Region	BE Flanders Region	SE Kronoberg County	SE Gothenburg County	DE North Rhine Westphalia Federal State	DE Emscher-Lippe region	DE Baden-Wuerttemberg Federal State	DE Bavaria Federal State	DE Lower Saxony Federal State	UK Scotland	UK London	DK Copenhagen	NL Rotterdam	MT State of Malta	
Question																							
13. The Adaptation Strategy has been implemented and given operative application through:																							
The elaboration of an Adaptation Action Plan	4																						
The elaboration of an Adaptation Action Plan and the mainstreaming into sectoral plans	7																						
The mainstreaming into sectoral plans	5																						
The design of specific measures	9																						
Other	3																						
No operative application till now	1																						

Mainstreaming the topic of climate change adaptation means entering this topic into different policy sectors or being covered by a wide group of stakeholders, mainly institutions and Public Authorities but also other actors (for example, private companies, environmental associations, etc.). One of the consequences of mainstreaming is widening the number of subjects across a society that consciously adopt adaptation actions - and to provide an adaptive analysis of existing tools and policies by telling whether and how they contribute to increase the resilience of a community or a territory.

The mechanisms that may be gathered under the category of mainstreaming include soft and economic incentives to pro-adaptation behaviour of individuals; legal “command & control” tools (e.g. laws, regulations, mandatory standards and requirements, etc.); voluntary actions; etc. All of them can be referred to one or more sectors, depending on the width and reach of the mechanism under inquiry (that can be from comprehensive and multi-sector, to sector-specific and focussed on one climate impact, or adaptation sector).

Existing planning tools are important in fostering adaptation at the regional and local level. This is recognised in the Partnership Agreements, laid out in the EU Adaptation Strategy. Some lessons learnt can be gained from experience within Member States. In Denmark, the amendment to the Planning Act makes it possible for municipalities to include climate change

adaptation directly in the local development plans. Ireland also follows a similar approach and deals with adaptation in local plans. Sweden and the Netherlands have also made a linkage between adaptation and spatial planning (Committee of the Regions, 2016).

In the UK, mainstreaming adaptation measures in sectorial planning has become a consolidated approach. For example, one of the 24 actions foreseen by the Welsh Adaptation Delivery Plan is specifically related to the mainstreaming of adaptation policies through Sectorial Adaptation Plans covering the natural environment, business and tourism, communities, infrastructure and health. Where there is no appropriate policy development to link up with, it is expected to develop the adaptation strategy as standalone documents, but in partnership with other teams and stakeholders to ensure that it will be accepted by the community. In Scotland, under the strategic direction of the Adaptation Framework, 12 Sector Action Plans were developed. The Sector Action Plans look to existing sources of information and research to identify the key impacts of climate change on each sector and appropriate actions which can build a higher resilience to these impacts. The actions in each plan are focused around the three pillars of the Adaptation Framework: one of these pillars relates to the integration of adaptation into public policy and regulation (see Chapter 3 – Mainstreaming of adaptation policies – some examples).

2.4 Governance of the planning process

Being any adaptation process inherently complex, due to the effects of climate change on different sectors and stakeholders, the suitable type of governance for an adaptation process extends beyond the national scale and cannot be the sole responsibility of any single institution, requiring an extended institutional participation including different levels of responsibilities. Additionally, a clear political willingness to take action is essential to support the development and implementation of adaptation measures. That is why adaptation to climate change is widely recognized as a multi-level governance challenge.

Regarding the political involvement during the adaptation policy processes, the authorities were asked if there was been a binding political commitment and at what terms (question 16). The results seem to indicate that more efforts must be done to get political part to be involved in the process considering that just half of the authorities declare a full involvement of the political part including the allocation of financial and human resources (10 of the 19 authorities who answered the question) (see Table 2.6).

The need to address sector specific and inter-sectorial actions has been recognised at all the different levels of governance. Horizontal coordination between different sectors and services is a fundamental aspect which is required when integrating adaptation in governmental policies. It seems that significant efforts have been done by public authorities to enhance an inter-sectorial approach (questions 17 and 18), considering that almost all have involved in the process at least two departments in setting their strategy, normally the environmental and the planning departments (respectively selected 20 and 17 times by the 21

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

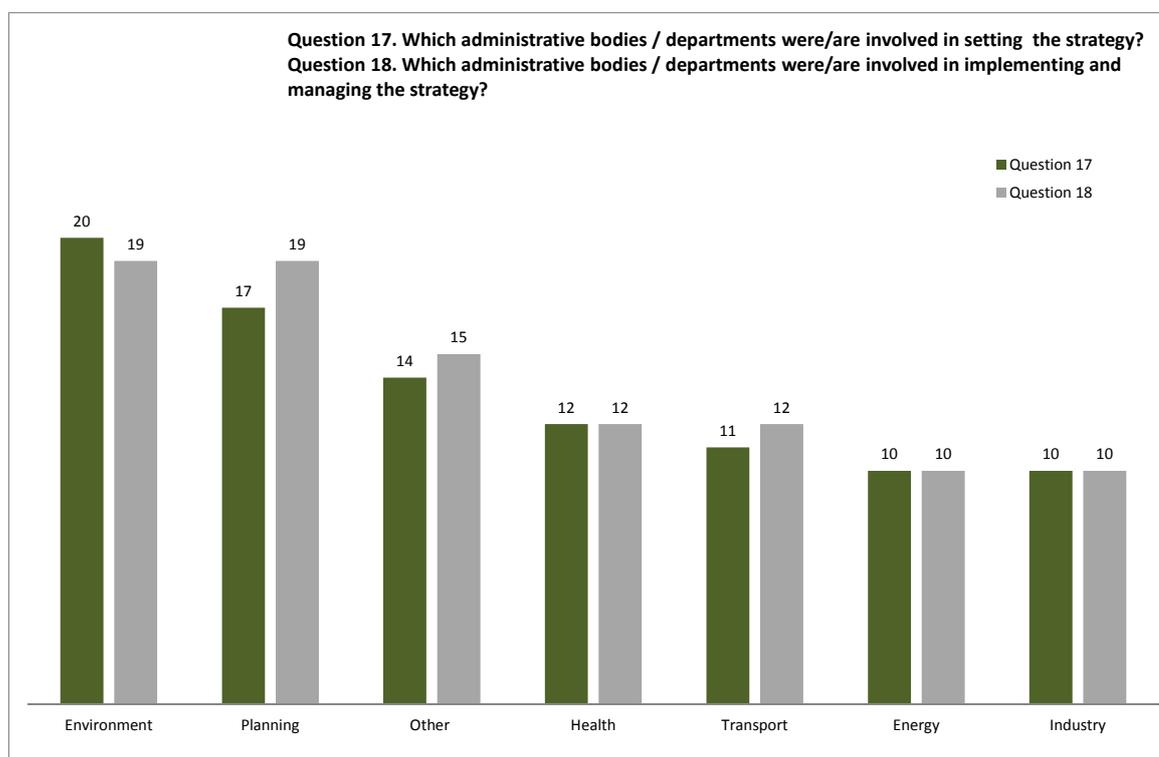
authorities) and thirteen authorities have involved at least four departments (see Figure 2.7). Other than the departments included in the given list, the authorities indicated mainly the agriculture and water management. The same first two departments have been usually involved in the implementing and managing phases (both selected 19 times by the 21 authorities) and fourteen administrations have involved at least four departments.

Table 2.6 Political commitment

	Total	FI	FR	FR	ES	ES	ES	ES	ES	BE	SE	SE	DE	DE	DE	DE	DE	UK	UK	DK	NL	MT
		Helsinki Metropolitan Area	Occitanie Region	Grand Lyon	Barcelona Metropolitan Area	Catalonia Region	Basque Region	Murcia Region	Navarra Region	Flanders Region	Kronoberg County	Gothenburg County	North Rhine Westphalia Federal State	Emscher-Lippe region	Baden-Wuerttemberg Federal State	Bavaria Federal State	Lower Saxony Federal State	Scotland	London	Copenhagen	Rotterdam	State of Malta
Question																						
16. Has there been a binding political commitment (such as a city or regional council decision) regarding:																						
The process of developing the strategy (including the allocation of financial and human resources)	10																					
The implementation of the strategy (in terms of integrating its objectives and individual measures into the formal administrative governance process)	10																					
An evaluation of the strategy and the related planning documents	4																					
An evaluation and periodic update of the strategy and the related planning documents	8																					

The steering of decision-making is no longer a function of government only, but of a broader array of actors and levels. The potential for more informal processes on local and regional levels or in connection with other actors such as the private or third sectors have resulted in the prevalence of less easily distinguished processes for decision-making as for hierarchical, state-steered decision making. Governance may take place by more or less fluid networks or pressure groups, while decentralisation may further result in a larger role for regional and local networks. The way in which such processes take place and the extent to which national, regional, and local levels are able to gain influence largely depends on the characteristics of a given national system and the power it attributes to different levels and actors (Keskitalo & al., 2013).

Figure 2.7 Bodies / departments involved



Regarding the stakeholders' involvement (question 19a and 20a), research institutions seem to be the principal actor involved on the strategy setting (selected 16 times by the 20 authorities who answered the question 19) followed by the authorities of neighbouring public administrations that are the principal actors involved in the implementation and management of the strategy (selected 12 times by the 15 authorities who answered the question 20) (see Figure 2.8).

Regarding the forms of their involvement (question 19b), it takes place, during the strategy setting phase, mainly through the organization of workshops and/or using consultation techniques (both selected 14 times by the 19 authorities who answered the question) followed by the usual forms of information/communication (see Figure 2.9). It seems that, in general, authorities use more than one approach in order to involve stakeholders (at least two techniques used by 15 of the 19 authorities who answered the question) and when using just one, never the information/communication as a unique form.

Also during the implementation and management phase (question 20b), public authorities tend not to use only an information approach, but try to get a stronger stakeholders' involvement: 8 of the 14 authorities who answered the question, in fact, declared to have reached, in some cases, a real "empowerment" level.

Figure 2.8 Stakeholders involved

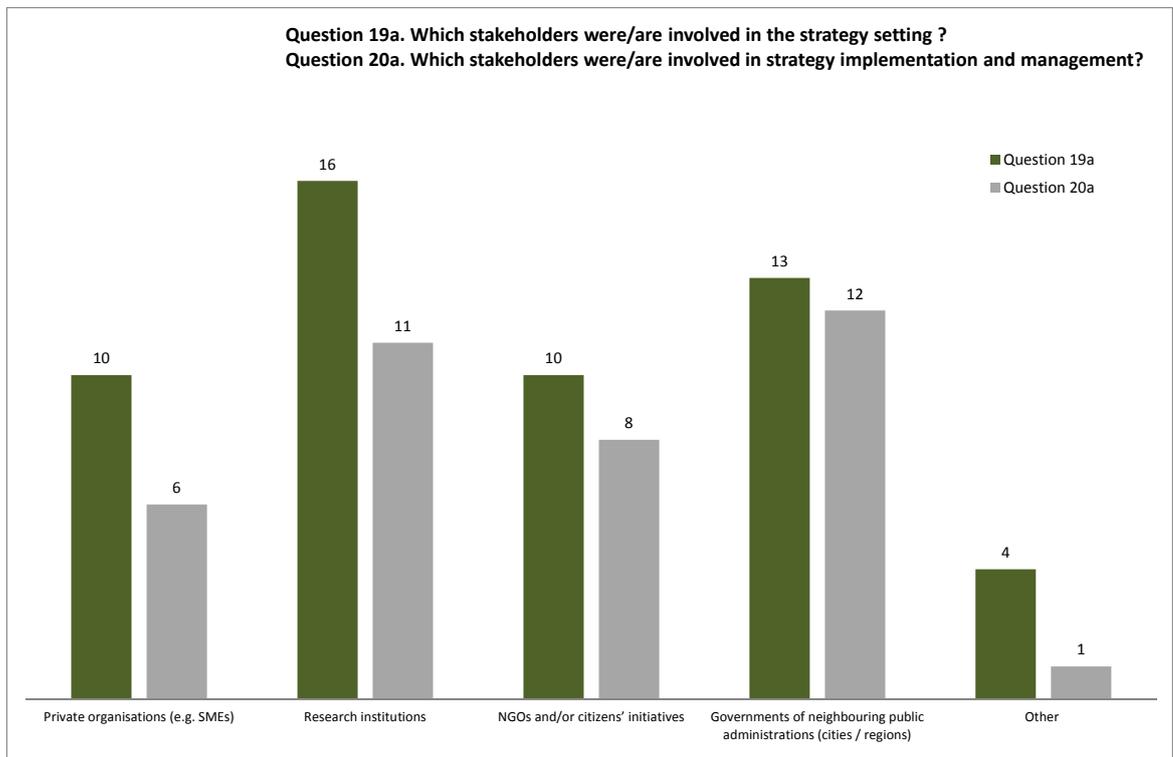
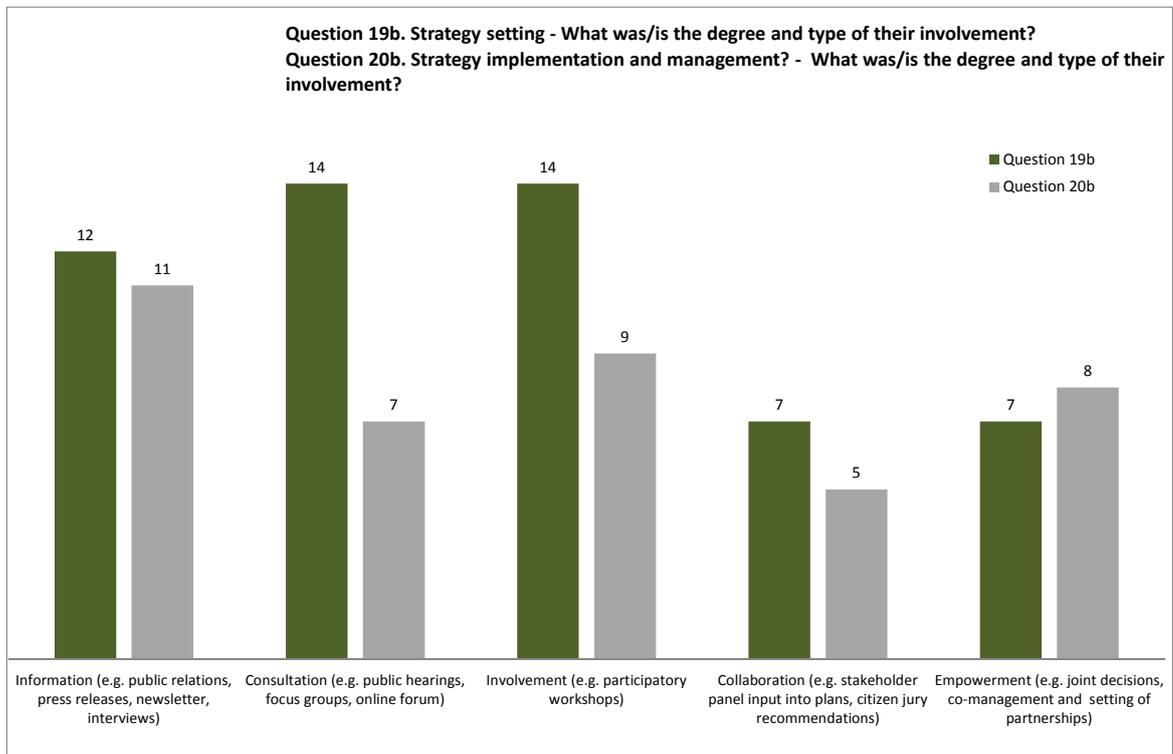


Figure 2.9 Degree and type of stakeholders' involvement



Example of inter-sectorial approaches and stakeholders involvement

Lombardy Region used an inter-sectorial approach in drafting its Adaptation Strategy (Committee of the Regions, 2016). The Adaptation Strategy drafting process in Lombardy Region involved regional stakeholders and decision makers in considering climatic trends (present and past), as well as future projections and the concerning scientific knowledge about the related vulnerabilities and impacts. This provided a first methodological framework to identify and prioritise future sectorial and cross-sectorial adaptation measures in Lombardy. Measures were designed in an iterative process between the Lombardy Department for Environment, Energy and Sustainable Development and the other sectorial administrations, evaluating the functional relationships between impacts and general objectives of adaptation and taking into account the overall framework of policies and sectorial interventions already in place or planned by the Regional Administration. The declared aim of this process is to communicate in a common language the main objectives and results and to discuss key vulnerabilities and adaptation priorities, but also to be able to convey those findings in each sectorial agenda, leading to better and more integrated decision making processes in the future.

At the local level an interesting experience comes from the Municipality of Kalamaria (Thessaloniki, Greece) which has developed an adaptation action plan through a cross-departmental and multi-stakeholder process involving different departments and offices: Land Registry Office and Municipal Property; Technical Works, Maintenance and Environment; Planning; Greenery; Protection of the Environment. A cross-departmental climate change monitoring task force led to the development of the action plan, in collaboration with a number of external stakeholders (the region of Central Macedonia, the Union of the Municipalities of Thessaloniki, 'Anatoliki' a local government development company, the Aristotle University of Thessaloniki, various technical, transportation and planning bodies within Thessaloniki, the water company and the fire service). This process brought different perspectives and types of experience to the adaptation action plan, improving the understanding of climate change impacts across stakeholders and establishing a long-term collaboration which otherwise would have not taken place.

Different approaches to stakeholder engagement are pursued in the EU Member States at the different national, regional and local levels. Spain and Germany, for example, developed consultation processes starting from the national level (e.g. workshops), but also enhancing the stakeholder engagement at regional level (Committee of the Regions, 2016). In Germany, for example, KLIMZUG – Managing Climate Change in the Regions for the Future - is a national project which aims at improving the competitiveness of German Regions through innovative strategies dealing with climate change through the setting of networks between enterprises, administration, social agencies and academia at regional and local levels. These networks aim to mitigate the risks of climate change and to capitalize on any recognizable opportunities. The funding measures want to help the integration of the anticipated climate changes and their impacts into planning and development processes and into political and economic

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

decision making. Furthermore, educational issues and capacity building are considered important key point to be enhanced.

In Denmark, the participatory approaches mostly focuses on the municipal level, with mobile teams visiting municipalities' representatives and private stakeholders to provide the ground technical adaptation support. For example, the Danish Municipality of Kalundborg, together with the Danish Board of Technology (DBT) carried out a comprehensive and path-breaking participatory approach involving local stakeholders and citizens to prepare a municipal Climate Change Adaptation Plan. The participatory aspect of the plan was part of the EU-INTERREG project "BaltCICA" on climate adaptation in the Baltic Sea Region (www.baltcica.org), which ran from 2009 to 2012 and included, inter-alia, a two-day scenario-workshop and a citizens' summit. The Danish Board of Technology ensured a close dialogue with the Kalundborg Municipal Committee for Engineering and Environment from the very beginning and throughout the participatory process. After the citizens' summit, the Danish Board of Technology prepared an analysis of the possible political implications of the voting results and presented it to the Committee, which embraced these recommendations and asked the city's Department of Engineering and Environment to include them in the adaptation plan. A very concrete result of citizens' involvement is that the plan points out by name specific summerhouse areas where climate risks are so high that it may be necessary to reconsider the location. This measure was controversial due to the resulting loss in property value and would likely have never been included by policymakers alone. The process also indicated the financial and legal challenge of changing the status of certain areas from summerhouses to wetlands.

In the Netherlands, the municipality of Dordrecht has been working in close collaboration with the Water Board Hollandse Delta since its establishment in 2005. The cooperation between different public and private parties has significantly improved over the last 10 to 15 years, among other because the Island of Dordrecht has been the focal point of the EU Interreg IVB project MARE. Within the context of MARE, a Learning and Action Alliance has been established as a platform of stakeholders in flood risk management, so as to enable collective active learning. The public and private parties included the municipality of Dordrecht, Water Board Hollandse Delta, Safety Region Zuid-Holland Zuid, Ministry of Transport, Public Works and Water Management, Rijkswaterstaat (together with Deltares), UNESCO-IHE and Dura Vermeer. Active involvement of the community is strongly pursued (particularly for rainfall flooding), and the municipality has managed to engage many local/regional companies in a programme linking together innovation and adaptation initiatives, as part of the EU Interreg IVB project CAMINO (Climate Adaptation Mainstreaming through Innovation).

In the UK, Regional Climate Change Partnerships (RCCP) were developed on central initiative from the late 1990s to support regional studies under the government's UK Climate Impacts Programme (UKCIP), a body that continues to support adaptation in English regions. Although the role of the regions is limited, the RCCP act as a liaison between local authorities, existing regional agencies, industry and NGOs in each English region. As a result, the regions have

taken on a partnership-based role initiated by the state, while the UKCIP acts as a largely distinctive organisation that supports multi-level adaptation and integration (Keskitalo & al., 2013).

A participatory foresight process was initiated in the French Region of Roussillon (one of the three pilot regions of the Aquimed project) where, in response to the increasing pressures on groundwater, the local authorities and government agencies have actively supported the establishment of a participatory forum bringing together all major stakeholders to debate on actions to be implemented. Three series of workshops were held with three small and homogeneous groups of farmers (youth, organic farming, farmers representatives) practicing the main crops of the region. In the first workshops, participants were invited to comment on four regional agriculture development scenarios for 2030. The second workshops dealt with scenarios portraying future levels of water scarcity and possible regional impacts of climate change on agriculture in 2050 and the actions that could be undertaken at farm level to improve adaptive capacities to such changes. In the final workshops, three groundwater management scenarios for 2050 were discussed. Similar workshops were organized with staff of the public organizations in charge of agriculture and water management. The final meeting brought together the farmers and the staff of the public organizations. Institutional representatives subsequently used the scenarios as discussion supports with other different groups at local and even regional level. The experience gained in the Aquimed project was one of the reasons behind the decision by the Chamber of Agriculture to launch its own official foresight analysis of the impacts of climate change. (<http://aquimed.cirad.fr/en/>).

2.5 Monitoring and evaluation

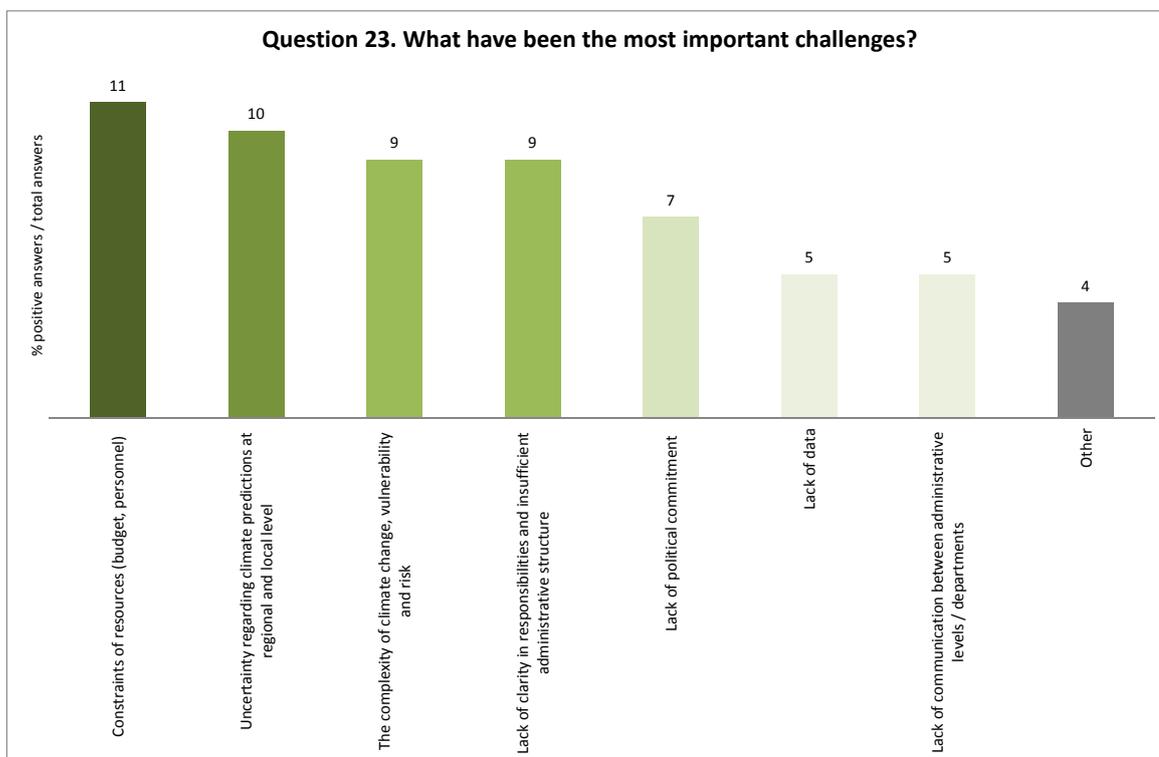
Regarding the monitoring of the strategy implementation (question 21), the responses can be linked to the question regarding the target-setting (question 11) and its responses (see previews Table 2.4 and the follow Table 2.6). Analysing both questions, it seems that the implementation of the strategy is still monitoring using mainly a qualitative approach that corresponds to the same approach given on the target-setting. The strategy implementation and its success seems to have a regular schedule timetable (12 of the 19 authorities who answered the question) (see Table 2.6).

Table 2.6 Monitoring and evaluation of the strategy implementation

	Total	FI	FR	FR	ES	ES	ES	ES	ES	BE	SE	SE	DE	DE	DE	DE	DE	UK	UK	DK	NL	MT	
		Helsinki Metropolitan Area	Occitanie Region	Grand Lyon	Barcelona Metropolitan Area	Catalonia Region	Basque Region	Murcia Region	Navarra Region	Flanders Region	Kronoberg County	Gothenburg County	North Rhine Westphalia Federal State	Emscher-Lippe region	Baden-Wuerttemberg Federal State	Bavaria Federal State	Lower Saxony Federal State	Scotland	London	Copenhagen	Rotterdam	State of Malta	
Question																							
21. Are there monitoring and evaluation instruments envisaged to monitor and evaluate success of the adaptation strategy implementation?																							
Qualitative evaluation	15																						
Setting of a list of criteria and indicators linked to the targets	10																						
Elaboration of a specific output reporting criteria and indicators (e.g. report, meeting)	6																						
Other	2																						
No																							
22. Is there a monitoring and evaluation process envisaged to monitor and evaluate success of the adaptation strategy implementation?																							
Evaluation repeated at regular intervals	12																						
<i>if yes in which:</i>																							
Evaluation output designed as basis for review of the plan	4																						
Evaluation output designed as basis for review of the plan and improvement of the strategy	6																						

Lastly, authorities were asked to select the most important challenges on adaptation process (question 23). The most commonly reported challenge was the lack of financial and human resources (selected 11 times by the 21 authorities), followed by uncertainty regarding climate prediction at regional and local level (selected 10 times) and the complexity, vulnerability and risk of climate change, together with the lack of clarity in responsibilities and insufficient administrative structures (selected 9 times each) (see Figure 2.11).

Figure 2.11 Most important challenges



3 MAINSTREAMING OF ADAPTATION POLICIES – SOME EXAMPLES

The following boxes report some examples of sectoral mainstreaming of adaptation policies.

<i>Flood and water management</i>	
<ul style="list-style-type: none"> • <i>Belgium - Integrated flood protection Sigma plan.</i> The original Sigma Plan conceived in 1977 was designed to protect the coastlines of the Scheldt and its tributaries against storm surge floods. However as the execution of the plan progressed, new requirements arose (shipping, nature development, landscape values, cleansing functions, fish nurseries) including the need for further adaptation to climate change. When the Sigma Plan was updated in 2005, it was understood that the existing plan was insufficient to provide adequate protection both under current conditions as well as for the likely conditions predicted by climate change models. The 2005 update referred to a projected sea level rise of 9 to 88 cm by 2100, taking into account varying estimates of seawater expansion, melting of the icecaps and glaciers and climate sensitivity based on the IPCC Third Assessment Report. The current plan is now focused on protection until 2050 and gives a greater role to controlled flood areas and deplored areas that counter storm surges by temporarily storing excess water, contributing, at the same time, to achieve conservation objectives and improving water quality. • <i>UK - River basin management plans.</i> The UK Adaptation Programme - according to the EU Guidance document on adaptation to climate change in water management (2009) and the Blueprint to Safeguard European Water resources (2012) - includes a specific action underlying that: “The second cycle of the River basin management plans will integrate climate change risk assessment and adaptation”. The River Basin Management Plans are privileged instruments in the mainstreaming of adaptation interventions in the water sector, harmonizing measures and monitoring levels on a EU scale and fostering the improvement of the communities’ resilience and of the good quality of the resource. The river basin management planning process is the best mechanism to balance available water resources and demands, thus avoiding long term water scarcity. It provides also clear links to the management of flood risk in catchments, which is specifically addressed through requirements in the EU Floods Directive. The river basin management have to consider climate change projections, to develop monitoring programmes which are configured to detect climate change impacts, and to select measures which are as robust as possible to projected climate conditions. • <i>UK - Thames Water management system.</i> Thames Water is the London Region Water Company which is working to increase the resilience of its water management systems in three key areas. <ul style="list-style-type: none"> - Water resource planning: it focuses on the identification of new water sources and how these can be secured and protected in the long term, including the creation of new reservoirs and options for transferring water from other, more water abundant regions. 	

Flood and water management



Options for increasing the efficiency of water use, through reductions in water leakages and demand, are also being examined.

- Sewerage design and capacity: the Thames Tideway Tunnel, a multi-billion Euro project aimed at meeting current and future sewerage capacity needs in London, has been specifically conceived to take climate change into account.
 - Resilience of assets to flooding: flood walls and early warning and contingency systems have been foreseen in order to increase the available back-up capacity in case of a damage to a pumping station or a treatment plant.
- *Scotland - Glasgow Flood prevention scheme.* The White Cart Water is a shallow river which has been prone to flash flooding, threatening vulnerable Glasgow suburbs downstream. Public awareness of such flooding risks in the 1980s and 1990s, and projections of more intense rainfall periods made devising a flood prevention scheme a priority for the Glasgow City Council. Huge investments have been required to protect properties not only from current flood risks but also from more frequent inundations expected as a result of global climate change Based on UKCP09 projections. According to a medium emissions scenario and a 2050's time horizon, in the Glasgow area there will be an increase in severity of fluvial flooding events and increase in severity of pluvial flooding events. In 2006, the scheme for the White Cart Water and its tributary was approved by the Scottish Government and became Scotland's largest flood prevention scheme at that time. It includes the construction of three upstream water storage areas outside of the city and a suite of downstream measures within the urban area such as low walls and embankments, combining cutting-edge engineering solutions and natural flood risk management techniques. Central to this is the optimisation of flood water storage in the upper catchment, allowing flood defence walls within the city to be limited to an acceptable height, helping to limit the impact on existing wildlife habitats and avoid creating barriers between the river and the community. The flexibility of the design of the upper catchment storage areas allows other storage areas to be introduced to redress the balance caused by the effects of climate change in due course. The "scheme" is a planning instrument which gives the Council the right to access property to undertake the works defined by the scheme within certain defined dimensional limits. While the scheme provides the legal framework to undertake the works, all other requirements regarding planning and environmental legislation have to be met and all specific permissions needed to carry out the works have to be obtained. As the watercourse provide the boundary between different local authorities, a total of 14 separate planning applications had to be made being carefully managed and co-ordinated.
 - *France - River basin management plans.* In France, according to the River basin management planning process, new procedures for defining withdrawable volumes have been promoted. Specifically, in sub-basin areas, were identified withdrawable volumes by each kind of water user (household, farmer and industry), while maintaining a minimum ecological flow, in order to ensure that the demand does not exceed the local supply. These volumes will be updated every few years, so that they match with the trend of the supply changes, including climate-related

Flood and water management



impacts. Furthermore, in the implementation of the Flood Directive, climate change adaptation will be included as a strategic component in French local strategies and into urban planning processes.

- *Italy - Public Waters General Exploitation Plan of the Province of Trento.* The new “Public Waters General Exploitation Plan” takes into consideration water shortages as one of the climate change forthcoming effects and introduce ceilings to the use of irrigation water and limits to soil moisture by assessing water content in a soil parcel, on the basis of its location and the history of the latest irrigation actions. The water balance has been carried out with rainfall and temperature values spatially interpolated from the neighbouring meteorological stations. A decision support system for irrigation scheduling has been proposed as a tool to improve agriculture sustainability and adaptation to the ongoing climate change, providing an estimation of soil water content to the end users.
- *Spain - Zaragoza Water Saving City programme.* The Municipal bylaw for Water Saving and Efficiency (approved in February 2011) has been conceived to be the main reference framework for all the future plans for water saving. Following this municipal bylaw, city water tariffs were revised to provide disincentives and incentives that ensure a full cost recovery whilst maintaining affordability for low income households. The programme also involved improvements to the water distribution infrastructure to reduce leakages. The city achieved a reduction of water consumption by almost 30%, mainly due to changes in water use behaviour and is now known throughout the world as a leader in the field of water conservation. Some interesting principles adopted include:
 - equitable charging (cost of water proportional to the benefits for users);
 - affordable access to basic water services for all (subsidies for vulnerable households);
 - incentive for the consumer to use water efficiently (water bill discounts rewarding households reducing their annual water consumption by 10% or more);
 - penalising excessive consumption with higher prices;
 - investments in controlling water losses, rehabilitation of the pipeline network, pressure management controls, maintenance to leaking storage tanks in residential buildings;
 - combination of changes in water use behaviour, water efficiency technologies and reduced leakages that generated sufficient savings to make new and costly water supply infrastructure unnecessary.
- *Netherlands – Delta Programme.* Dealing with the extraordinary importance of the water resources for the country and the recurring problems connected with the management of freshwater and floods, the Dutch government launched the Delta Programme in 2010, originated from recommendations of the Second Delta Committee that investigated the expected effects of climate change on the Dutch water management and especially its safety.

Flood and water management



This programme is aimed at the improvement of the resilience and the climate proofing of the water management sector, through a comprehensive mainstreaming process, revised every year and supported by dedicated economic resources.

The Delta Programme, which is currently the key element in the Dutch policy arrangement of climate adaptation policies, brings together different government layers, up from the local level to the central state government, and various stakeholders, coming both from the public and the private sector (communities, firms and NGOs). This virtuous approach brings forward a mainstreaming intervention, adapting current governmental programs and plans to ongoing analysis and new data findings about future climatic scenarios and expected changes in water availability and flood patterns. The Delta Programme is composed by two documents: the Delta Plan on Flood Risk Management and the Delta Plan on Freshwater Supply. In order to reinforce the approach to a water-resilient and a climate-proof development, the Delta Programme is also drawing up a Delta Plan on Spatial Adaptation. The Delta Plan on Spatial Adaptation will be a component of the Delta Programme 2018.

For so-called delta hot spots, specific vulnerable regions or issues, regional sub-programmes have been developed. A Delta Commissioner coordinates these processes and the programme is supported by a Delta Act and Delta funding. The Delta Fund that finances the Delta Programme was established in 2013 under the responsibility of the Ministry of Infrastructure and the Environment. This Fund is expected to collect 1 billion dollars each year starting from 2020, thanks to governmental resources.

The Delta Programme rely on the “monitoring, analysing, acting” method. Every year the Programme must analyse its pace in the attempt to reach the adaptation targets, the evolution of the socio-economic dimensions and the new climatic findings. Supplementary to this process, there will be a comprehensive and robust revision of the programme one time every six years. Fundamental for these updates, the 2015 Delta Programme outlined the Knowledge Agenda, a document where, every year, the Commission reviews the current state of the information available on the water resources management in the Netherlands and on eventual new findings about climate change scenarios and economic analysis (cost-benefit analysis of interventions).

Provinces are involved in climate adaptation governance at the regional level, as they supervise primary and secondary weirs, as well as regional water bodies. Local government, particularly municipalities, has less competence regarding climate adaptation in connection with fluvial floods, but has some responsibility in pluvial flooding matters. Besides these three generic administrative levels, the Netherlands also has a functional level of regional water authorities (waterschappen). Dutch climate adaptation policy is typified as functionally decentralized and can be characterized by a sectorial approach, dominated by public actors in the water management sector.

- *Malta - Leak reduction programme of Malta's Water Services Corporation.* In recognition of existing risks, including those associated with climate change, Malta's Water Services Corporation undertook a review of its water management network, with support from other government

Flood and water management



authorities and research institutions. The review suggested increasing water use efficiency as the main adaptation strategy. To do so, an extensive leak reduction programme has been developed, with a target of reducing leakage by 50% over five years. This will require investment in physical upgrades and modifications to existing water management, tourism and other sectorial development strategies, including efforts to reduce demand in areas of particular water scarcity. Implementing these suggestions will have multiple benefits: the actions are expected to build resilience to water shortages caused by climate change and, at the same time, save the authority € 37 million over a period of 20 years.

Land use and spatial planning



- Italy – Bologna Municipal building plans and rules.* The Local Adaptation Plan to Climate Change foreseen the mainstreaming of strategic adaptation targets like the decreasing of sealed surface and water consumption in the most operative planning instruments of the Municipality of Bologna. For example, according to the new Operative Urban Plan Variant adopted in June 2014, the 31 private project affecting urban transformations, once finalised, will allow the decreasing of 39,000 m² of sealed surfaces and the planting of 375 new trees. This experience will be a model for guiding the future planning of Bologna and, in particular, the formation of the next Operative Urban Plan. As regards the reduction of civil water consumption, the revision of the technical annexes of the Building Rule have decreased the allowed maximum daily consumption from 150 to 140 l/inh/day and further incentivised rainwater harvesting and reuse.
- Italy - Faenza Local regulation and bio-neighbourhood incentive programme.* The Municipality of Faenza has implemented a bio-neighbourhood incentive programme for developers, including it in the town planning regulations. The incentive programme aims to achieve energy savings, promote aesthetic qualities of neighbourhoods, and also to create better microclimate conditions in order to face the future rising temperatures associated with climate change. The incentive programme allows developers to extend the size of buildings in bio-neighbourhoods exceeding the approved standards if the buildings meet certain criteria of environmental sustainability. These include green roofs, green walls and water retention systems as well as the creation of continuous public green spaces by developers. These regulations do not include a set of standards. Agreements are negotiated on a case-by-case basis. The negotiations between municipal authorities and developers or housing associations means that the waiting time for building permits to be obtained is shortened, thereby providing an incentive to developers to be engaged in the scheme.
- Italy - The Water Plans of Venice Metropolitan Area and Veneto Region.* Over the years, the Venice Metropolitan City has done a great deal to reduce the hydrogeological risks of its territory by identifying the Provincial Territorial Coordination Plan (PTCP) as the planning instrument allowing it to coordinate territorial objectives and actions. An important role of PTCP has been the coordination work on Municipal Water Plans, designed by local authorities, together with the Land Reclamation Authority (Consorti di Bonifica), to plan the activities related to the hydrographic network of their own competence with actions for environmental reclamation, maintenance and monitoring of water bodies. In 2013, the Veneto Region also recognized the value of these instruments, defining them as mandatory and obligating all the municipalities to draft the Water Plans together with the drafting of municipal and inter-communal urban planning tools.
- Germany - Climate atlas recommendation for Stuttgart urban planning.* The future climate

Land use and spatial planning



projections for 2071-2100 suggest a 2°C increase of the mean annual temperature in Stuttgart. The projections for heat waves ($T > 30^{\circ}\text{C}$) suggest that the number of days with heat stress will increase significantly. By 2100, 57% of the Greater Stuttgart Region could have more than 30 days with heat stress. The Climate Atlas for the region of Stuttgart was published in 2008, providing standardised climatic assessments for the 179 towns and municipalities in the Stuttgart Region. The Atlas comprises maps which show regional wind patterns, flows of cold air, air pollution concentrations, and other relevant information required to inform planners on what to do for urban climatic optimization of new projects and retrofits, forming the basis for the planning recommendations included in the "Climate Booklet for Urban Development Online". The implementation of the recommendations in the Climate Atlas is carried out by the Office for Urban Planning and Urban Renewal, supported by the Office for Environmental Protection. The Section of Urban Climatology within the Office for Environmental Protection evaluates the climatic implications of intended development and larger buildings. In line with the city development vision, 60 hectares of greenfield land previously earmarked for development has been cut from the 2010 land development plan to protect existing green space. Targeted interventions such as a building ban in the hills around the town, and prevention of building projects that might obstruct the ventilation effect of nocturnal cold-air flows have resulted in preservation and enhancement of air exchange and cool air flows in the city.

- *Germany - North Rhine-Westphalia Climate Protection Plan and spatial structure plans.* The measures developed for the Climate Protection Plan aim, above all, to support opportunities for climate-conscious urban and district development through specific funding programmes (such as for eliminating green deficits in cities and communities) and advisory programmes. The state government has amended state planning law to create a direct link between the Climate Protection Plan and spatial structure plans. Spatial structure plans must implement those requirements of the Climate Protection Plan which a separate statutory instrument has declared to be binding. Due to the largely parallel procedures employed when drafting the Climate Protection Plan and the new state development plan for North Rhine-Westphalia, the clearly identifiable spatial requirements of measures for climate change mitigation and adaptation are already included in the specifications of the current development plan's draft.
- *Sweden - Branding existing initiatives as adaptation measures in Malmo.* In order to take concrete steps to protect existing and future housing developments as a part of the municipal Climate Adaptation Strategy, a number of existing or ongoing green and blue space projects has been identified as contributing to adaptation, despite not necessarily being designed for this purpose. Branding existing initiatives as adaptation measures can help to convince the politicians and other stakeholders that adaptation may require small changes in business as usual, rather than additional extra work.

Integrated coastal zone and planning



- *EU Mediterranean basin - Integrated Coastal Zone Management (ICMZ) and Maritime Spatial Planning (MSP).* ICMZ and MSP, strongly supported at the EU level, are the main planning tools aiming to contribute to sustainable growth of the maritime and coastal economies and sustainable use of marine and coastal resources. Having the potential impacts and the related costs in mind, it is important that adaptation will become a central element in ICMZ and MSP. The ICMZ Mediterranean Awareness-Raising Strategy (MARS), a framework strategy supporting the development of the Mediterranean coast and sea, consider resilience as one of the key aspects to be pursued, in particular: resilience to climate change, resilience to natural processes, resilience to human processes.
- *Croatia - Integrating climate change adaptation into Šibenik-Knin County coastal planning.* The development of the Coastal Plan for Šibenik-Knin County is part of a larger UNEP project entitled "Integration of Climatic Variability and Change into National Strategies to Implement the Protocol on ICZM in the Mediterranean". The Coastal Plan focuses on the impacts of climate change in the coastal zone and adaptation to projected changes. Innovative tools like the DIVA (Dynamic Integrated Vulnerability Assessment) method and the participatory Climagine method have been used to assess the climate variability and change in the coastal zone. The Plan was completed in September 2015 and, even if not binding, it will feed into local spatial plans, a regional development strategy and other sectorial policy documents. The Plan offers a number of recommendations, but also opens a number of questions, especially with climate change opening new levels of uncertainty.
- *Spain - Local coastal management plans.* Spain has mapped climate change effects and flood risk for its entire coast. The project, carried out by the Ministry of Environment and the University of Cantabria, has developed a flood atlas. Drawing on historical evidence of flood events, the flood atlas combines mapping tools with modelling of predicted future flood levels along the coastline to identify areas expected to be at increased risk. The integrated diagnosis of the coastal zone carried out has permitted to gain further knowledge of the state of the entire coast and to propose measures dealing with 4 main challenges: stopping the massive development of the coastal zone; recovering the physical and ecological functionality of the littoral; introducing mitigation/adaptation to Climate Change effects; changing the current coastal management model. The results of this kind of 'stress test' have been incorporated into the revision of local coastal management plans.

Portugal - Azores Coastal zone management plans for islands. Coastal Zone Management Plans were approved in 2008 for the four smallest islands of the Azores archipelago: Santa Maria, Graciosa, Flores and Corvo. These plans are legally binding and establish the potential for land use. Public participation is encouraged through internet use and public meeting and a monitoring system is also developed to manage adaptation measures. The objectives were: managing impacts of climate change and safeguarding resilience of coasts/coastal systems;

Integrated coastal zone and planning



preventing and managing natural and technological (human-made) hazards; preserving coastal environment (its functioning and integrity) to share space; balancing economic, social, cultural development whilst enhancing environment.

- *Ireland – Cork Integrated Harbour Management Strategy.* Sea level rise and coastal erosion due to climate change could negatively affect Cork Harbour, the second largest port in Ireland. Municipal authorities worked together with experts from University of Cork to develop a plan focusing on flood management, safeguarding the resilience of coastal systems and balancing economic, social and cultural development, whilst also enhancing the environment. Although non-statutory, the strategy received cross-party support by all the key stakeholders who formed the Harbour Management Focus Group.

Nature and biodiversity



- *The Netherlands - Adaptation strategy for climate-proofing biodiversity of the National Environmental Assessment Agency.* The strategy proposes priority actions including connecting habitats; removing features that inhibit natural movement (such as man-made barriers designed to control coastal sediment movement and sea walls) and using targeted agri-environment funding to support mobility of species across specific parts of the landscape. A particular feature of this strategy is that it identifies wider benefits that the proposed adaptation actions can deliver, such as reduced flooding risk, improved recreational areas and water quality and addressing high temperatures through green infrastructure in urban areas.
- *Finland - National conservation strategy and action plan and Saimaa Seal project (EU LIFE).* The Saimaa ringed seal is an endemic sub-species that lives only in Finland in the fragmented Saimaa freshwater lake complex. Climate change poses a long-term threat to the Saimaa seal population, because the successful breeding of the sub-species depends on ice and snow cover. The adopted solution was the creation of man-made snowdrifts in winters 2014-2016 to improve the seals breeding habitat in poor snow conditions. In this example, the involvement of local people in conservation actions and the increase of their awareness, the knowledge on essential ecological issues and on potential threats to the seals (including the climate change effects), represent the basis for effective conservation and monitoring.
- *Czech Republic - Programme of renewal of the natural functions of the landscape.* The Programme of renewal of the natural functions of the landscape gives support for adaptation measures contributing to improve the natural function of water courses, enhancing a better functioning of the natural retention capacity of the water ecosystems and the establishment and restoration of

Nature and biodiversity



elements of the natural sites influencing the water regime. The programme gives a subsidy of up to 100% of the total costs of the project: tens of millions of Czech crowns are annually allocated. The program is divided into several sub-programs, including one about adaptation measures to mitigate the impacts of climate change on aquatic ecosystems as well as forest and non-forest ecosystems.

- *Greece - Strategy and Action Plan for the wetland ecosystems in Attica Region.* In the framework of the EU ORIENTGATE Project, a framework strategy and an operative action plan were developed to set the vision and commitment to conservation and adaptation to climate change of the Attica's wetlands, in order to increase its resilience and to reduce biodiversity loss, while making better use of ecosystem services. The following elements have been pursued: sustainable management and restoration of wetlands and their interconnection in a "green arc"; the evaluation of the services provided; awareness raising and environmental education in biodiversity and climate change, and citizen participation. The Attica Regional Authority also drafted a road map to promote the implementation of selected actions of the Plan under the new National Strategic Reference Framework 2014-2020.
- *Germany - Innovation Network for Climate Change Adaptation Brandenburg.* The Innovation Network for Climate Change Adaptation Brandenburg Berlin is a research project which has been investigating appropriate adaptation actions as part of a larger project on adaptation in the Brandenburg region, funded by the German federal government. The project recognised that current conservation approaches applied static goals and targets and were not responsive to the expected changes in climate and other factors requiring flexible planning. To improve flexibility in existing conservation strategies and plans, the following actions have been proposed:
 - targeting and selection of conservation sites based on their vulnerability to predicted changes in the climate;
 - integrating climate change considerations into protected area management plans;
 - providing advice to policy makers (in particular in urban development) on how to increase habitat connectivity for all species to enable migration as the climate changes;
 - creation of a 'landscape framework' that helps to integrate climate change considerations into biodiversity management planning in the region.
- *UK - Dorset Heathland Planning Framework Supplementary Planning Document.* Dorset heathlands is a natural area with a high biodiversity value, qualifying for three different European designations. A specific Supplementary Planning Document of the Dorset Heathland Planning Framework foreseen a mechanism which aims to deliver increased resilience to higher fire risk, due to the combined effect of climate change and urban development. Adaptation measures have to be financed by developer contributions (fees) from new developments located in a distance between 400 m and 5 km away from the protected heathland sites. This will help to reconcile the pressures of further residential development with the conservation of the designated heathland sites. Fees are applied to fund measures to mitigate the impact of urban

Nature and biodiversity



development on heathlands, that can contribute in reducing heathlands sensitivity to climate change induced effects, as in particular to increased fire risk. Financed measures include: improvement of existing recreational sites and development of new recreational infrastructure to divert the recreational pressure from the most valuable and sensitive heathlands; land purchased as alternative open space; land management to reduce fire load and risk of fires.

- *Poland - Biebrza National Park Climate-Adapted Management Plan.* The plan was developed for the Park, as part of the EU-funded transnational project HABIT-CHANGE. The preparation of the plan involved local farmers and other stakeholders trying to find with them sustainable responses to the drier conditions. Examples of management actions include: switching from mechanical mowing to grazing (to reduce soil compaction), using measures to prevent water run-off in winter and stopping activities at certain times of the year to avoid disturbance to birds.
- *Hungary - Climate Change Adapted Management Plan for Koros-Maros National Park.* The National Park has a variety of habitats including steppes, remnants of wooded grasslands and marshlands as well as meadows and groves of extraordinary value. To address the impacts of climate change, a specific climate-change adaptation management plan has been created. The main goals of the Plan include:
 - increased resilience of protected and valuable habitats;
 - intensification and improvement of stakeholder dialogues within the park;
 - concepts to deal with uncertainties in climate-change projections;
 - integration of climate change scenarios in the management of habitats;
 - implementation of an “active adaptive management” approach;
 - development of exemplary management plans for Natura 2000 Habitats that integrate the latest knowledge about climate change and its impacts;
 - integration of the results of climate modelling and hydrological modelling, for the first time into the management of protected habitats.
- *Spain - Delta Lagoon Project (EU LIFE +).* The lagoons in the Alfacada and Tancada coastal areas are vulnerable to the effects of climate change, particularly the sea level rise, in combination with sediment deficit due to river regulation, leading to exacerbated coastal erosion and subsidence. Local management practices (e.g. intensive rice farming) have also affected the natural habitats and species, causing wetland loss and changes in salinity and water quality. During the Delta Lagoon project, with the involvement of local stakeholders, a series of habitat restoration and management measures have been implemented to improve resilience against sea level rise and recover the hydrological connectivity and the ecological quality of the coastal lagoons.



- *Spain - Extremadura Plan for Climate Change Adaptation in the Agricultural Sector and Rural Development Programme.* The plan for Climate Change Adaptation in the Agricultural Sector drafts a specific strategy to enhance modernisation of in-farm irrigation systems in response to expected decrease in water availability in the future. Through the 2007-2013 Rural Development Programme funding mechanisms have been made available to farmers in order to develop farming practices and to encourage measures that are adapted to local conditions and crop requirements and which minimise erosion or soil degradation. This funding mechanism also supports farmers in selecting options that have considerable side benefits for adaptation (e.g. crop varieties that have greater resistance to drought and high temperatures).
- *Slovenia - Action Plan for Forestry and Agriculture and Rural Development Programme.* The sectorial plan for Forestry and Agriculture foreseen the breeding of livestock to reduce the impact of hotter summers (risks of heat stroke and sun-burn) on sows and piglets. Through the 2007-2013 Rural Development Programme, specific funding mechanisms have been made available for :
 - the purchase of hail nets (since extreme weather events are anticipated to increase, including hail storms) and investment in water infrastructure in response to predicted climate change impacts;
 - insurance schemes covering the event of crops being destroyed or damaged, a risk that is expected to increase with future expected climate changes.
- *France - The SAFE project: Silvoarable Agroforestry For Europe.* A French national scheme for planting half a million hectares of agroforestry during the next 25 years, based on results obtained from Montpellier case study. The agriculture sector in Montpellier is highly vulnerable to higher temperature and more frequent droughts associated with projected climate change. The current system, largely based on monoculture, is deemed to be more vulnerable compared to alternatives such as the cultivation of a mixture of crops and species, especially a mixture of trees and crops as in agroforestry. The implemented solution is based on adoption of an agroforestry scheme, a combination of trees and crops cultivation so that the available resources can be more effectively exploited. Agroforestry provides a different land use option, compared with separated traditional arable and forestry systems. It is a practice that respects the environment and has long-term landscape benefit.
- *Finland - Action Plan for the Adaptation to Climate Change of the Ministry of Agriculture and Forestry 2011–2015.* This national sectorial plan specifically refers to climate change, in particular:
 - monitoring and responding to changes in plant and animal diseases;
 - enhancing climate-proofing existing processes by requiring the consideration of CC in activities related to the Common Agricultural Policy;
 - seeking and monitoring new varieties of seed and livestock that are more resilient to climatic changes;
 - promoting diversification in agriculture and forestry;
 - increasing communication on the importance of climate change adaptation.
 Finland also promotes the development of the Caravan tool, developed by the Finnish

Agriculture and forestry



Environmental Institute. The tool represents an on-line resource that allows to assess climate change vulnerability and adaptive capacity in the Nordic countries, so facilitating adaptation planning at regional and local levels.

- *Bavaria - The Bavarian Climate Protection Programme.* The programme addresses forestry and land-use, and integrates biodiversity protection with climate change adaptation. Under this programme, nearly half the acutely endangered spruce in the region's private and communal forests will be converted into climate-tolerant mixed forest by 2020. Other planned measures include:
 - preservation and restoration of floodplains and marshlands;
 - promotion of climate-friendly agricultural use of moorlands, for instance through re-conversion of arable land into waterlogged grasslands;
 - improvement to the microclimate in large built-up areas including maintenance and improvement of green spaces and fresh-air corridors.
- *UK - Welsh "Making Woodlands More Diverse" Programme.* The forestry plan has considered projected climate impacts identifying changes to pest, disease and weather patterns. Diversification of planting and a new management approach have been seen as the most effective response, to be implemented in several ways, including changes to the agri-environment scheme funded by the Rural Development Plan, the Woodland Strategy and in the production of guidance documents for forest managers.

Infrastructures



- *UK - Climate Resilient Infrastructure Guidelines of the Department for the Environment, Food and Rural Affairs.* The document « Climate Resilient Infrastructure: preparing for a Changing Climate » provides a detailed analysis of what climate change means for infrastructure in the UK and underlines the vulnerabilities for different types of infrastructure, such as information technology, energy, transport and water. One most important recommendation is about the use of planning applications that set out how the impacts of climate change have been considered in every stage of infrastructure development or refurbishment.
- *UK - Heathrow Airport climate adaptation strategy.* As all other large infrastructure providers, the Heathrow Airport has been asked by the UK government to submit a climate change adaptation strategy. The Climate Change Act 2008, in fact, gives government the power to ask certain organisations responsible for essential services and infrastructure to produce reports on: the current and future predicted impacts of climate change on their organisation and their proposals for adapting to climate change. The Heathrow strategy includes a climate adaptation risk analysis matrix, which has been regularly monitored. Besides rain (and consequent flooding) and temperature, fog and changing wind directions were identified as the weather conditions



deserving more attention today and also in the future, opening the way for a more comprehensive, long-term approach to the challenges of climate change. Since 2011, adaptation to climate change has been mainstreamed in the main planning instruments of the airport. This includes the annual strategic capital business plan, which now is dedicating a specific section to resilience investments, the airport management system, which is following ISO14001:2015 guidance, including climate change adaptation, the annual operational resilience plan and a corporate risk process including the regular review of the 34 risks initially identified in the Adaptation Report.

- *France - Standards and guidelines on the design, maintenance and operation of transport infrastructures.* At the request of the Ministry of Ecology, Sustainable Development and Energy, the Centre d'Études et d'Expertise sur les Risques, l'Environnement, la Mobilité et l'Aménagement (CEREMA) completed in 2015 a systematic review of standards and guidelines on the design, maintenance and operation of transport infrastructures. The aim of this review is to adapt transport infrastructures and systems to future climate conditions and to foster greater resilience to the effects of extreme weather events. The screening process is being followed by the actual revision and update of the standards, in order to cope with the foreseen changes in climate by 2100. The new standards will replace the existing ones for the design, maintenance and operation of transport infrastructure. The final purpose of the process is to make sure that transport infrastructure, with a long time span of service (sometimes of 100 years or more) can satisfactorily cope with the conditions imposed by future climate and extreme weather events. This innovative approach tries to undertake a homogeneous methodology to review standards to be applied to different transport modes and to different phases, as design, maintenance and operations, enhancing a fruitful partnership between climate experts (understanding the information needs of transport infrastructure designers and managers) and transport specialists (adapting their practices to the climate information actually available and its related uncertainty).
- *Sweden - Long-term infrastructure management plans of electricity transmission companies.* The Swedish electricity transmission companies are increasing investment in underground cables, which are more expensive initially, but more resilient to expected climate change impacts. Increasing system maintenance is another adaptation response, along with insulating overhead lines so that they can be stronger and more resistant to snow. Such actions are being included in long-term infrastructure management plans to help ensuring the resilience of this essential infrastructure.
- *Austria - Risk management strategies of railway infrastructures.* Meteorological extreme events pose a great risk for railway infrastructure and the safety of passengers. In the future, climate change will presumably have serious implications on meteorological hazards in the Alpine region. To minimize direct damage to railway infrastructure, structural protections measures are going to be progressively implemented by the Austrian Federal Railway (ÖBB Infra AG), where this is economically, technically and environmentally feasible. However, especially in the alpine environment full protection is not possible and the risk profile continuously changes due to climate change. To ensure the safe and continuous operation of the network and the safety of

Infrastructures



passengers, a complementary weather monitoring and early warning systems was developed. At the level of structural risk reduction measures, ÖBB cooperated with regional authorities, communities and the Federal Ministry of Agriculture, Forestry, Environment and Water Management. Regarding non-structural measures, ÖBB involved the private sector, academic institutions and regional authorities for operating the weather monitoring and early warning system and improving risk assessments methodologies.

- *Denmark - Design and planning of the Copenhagen underground metro.* Climate change impact assessment has been an integrated part of the design and planning of the Copenhagen metro since the first metro line was designed in the mid-1990s. The Copenhagen metro company is now constructing an underground metro ring in the city centre of Copenhagen, which is scheduled to open in 2018. The biggest planning challenge is changing projections of increasingly higher sea water level as a consequence of climate change, meaning that entrances, ventilation (plus other infrastructure elements) to stations and shafts near the harbour and the coastline should provide sufficient protection against heavy rainfall, storm surges and storms. The highest water level has been identified separately for each station in order to estimate the exact level for each entrance, stairs, tunnel ventilation, ramp, technique room, shaft, elevator, and control and maintenance centre. As the basis for identifying the water levels for heavy rainfall and storm surges, a 2000 year event has been used, an event which is 5 % chance of happening in the metro life (100 years). Moreover, IPCC climate projections were considered as a basis for sea level rise. These projections have changed considerably from the planning of the first metro line until now, with consequences in the design of the elevation levels.

Health



- *Portugal - Portuguese Heatwave Contingency Plan.* The main objective of the plan is to prevent the adverse health impacts from elevated temperatures, also considering the possible impacts of climate change. This is achieved by providing timely relevant information to local authorities to enable them to conduct risk assessments and suitable corrective measures. Special attention is placed on the elderly population. This Plan establishes roles and functions for governmental institutions at national, regional and local level. Although it is coordinated centrally by the Directorate-General of Health, it has a de-centralized operational structure: roles and responsibilities involve national, regional and municipal levels. The Plan also establishes protocols of operations with other sectors such as Protection Services (including Metrological services) and Social Services.
- *UK - Heatwave plan for England.* The plan is managed by the National Health Services and intends to protect the population from heat-related harm to health. While it already offers solutions for the present, it has been devised with future climate in mind. The heatwave plan coordinates long-term and multi-agency planning, referring to a joint effort together with experts outside the



health sector to, e.g., increase cooling capacity of the built environment. It considers and informs other relevant frameworks and strategies, like the Public Health Outcomes Framework, Joint Strategic Needs Assignments and Joint Health and Wellbeing Strategies. This helps to align adaptation measures with technically related strategies and improve performance through synergies (exchange subject matter know-how and evidence, ensure convergence of measures, etc.). A coordinated, multi-agency response foreseen the inclusion of the UK Local Resilience Forums (LRF): these are institutionalised response partnerships of local public services – including emergency services, local authorities, the National Health Service, the Environment Agency and others. So the plan both supports and relies on local to regional agents, notably the LRF but also Local Health Resilience Partnerships, public health directors as local agenda-setters, or Local Health and Wellbeing Boards. This ensures swift and locally adequate response and cooperation among responders of administratively distinct forces.

- *Sweden – Stockholm County regional plan about Health Effects of Climate Change.* Four main factors have contributed to the success of the regional plan «Health Effects of Climate Change: risks and actions in Stockholm County». Firstly, the plan clearly defines management responsibilities, recognising that leadership and management structures are important for the effective coordination of climate adaptation work. Secondly, support mechanisms are in place across multiple levels of governance: the plan highlights the coordinating role of the regional government in regional climate adaptation work and supports local authorities and other stakeholders to facilitate planning and implementation of appropriate measures. Third, the plan recognises the need for additional measures for vulnerable areas and social groups, and proposes focused measures for this purpose. Last but not least, the plan was developed with a view to raise awareness and thereby facilitate better individual preparedness.

4 BEST PRACTICES EXCHANGE

The following boxes summarise the experiences of Catalonia Region Climate Change Office (Spain), Environmental Protection Agency of the Baden-Württemberg Federal State (Germany) and County of Kronoberg (Sweden), all three having participated to the workshop that took place in Milan.

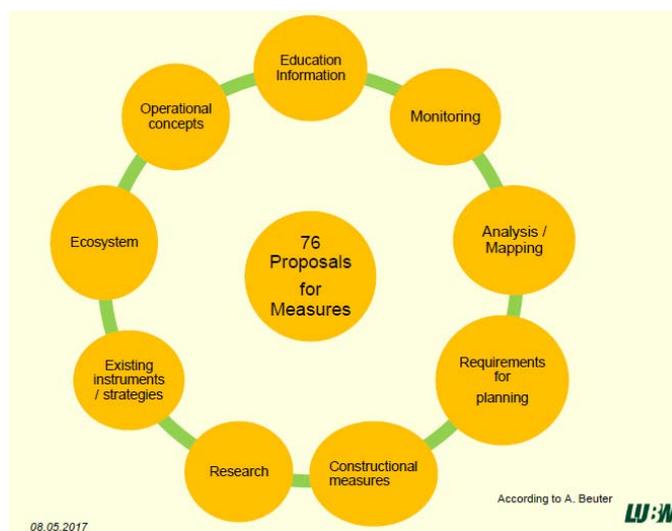
Baden-Württemberg Federal State

Political frame

Following the German federal adaptation strategy (2008) and the adaptation action plan (2011), Baden Wurttemberg published, in 2013, the Act of encouragement climate protection, followed by the Integrated energy and climate protection concept (2014) and the Adaptation strategy (2015).

Process and structure

The development of the regional Adaptation Strategy has been a rather well structured process, following formal requirements and making available to decision makers methodological guidelines. It started in 2011 with an analysis about climate change scenarios (2021-2050 and 2071-2100) followed by vulnerability studies related to 8 different fields disaggregated into the different rural and urban districts of the region. Each vulnerability study was reviewed by the Adaptation Working Group (>30 sessions). Following these vulnerability studies, having a focus on the four dimensions more interested by the urban and regional planning - human, economy, infrastructure, green areas - recommendation on more than 250 measures were proposed. Then, 10 priority measures per field were selected, 76 in total. Being Adaptation not a high priority issue, it has been difficult to set a time line for the implementation of these priority measures, with a dedicated budget.



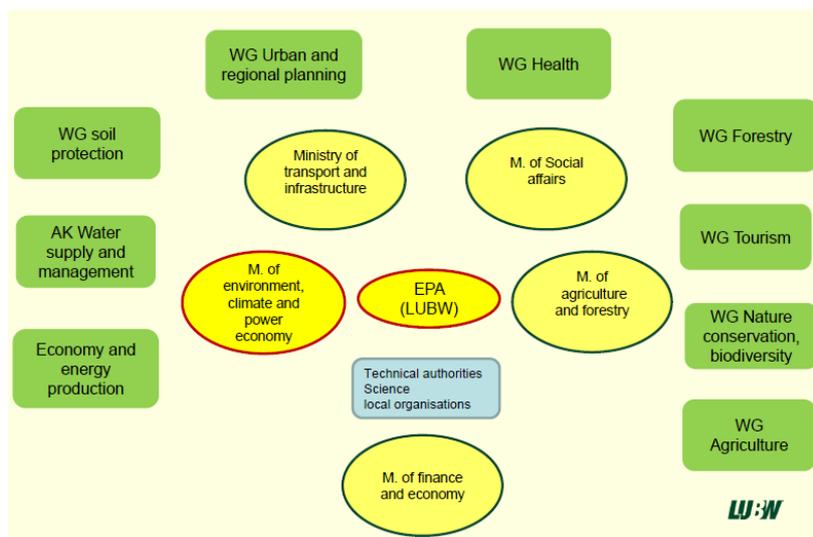
Monitoring

In July 2017 the first monitoring report on climate change and adaptation is expected (based on 43 indicators). The second one will be in 2019. A new support program for adaptation measures regarding the needs of municipality and enterprises (KLIMOPASS) has been foreseen too.

Governance

Cross sectorial participation and stakeholder involvement have been a key aspect of the process which allowed to prioritize adaptation measures according to technical and political considerations. The organization of cross-section workshops has been very important to anticipate future possible conflicts, trying to get a shared solution, even if the heterogeneity of previous knowledge and various mindsets made this rather difficult.

The first draft of the adaptation strategy was subjected to an internet based public participation procedure and to the hearing of stakeholders. The public opinion poll about climate change and adaptation collected 361 feedbacks, showing a general lack of awareness about this issue in the society.



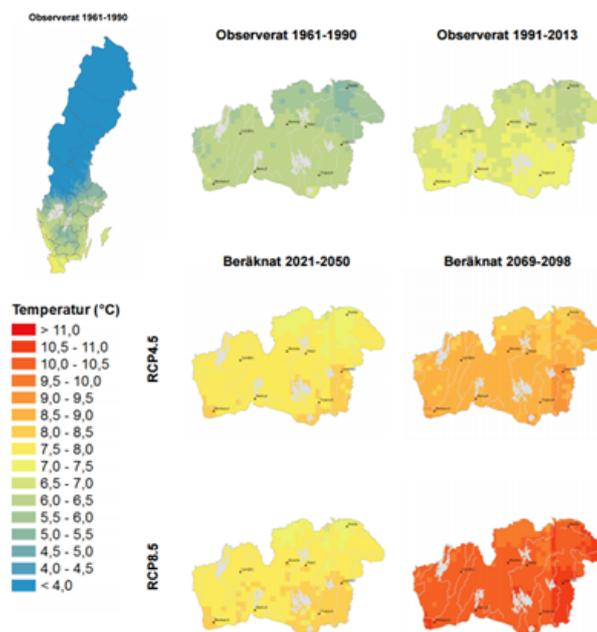
For more information: <https://um.baden-wuerttemberg.de/en/topics/climate-protection/>

Political frame

In Sweden a national adaptation plan is still missing, but 21 regional action plans has been implemented by Counties. Spatial planning still remains a “monopoly” of municipalities and the County Administrative Board has the only power to check if the municipal planning is complying with law and national interests.

Process and structure

Regional plans rely on the identification of the main vulnerabilities, based on climate projections in the 21 Counties made by the national agency, in particular the ones related to flooding, lack of drinking water, heat waves and storms. The target setting process in Kronoberg mostly concentrated on water management, related both to spatial planning (risk of floods vs value of building close to water, need of more space for water etc.) and stormwater management (surface runoff and allocation of costs between municipalities, land owners and insurances).



At municipal level, adaptation strategies do not follow a common approach. For example Växjö, having signed the Covenant of Mayors for Climate and Energy, has implemented a comprehensive local adaptation strategy while Alvesta, on the other hand, has relied more on the mainstreaming of adaptation measures in spatial planning and relevant strategic documents.

Monitoring

A structured monitoring system still need to be developed. The idea is to have a comprehensive approach based on polls, the monitoring of spatial planning and green infrastructure measures, the use of a climate change indicator system, and the cooperation with insurance companies for getting

Kronoberg County

further information and datasets.

Governance

The County Administrative Board has the role to coordinate both the municipalities and other regional actors. It also has a communication role with national agencies and the national center for climate change adaptation information. The involvement of citizens has not been too much developed at the County level, because it tends to be more effective at the municipal level.

For more information: <http://www.lansstyrelsen.se/Kronoberg/En/miljo-och-klimat/klimat-och-energi/Pages/default.aspx>

Catalonia Region

Political frame

In late 2006 the Government of Catalonia set up two formal instruments to address climate change in Catalonia: the Catalan Office for Climate Change and the Intergovernmental Commission on Climate Change. After six years, in 2012, the Catalan Strategy for adapting to climate change 2013-2020 was adopted. A Part of the strategy implementation is being pursued through the development of specific projects, some of them co-financed by the EU Commission: LIFE MEDACC - forest, agriculture and water (2013); LIFE ADMICLIM - tourism, agriculture, water, fisheries (2015); LIFE CLINOMICS - tourism, agriculture, forest (2016).

Together with these programmes, the Government of Catalonia in 2013 decided to start the elaboration of a Climate Change Bill (approved by the Government in 2015), an initiative aiming to boost a political and social debate in the Catalan society in order to make the Catalan climate action stronger to face future challenges. One of the objective of the adaptation Climate Change Bill is the incorporation of the analysis of the resilience to climate change in the sectorial planning.

Process and structure

The Strategy identifies two most critical areas (the Pyrenees mountain region and Ebro's Delta) and foreseen 182 measures, divided into three different groups: Natural systems (agriculture and livestock, biodiversity, water management and forest management), Socioeconomic sectors (energy, fisheries, health, industry, services and trade, mobility, infrastructure, tourism, town planning and housing) and Generic measures related to cross-cutting natural systems and socioeconomic sectors.

Monitoring

A first assessment of the Catalan Strategy for adapting to climate change was done in 2016, together with the 3rd report on Climate Change in Catalonia. The assessment has been published on the web and uses a lot of infographic tools in order to be as much communicative as possible.

It is foreseen that a report will be presented in the Parliament every three years, with two

differentiated parts: one made by the government and the other one by an independent committee.

Forest management

Impacts of climate change

December 2016
ESCACC 2013-2020

Current situation

- 64% of Catalonia is under forest
- 73% of forested land is privately owned and 27% is public land
- Highly atomized private ownership: 52% of holdings are <1 ha

Forested area (ha)

- Dense forest (58.63%) ■ Scrubland (25.64%)
- Meadows and grassland (7.82%)
- Low-density forest (4.15%)
- Unproductive (3.77%)

Climate impacts affecting the sector

Rising temperatures

Drought

Impacts on the sector

Increased risk of forest fires

Declining forest health

Change from CO2 sinks to carbon dioxide emitters

Changes in the phenology and composition of communities

Increased damage due by insects and pathogens

Some humid forests in the north of the peninsula have seen a reduction of up to 50% in their growth rate

Holm oak may be replaced by taller shrub-like species, resulting in forests with less ability to sequester carbon dioxide from the atmosphere

Water management

Monitoring and evaluation of adaptive measures

December 2016
ESCACC 2013-2020

Monitoring of measures

Generate and transfer knowledge

Started (66.67%) Not started (33.33%)

Increase adaptive capacity

Started (78.57%) Not started (21.43%)

Good action for adaptation

Resiliència de les dades dels domèstics

The evolution of domestic water consumption shows a steady drop over the past ten years, with an accumulated drop of more than 15% compared to historic peaks

Evaluation of measures

Generate and transfer knowledge

Despite the increased availability of simulation tools and indicators, insufficient progress has been made in the evaluation of the vulnerability of water bodies in terms of quality

Increase adaptive capacity

The ACA has pushed for the new planning cycle to be a lever for transforming the system toward adaptation to climate change

Governance

The private sector awareness and action are generally low. In order to improve this aspect, the Climate Bill foreseen the creation of the Climate change council, a new body that will be both in charge of proposals for CC policies (on mitigation and adaptation) and will enhance “public participation, information and consultation”.

In 2013 and 2014, the Catalan government subsidized local authorities with grants for drafting local Adaptation Plans (about € 60.000) implementing the strategy, but then realized that a better support to local authorities could have been done supplying them with tools increasing their building capacity, like a study of vulnerabilities providing common information such as: projected increases of temperature in summer, ratio of parkland area of the town with respect to urban land, water consumption per day.

For more information: <http://canvclimatic.gencat.cat/en/index.html>

ACTION A2

50

The following box summarises the experience of Malta acquired during the bilateral meeting that took place in Malta.

Malta

In May 2012, the Ministry for Resources and Rural Affairs published the National Strategy for Climate Change and Adaptation.

The National Adaptation Strategy adopts a holistic approach to Climate Change Adaptation in Malta, identifying climate change impacts with particular reference to health and socio-economic policy, water and flooding as well as biodiversity, agriculture and fisheries. The Strategy also provides a recommendation of emergency plans and the circumstances under which they should be formed in high-probability, high-consequence risk areas. Moreover, timely adaptation action will help in reducing the costs and disruptions likely to emanate from adverse climate change conditions, as well as necessarily altering behavioural patterns and enabling better planning and decision-making.

Within the framework of the Strategy, adaptation measures have been mainstreamed into sectorial projects and plans as the National Flood Relief Project and the Water Catchment Management Plan.

 NFRRP

NATIONAL FLOOD RELIEF PROJECT



The Malta National Flood Relief Project simultaneously addresses both flood relief and water shortage, according to the motto “to manage water away from where it is a hazard to where there is a shortage. This approach to water management is a good example of the integrated thinking which is required to better address climate change risks.

The primary objective of the National Flood Relief project was to address the risk caused by uncontrolled storm water runoff on the population living in urban areas which are at risk of urban flooding, and in so doing, create scope for water conservation.

Specifically the project involved the construction of a network of underground tunnels, canals and bridges to provide an adequate storm water drainage infrastructure for the worst hit areas. The project consisted of a number of components which included the following major interventions designed to withstand future flood events, and the water catchment system planned to connect drainage solutions of adjacent basins together to manage surface runoff:

- The construction of an underground tunnel system to gather storm water runoff emanating from Attard, Naxxar and Mosta which conveys storm water runoff to a sea outlet in Ta' Xbiex.
- The construction of a soakaway reservoir of around 10,000 cubic meters at Gzira, which reservoir shall be used a pilot project to check the quality of water that is collected from urban areas.
- The construction of an underground tunnel system and storm water intercepting culverts aimed at gathering storm water emanating from Rabat and Zebbug so as to divert this water to Wied Qirda and Wied il-Kbir Valley system.

- The construction of two underground water channels and the removal of obstructions within Triq il-Wied in Qormi in order to improve water flow.
- The construction of two large culverts at the intersection of the Wied il-Kbir and Wied is-Sewda valley systems in order to remove any obstructions and improve the flow of water.
- The construction of an underground tunnel systems and storm water intercepting culverts aimed at gathering storm water emanating from the upper areas of Zabbar and lead this storm water to an outflow on the coastline between Xghajra and Marsaskala.

The areas which were targeted by the National Flood Relief Project were considered as top priority areas for flood risk mitigation and the interventions carried out as part of this project were considered to be the most cost effective with regards to the reduction of risk to human beings.

The administrative and technical management of National Flood Relief project and its associated infrastructure is now the responsibility of the Marine, Storm Water and Valley Management Unit within the with Ministry for Transport and Infrastructure. The Marine, Storm Water and Valley Management Unit carries out interventions and provides technical assistance in the construction and repair of storm water relief systems as well as the rehabilitation and conservation of valley systems.

The 1st Flood Risk Management Plan (FRMP) for the Malta Water Catchment District has been integrated within the 2nd "River Basin Management Plan (RBMP). This since the Programme of Measures within the 2nd RBMP includes a suite of measures (both direct and indirect supporting measures) aimed at achieving the objectives of the 1st FRMP. The flood management objectives of the 1st FRMP for the Malta Water Catchment District will seek to:

- develop a modelling framework for the comprehensive assessment of the risk to flooding in all water catchment areas in the Maltese islands;
- focus on the reduction of the likelihood of flooding in catchments identified as being 'at risk' through the adoption of upstream water management measures such as rainwater harvesting and sustainable urban drainage systems;
- introduce water level monitoring facilities in catchments identified as being 'at risk' to optimise the monitoring of flood events.

Through the flood risk management measures identified in the 2nd Water Catchment Management Plan, the development of 1.5 million cubic meters of upstream storage and/or additional infiltration capacity will be sought in order to contribute to the reduction of flood risk.

The Plan, holistic in its approach, addresses all aspects concerning water issues. Additionally, the achievement of the plan's objectives impacts other sectors directly: health, biodiversity, landscape, soil and climate factors.

The objectives related to groundwater include the following:

- preventing deterioration in the status of groundwater bodies;
- protecting, enhancing and restoring of all groundwater bodies;
- prevention of and limitation of the input of pollutants to groundwater;
- reversing any significant upward trend of pollutants in groundwater;

- achievement of good groundwater qualitative and quantitative status by 2015 or in specific circumstances by 2021 and 2027

In order to ensure climate change strategy compliance, the Water Catchment Management Plan measures were subjected to a climate change check. Such a check was performed to identify those measures best suited to strengthen Malta's capacity in adapting to climate change and in identifying those that are be less effective directly in this regard. Consequently, these measures can also be considered as climate change adaptation measures.

For more information: <http://mra.org.mt/climate-change/adaptation-to-climate-change/>

5 ANNEXES

5.1 Questionnaire

<p>a. Region/Province/Metropolitan area</p> <p>Region (NUTS2 level): [Please insert text here.]</p> <p>Country: [Please insert text here.]</p> <p>Province (NUTS3 level): [Please insert text here.]</p> <p>Metropolitan area: [Please insert text here.]</p> <p>Other: please specify: [Please insert text here.]</p>	
<p>b. Contact:</p> <p>Name: [Please insert text here.]</p> <p>Functional title: Higher Executive Officer</p> <p>Institution, department: [Please insert text here.]</p> <p>City/Town: [Please insert text here.]</p> <p>Email address: [Please insert text here.]</p> <p>Phone number: [Please insert text here.]</p> <p>Additional information: [Please insert text here.]</p>	<p>c. Contact 2 (if applicable):</p> <p>Name: [Please insert text here.]</p> <p>Functional title: [Please insert text here.]</p> <p>Institution, department: [Please insert text here.]</p> <p>City/Town: [Please insert text here.]</p> <p>Email address: [Please insert text here.]</p> <p>Phone number: [Please insert text here.]</p> <p>Additional information: [Please insert text here.]</p>

Glossary

Adaptation - Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory, autonomous and planned adaptation (UNFCCC - Glossary of climate change acronyms)

Mitigation - In the context of climate change, a human intervention to reduce the sources or enhance the sinks of greenhouse gases. Examples include using fossil fuels more efficiently for industrial

processes or electricity generation, switching to solar energy or wind power, improving the insulation of buildings, and expanding forests and other "sinks" to remove greater amounts of carbon dioxide from the atmosphere. (UNFCCC - Glossary of climate change acronyms)

Adaptation mainstreaming - The iterative process of integrating adaptation considerations into policy-making, budgeting and implementation processes at national, sector and subnational levels. It is a multi-year, multi-stakeholder effort that entails working with government actors (head of state's office, environment, finance and planning bodies, sector and subnational bodies, political parties and parliament, national statistics office and judicial system), non-governmental actors (civil society, academia, business and industry, general public and communities, and the media) and development actors (2011, UNEP - Mainstreaming Climate Change Adaptation into Development Planning: A Guide for Practitioners).

A) SETTING THE ADAPTATION STRATEGY

1) State of completion of the National Adaptation Strategy

- Finalised strategy document approved (please indicate the year)
- First implementation steps taken
- Comprehensive implementation steps taken

2) Does the National Adaptation Strategy enhance the creation of local or regional adaptation strategies?

- Yes, it mandates (please indicate if at regional and/or local level)
- Yes, it encourages (please indicate if at regional and/or local level)
- No

3) What is the territorial level of the Adaptation Strategy you are referring to?

- Regional
- Local

4) State of completion of the Adaptation Strategy

- Ongoing strategy document
(please step to question 6)
- Finalised strategy document approved (please indicate the year)
- (please step to question 5)
- First implementation steps taken
(please step to question 5)
- Comprehensive implementation steps
(please step to question 5)

5) How long did it take to develop the Adaptation Strategy?

- < 1 year
- > 1 year; < 2 years
- > 2 years

6) Is the Adaptation Strategy:

- An “independent” strategy document which is not a part of other ones
(please step to question 8)
- A part of a broader strategic framework
(please step to question 7)

7) The broader strategic framework including the Adaptation Strategy is:

- Climate Strategy (including also Mitigation strategy other than Adaptation)
- Resilience or Sustainable Development Strategy (considering not only Climate Change but also other shocks and chronic stresses)
- Other (please specify):

8) What are the main Adaptation challenges arising from direct climate change impacts

- River floods
- Sea level rise
- Intense precipitation, drainage and flash flooding
- Drought and water efficiency
- Heat waves / urban heat islands
- Wind/ Storm Damage
- Other (please specify):

9) What are the main Adaptation challenges arising from indirect climate change impacts

- Water quality
- Increased health and disease problems
- Biodiversity loss
- Migration, differential social impacts
- Other (please specify):

10) What are the main themes considered by the Adaptation Strategy?

- Flood and coastal zone management
- Water resources management
- Land use
- Nature and Biodiversity
- Forestry and forest management
- Agriculture

- Fishing
- Energy supply and consumption
- Industry
- Regional/Local economy
- Building sector
- Transport, transport infrastructure
- Tourism and leisure activities
- Human health
- Emergency planning
- Finance and insurance
- Other (please specify):

11) Does the Adaptation Strategy set targets?

- Yes, quantitative targets
- Yes, qualitative targets
- No

12) Does the Adaptation Strategy set targets for specific areas/territories?

- Yes, quantitative
- Yes, qualitative
- No

B) IMPLEMENTING THE ADAPTATION STRATEGY

13) The Adaptation Strategy has been implemented and given operative application through:

- The elaboration of an Adaptation Action Plan
- The elaboration of an Adaptation Action Plan and the mainstreaming into sectoral plans
- The mainstreaming into sectoral plans
- The design of specific measures
- Other (please specify):
- No operative application till now

14) Has the Adaptation Strategy been mainstreamed into sectoral plans related to?

- Flood and landslides risk management
- Water management and protection (surface and groundwater)
- Land use/planning
- Nature and Biodiversity
- Forestry and forest management
- Agriculture
- Fishing

- Energy
- Industry
- Economy
- Building sector
- Transport, transport infrastructure
- Civil protection
- Healthcare
- Tourism
- Other (please specify):

15) When setting priorities on adaptation challenges and individual measures able to face them, which of the following factors were taken into account?

- Perception of urgency (pressing problem, e.g. high flood vulnerability)
- Vulnerability assessment
- Available financial, personnel, and other resources
- Synergies with policy objectives other than adaptation
- Acceptance of measures / absence of conflicts and trade-offs
- Community planning process (e.g. Local Agenda 21)
- Based on stakeholder consultation
- Other (please specify):

C) EVALUATION OF THE STRATEGY AND PLANNING PROCESS

16) Has there been a binding political commitment (such as a city or regional council decision) regarding

- The process of developing the strategy (including the allocation of financial and human resources to it)
- The implementation of the strategy (in terms of integrating its objectives and individual measures into the formal administrative governance process)
- An evaluation of the strategy and the related planning documents
- An evaluation and periodic update of the strategy and the related planning documents

17) Which administrative bodies / departments were/are involved in setting the strategy?

- Environment
- Planning
- Energy
- Industry
- Transport
- Health
- Other (please specify):

- Other (please specify):
- Other (please specify):
- Other (please specify):

18) Which administrative bodies / departments were/are involved in implementing and managing the strategy?

- Environment
- Planning
- Energy
- Industry
- Transport
- Health
- Other (please specify):

19) Which stakeholders were/are involved in the strategy setting ?

- Private organisations (e.g. SMEs)
- Research institutions
- NGOs and/or citizens' initiatives
- Governments of neighbouring public administrations (cities / regions)
- Other (please specify):

What was/is the degree and type of their involvement?

- Information (e.g. public relations, press releases, newsletter, interviews)
- Consultation (e.g. public hearings, focus groups, online forum)
- Involvement (e.g. participatory workshops)
- Collaboration (e.g. stakeholder panel input into plans, citizen jury recommendations)
- Empowerment (e.g. joint decisions, co-management and setting of partnerships)

20) Which stakeholders were/are involved in strategy implementation and management?

- Private organisations (e.g. SMEs)
- Research institutions
- NGOs and/or citizens' initiatives
- Governments of neighbouring public administrations (cities / regions)
- Other (please specify):

What was/is the degree and type of their involvement?

- Information (e.g. public relations, press releases, newsletter, interviews)
- Consultation (e.g. public hearings, focus groups, online forum)

- Involvement (e.g. participatory workshops)
- Collaboration (e.g. stakeholder panel input into plans, citizen jury recommendations)
- Empowerment (e.g. joint decisions, co-management and setting of partnerships)

21) Are there monitoring and evaluation instruments envisaged to monitor and evaluate success of the adaptation strategy implementation?

- Qualitative evaluation
- Setting of a list of criteria and indicators linked to the targets
- Elaboration of a specific output reporting criteria and indicators (e.g. report, meeting)
- Other (please specify):
- No

22) Is there a monitoring and evaluation process envisaged to monitor and evaluate success of the adaptation strategy implementation?

- Evaluation repeated at regular intervals
if yes in which:
- Evaluation output designed as basis for review of the plan
- Evaluation output designed as basis for review of the plan and improvement of the strategy

23) What have been the most important challenges?

- Lack of data
- Uncertainty regarding climate predictions at regional and local level
- The complexity of climate change, vulnerability and risk
- Constraints of resources (budget, personnel)
- Lack of political commitment
- Lack of clarity in responsibilities and insufficient administrative structure
- Lack of communication between administrative levels / departments
- Other (please specify):.....

Please briefly explain in which way have they been addressed

.....

24) Please describe the main strengths and weaknesses of the process

.....

25) What are the conditions for a successful replication?

.....

Please indicate the link for download the Adaptation Strategy and/or Plan

.....

Please fill free of sending material regarding the Adaptation Strategy and/or Plan

6 REFERENCES

- (EC, 2013a) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. "An EU Strategy on adaptation to climate change", COM (2013) 216 final. European Commission, Brussels, Belgium.
- (EC, 2013b) Climate change adaptation practice across the EU
- (Milieu&al., 2013) Milieu Ltd and Collingwood Environmental Planning, 2013, Study of Adaptation Activities at Regional Level in the EU. Final Study (for DG Climate Action under Study Contract 071303/2012/639745/SER/CLIMA.C.3).
- (Keskitalo, Juhola, Westerhoff, 2013) Umea university, January 2013, "Connecting multiple levels of governance for adaptation to climate change in advanced industrial states".
- (EEA, 2014) European Environment Agency, 2014, "National adaptation policy processes in European countries - 2014".
- (Van Eerd, Wiering, Dieperink, 2014) Uthrecht Law Review, May 2014, "Exploring the Prospects for Cross-Border Climate Change Adaptation between North Rhine-Westphalia and the Netherlands".
- (FP7 BASE project, 2016) BASE: Bottom-up Climate Adaptation Strategies towards a Sustainable Europe, February 2016, "Adapting to Climate Change: Comparison of Case Studies".
- (ISPRA, 2016) Italian National Institute for Environmental Protection and Research, 2016, "Environmental Data Yearbook (14th edition)".
- (Committee, 2016) European Union - Committee of the Regions, 2016, "Regional and Local Adaptation in the EU since the Adoption of the EU Adaptation Strategy in 2013".

Useful websites:

- European Climate Adaptation Platform (Climate-ADAPT):
<http://climate-adapt.eea.europa.eu/countries-regions/countries/>
- United Nations Framework Convention on Climate Change (UNFCCC):
<http://unfccc.int/2860.php>
<http://www4.unfccc.int/nap/Pages/adaptation-plans-and-strategies.aspx>
- Intergovernmental Panel on Climate Change (IPCC) (WMO / UNEP):
<http://www.ipcc.ch/report/ar5/wg2/>

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

Information on National Adaptation Strategy and Plan across European countries

Country		Information on
Austria	Ministry of Agriculture, Forestry, Environment and Water Management	https://www.bmlfuw.gv.at/english/environment/Climateprotect.html
	Platform on Climate Change Adaptation	http://www.klimawandelanpassung.at/ms/klimawandelanpassung/en/
Belgium		http://www.cnc-nkc.be/sites/default/files/report/file/be_nas_2010_1.pdf
Bulgaria	-	-
Croatia	-	-
Cyprus	-	-
Czech Republic	Ministry of Environment	http://www.mzp.cz/cz/narodni_akcni_plan_zmena_klimatu https://www.mzp.cz/cz/zmena_klimatu_adaptacni_strategie https://www.mzp.cz/C125750E003B698B/en/climate_energy/\$FILE/OEOK-State_Energy_Policy-20160310.pdf
Denmark	Platform on Climate Change Adaptation	http://en.klimatilpasning.dk/media/5322/klimatilpasningsstrategi_uk_web.pdf http://en.klimatilpasning.dk/media/590075/action_plan.pdf
Estonia	Ministry of Environment	http://www.envir.ee/et/eesmargid-tegevused/kliima/kliimamuutustega-kohanemise-arengukava
Finland	Ministry of agriculture and Forestry	http://mmm.fi/documents/1410837/1721050/MMMjulkaisu2005_1a.pdf/63f5d78d-8492-4621-b019-fe38d7aeb709 http://mmm.fi/en/nature-and-climate/climate-change-adaptation
	Platform on Climate Change Adaptation	http://ilmasto-opas.fi/en/
France	Ministère de la Transition écologique et solidaire	http://www.ecologique-solidaire.gouv.fr/adaptation-france-au-changement-climatique
	WIKLIMAT - Plate-forme sûr l'adaptation au changement climatique	http://wiklimat.developpement-durable.gouv.fr/index.php/Wiklimat:Accueil
Germany	Ministry of Environment	http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/das_gesamt_en_bf.pdf
	KomPass- Climate Impacts and Adaptation in Germany	http://www.umweltbundesamt.de/en/topics/climate-energy/climate-change-adaptation/kompass
Greece	Ministry of Environment and Energy	http://www.ypeka.gr/LinkClick.aspx?fileticket=crbjkiclLIA%3d&tabid=303&language=el-GR
Hungary	Klímadialógus	http://klimadialogus.mfgi.hu/hu
Ireland	Department of communications, Climate Action & Environment	http://www.dccae.gov.ie/en-ie/climate-action/topics/adapting-to-climate-change/national-adaptation-framework/Pages/default.aspx
	Climate Ireland	http://www.climateireland.ie/#/
Italy	Ministry of Environment	http://www.minambiente.it/sites/default/files/archivio/allegati/clima/strategia_adattamentoCC.pdf
Latvia	Ministry of Environment	http://www.varam.gov.lv/eng/fondi/EEA_Norv/european_economic_area_financial_mechanism_programme__national_climate_policy/?doc=18233
Lithuania	-	-
Luxembourg	(information founded on UNFCC website)	http://www4.unfccc.int/nap/Documents%20NAP/Adaptation%20Strategies%20and%20Plans/Adaptation%20to%20Climate%20Change%20-%20Spatial%20Planning%20Strategies%20in%20Luxembourg.pdf
Malta	(information founded on UNFCC	http://www4.unfccc.int/nap/Documents%20NAP/Adaptation%20Strategie

CLIMATE CHANGE ADAPTATION PRACTICES ACROSS THE EU

Country		Information on
	<i>website)</i>	s%20and%20Plans/Malta%20National%20Adaptation%20Strategy_2012.pdf
Netherlands	Platform for climate adaptation	http://ruimtelijkeadaptatie.nl/english/nas/
Poland	<i>(information founded on UNFCC website)</i>	http://www4.unfccc.int/nap/Documents%20NAP/Adaptation%20Strategie%20and%20Plans/Polish%20National%20Strategy%20for%20Adaptation%20to%20Climate%20Change%20(NAS%202020).pdf
Portugal	Portuguese Environment Agency (APA)	https://www.apambiente.pt/index.php?ref=16&subref=81&sub2ref=117&sub3ref=1376 https://dre.pt/application/file/69906414 http://servicos-sraa.azores.gov.pt/grastore/SRAM/Resolu%C3%A7ao%20estrat%C3%A9gia%20para%20as%20altera%C3%A7%C3%B5es%20clim%C3%A1ticas.pdf http://clima-madeira.pt/uploads/public/estr_clima_web.pdf
	Portal do clima - Platform for climate change	http://portaldoclima.pt/en/
Romania	Ministry of Environment	http://www.mmediu.ro/beta/wp-content/uploads/2013/10/2013-10-01_SNSC.pdf
Slovakia	Ministry of Environment	http://www.minzp.sk/files/oblasti/politika-zmeny-klimy/nas-sr-2014.pdf
Slovenia	Ministry of Environment	http://www.mop.gov.si/si/delovna_podrocja/podnebne_spremembe/prilaga_gajanje_podnebnim_spremembam/ Slovenian language
Spain	Ministry of agriculture, fishing and Environment	http://www.mapama.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/plan-nacional-adaptacion-cambio-climatico/planificacion_seguinto.aspx http://www.mapama.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/folleto_pnacc_ing_tcm7-197095.pdf http://www.adaptecca.es/
	Platform on Climate Change Adaptation	http://www.adaptecca.es/
Sweden	Government Offices	http://www.regeringen.se/rattsdokument/proposition/2009/03/prop.-200809162/
	Portal for Climate Change Adaptation	http://www.klimatanpassning.se/roller-och-ansvar/vem-har-ansvaret/regionala-handlingsplaner-for-klimatanpassning-1.77455
United Kingdom	UK government and legislation	http://www.legislation.gov.uk/ukpga/2008/27/contents https://www.gov.uk/government/publications/adapting-to-climate-change-national-adaptation-programme
	Welsh government and legislation	http://gov.wales/docs/desh/publications/101006ccstratdeliveryadaptationen.pdf
	Scottish government and legislation	http://www.legislation.gov.uk/asp/2009/12/contents http://www.gov.scot/Resource/0045/00451392.pdf
	North Ireland Department of Agriculture, Environment and Rural Affairs	https://www.daera-ni.gov.uk/sites/default/files/publications/daera/Northern%20Ireland%20Climate%20Change%20Adaptation%20Programme.pdf

Icons (credits):

- "Icons created by Luis Prado, BomSymbols, Christopher Classens, Joao Santos, Marco Hernandez, Fatahillah from the Noun Project" on <https://thenounproject.com/>



MASTER ADAPT

MAInSTreaming Experiences
at Regional and local level
for ADAPTation to climate change



Contribution to the 2014-2020 Operational Program "Regional Development"
with the contribution of the LIFE financial instrument of the European Community

LIFE 2014/2020/2017 - Mainstreaming Experiences at Regional and local level
for Adaptation to climate change - (PFR 1/2014/2017)

Coordinatore



Partners

AMBIENTEITALIA



uniss



1
2
3
4
5
6
7

Regione
Lombarda

Con il contributo di

fondazione
cariplo

